Closure Report
Greyhound Lines, Inc.
Maintenance Center

San Diego, California

Volume I - Technical Report

Prepared for:
Greyhound Lines, Inc.

Prepared by:
ERC Environmental and Energy Services, Co.

February 1990

ERC
Environmental
and Energy
Services Co.

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Prepared for:
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TABLE OF CONTENTS
VOLUME I

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

LIST OF FIGURES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF APPENDICES
VOLUME II

TABLE OF CONTENTS (Continued)

LIST OF APPENDICES
VOLUME II (Continued)

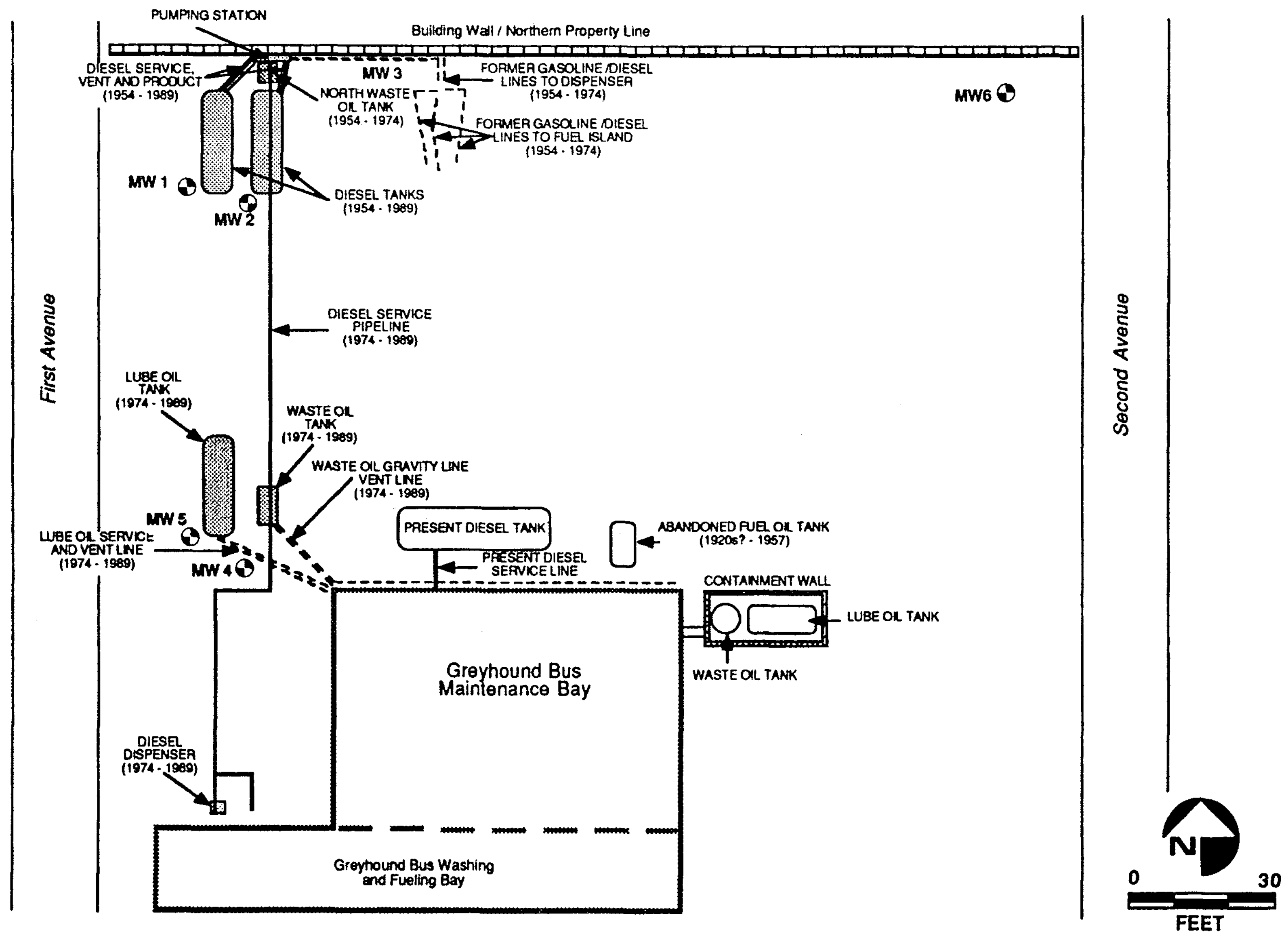
EXECUTIVE SUMMARY

During September, October and November 1989, a tank closure investigation was conducted at the San Diego Greyhound Maintenance Center, 539 First Avenue, San Diego, California. The investigation was conducted by ERC Environmental and Energy Services Co. ("ERCE") for Greyhound Lines, Inc. ("GLI") of Dallas, Texas. The purpose of the investigation was to: (i) remove existing underground storage tanks, (ii) assess any leakage from the tanks, and (iii) evaluate past and present uses on the site for potential contribution to the hydrocarbon plume. The investigation included extensive on-site soil sampling, tank removal and inspection, and analysis of free product samples from six on-site monitoring wells. A map of the project site is presented in Figure ES-1.

1. Underground Tank Removal

    a. Diesel Tanks. Two (2) 10,000-gallon diesel tanks were removed from the northwest corner of the site. These tanks were used to store gasoline (1954-1967), diesel #1-D (1967-1974) and diesel #2-D (1974-1989). Both tanks proved to be in good condition. There were no signs of leakage from either tank. Nevertheless, there was evidence of soil contamination near the southern end of the tanks. The contamination was suggestive of diesel #1-D and diesel #2-D. The soils were contaminated to a depth of 12 feet bgs (below ground surface). Since the worst contamination was located beneath the fill port of the easterly tank, it is most likely that the contamination resulted from above-ground overfill/spillage of diesel products. All contaminated soils associated with the 10,000 gallon tanks have been excavated, and removed from the site.

    b. Waste Oil Tank. A 550-gallon waste oil tank was removed from the northwest corner of the site. The tank was in good condition. There was no evidence of leakage. The investigation revealed evidence of soil contamination near the northern portion of the tank. Contaminants were suggestive of diesel #1-D, diesel #2-D and waste oil. It is likely that the contamination resulted from overfill/spillage of waste oil, and from minor seepage of diesel products at the pumping station. All contaminated soils associated with the 550-gallon waste oil tank have been excavated, and removed from the site.



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Underground Tanks and Associated Structures Removed in September 1989, and Present System

FIGURE ES-1

c. Lube Oil and Waste Oil Tanks. An 8,000-gallon lube oil tank and a 550-gallon waste oil tank were removed from the west-central area of the site. Both tanks were in good condition. There was no evidence of leakage. Slight amounts of soil contamination were discovered above the tanks. It is believed that the contamination soil resulted from overfill/spillage of lube oils and/or waste oils. All contaminated soils associated with the 8,000-gallon lube oil tank and the 550-gallon waste oil tank have been excavated, and removed from the site.

d. Heating Oil Tank. An undocumented (abandoned) heating oil tank was removed from the east-central portion of the site. It is believed this tank was utilized to store heating oil for a lumber yard which was previously located on the property. The tank was filled with cement and dirt. The tank was corroded in many areas, but it appeared to have sound structural integrity. Soils surrounding the tank were not contaminated, except for minor leakage which occurred during removal of the tank. All contaminated soils have been excavated, and removed from the site.

2. Fuel Pipelines

a. New Fuel Line. The diesel fiberglass pipeline from the pumping station to the fuel dispenser near the southwest portion of the site was uncovered and inspected. The pipeline was in very good condition. There were no signs of leakage. Slight soil contamination was present directly beneath the pipeline. It is likely that the soil contamination resulted from migration from overfill/spillage at the 10,000-gallon tanks. All contaminated soils have been excavated, and removed from the site.

b. Service Lines. Certain lube oil and waste oil lines near the northeast corner of the maintenance building were removed and inspected. All lines were found to be in good condition. Very small amounts of contamination were discovered beneath both lines. It is likely that the contamination resulted from overfill/spillage at the fill ports of the lube oil and waste oil tanks. All contaminated soils have been excavated, and removed from the site.

3. Fuel Dispensers

a. New Dispenser. Elevated levels of contamination were found beneath the fuel dispenser at the southwest corner of the site. Soil contamination constituents were suggestive of diesel #2-D. It is likely that the soil contamination was caused by seepage from a filter coupling. Excavation was conducted in an area of 10 x 14 feet, at a depth of 12 feet bgs. Contamination levels were very inconsistent. All contaminated soils to the north and east were removed. Excavation to the south and west was discontinued due to proximity of buildings and utility lines and a currently unknown volume of contaminated soils are still present in these areas. The depth of the contaminated soils suggest that a potential for contaminant impact to the underlying ground-water system may exist in this area.

b. Old Dispenser. Prior to 1974, gasoline and diesel #1-D was dispensed from a pump station located at the north-central portion of the site. The wall-mounted fuel dispenser was probably removed at the time of demolition of the service bay. Existing pipelines were abandoned in place, and display varying degrees of corrosion. Excavation was conducted in an area 20 x 64 feet, at a depth of 17 feet bgs. Contaminated soils beneath the abandoned pipelines contained constituents suggestive of gasoline and diesel #1-D. Soil samples were taken at 1.5 feet, 2.5 feet, 5 feet, 8 feet, 13 feet, 15 feet and 17 feet. Soil contamination was identified from ground surface to a depth of 17 feet. The potential exists that impacts to the underlying ground-water system may have occurred in this area.

4. Hydrocarbon Plume

Samples from monitor wells MW1-MW5 were light yellow in color with chromatograms resembling diesel #1-D. This finding was consistent with the Klienfelder report dated December, 1988. However, samples from monitor well MW6 in the northeast corner of the site was dark amber in color with chromatograms resembling diesel #1-D and gasoline. Thus, the possibility exists that new constituents (gasoline) have migrated onto the GLI property within the past year.

SECTION 1
INTRODUCTION

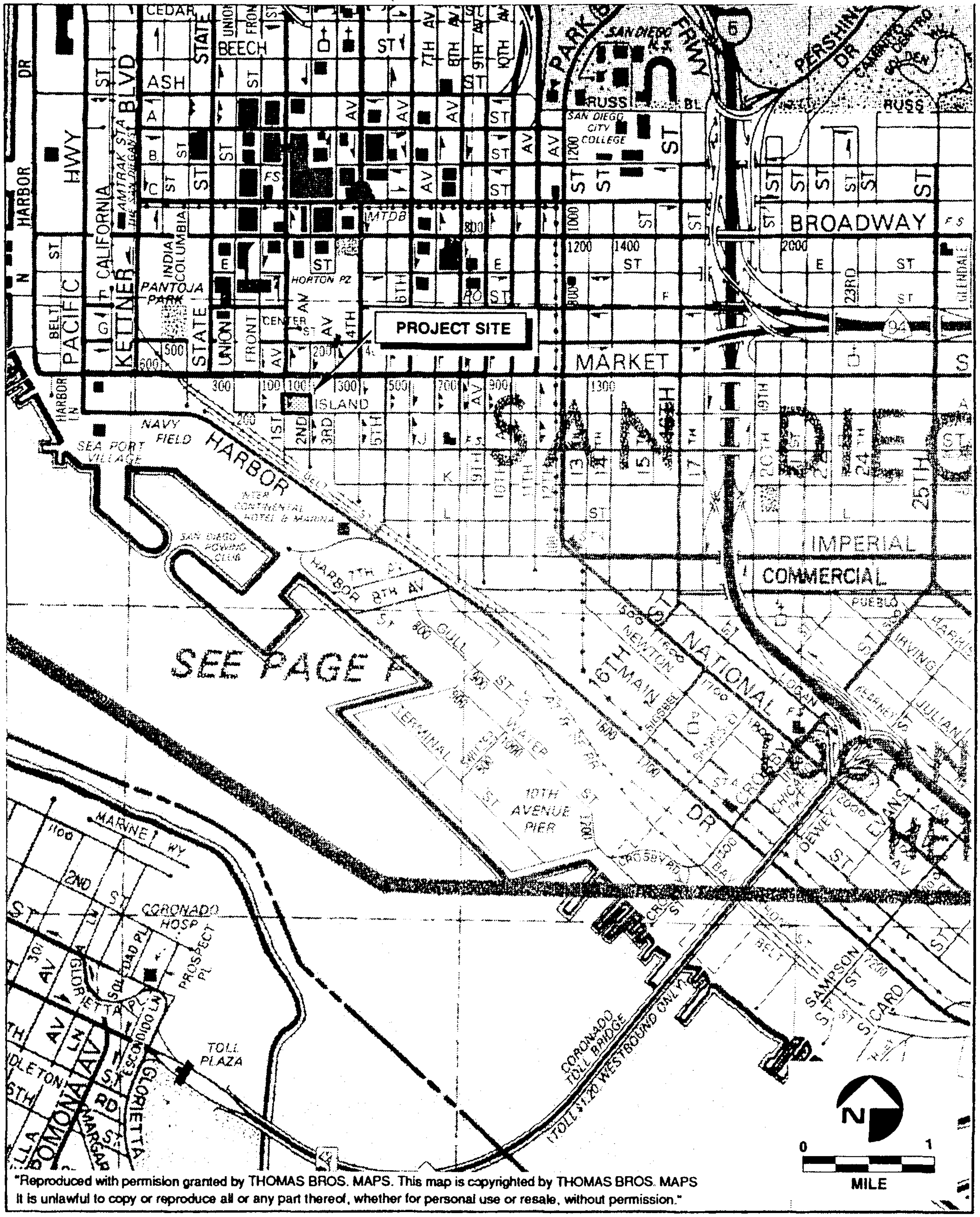
This Closure Report documents the removal of underground tanks and service lines supervised by ERC Environmental and Energy Services Company (ERCE) at the Greyhound Lines, Inc. (GLI) Maintenance Center located at 539 First Avenue, San Diego, California (Figure 1-1). The report discusses the results of previous subsurface investigations, and provides information on site background, regulatory action, local geology and hydrogeology, and the chronology of events. The Closure Report also documents the contaminants and contaminant concentrations found in the soils near the tanks and ancillary structures, and contrasts these with background contaminants and contaminant concentrations prevalent in the soils and free product beneath the site.

1.1 INITIATION OF TANK CLOSURE

On May 19, 1989, the California Regional Water Quality Control Board San Diego Region (RWQCB) issued a Cleanup and Abatement Order, No. 89-49, to GLI as a result of the presence of hydrocarbons in the soil and ground water beneath the site. The order directed GLI to remove free product from the water-table and to clean up soil and ground-water contamination associated with the hydrocarbon contamination. GLI felt that there was no indication that a loss had occurred from their underground storage tanks as evidenced by inventory records, tank tests, and tracer tests. For this reason, GLI responded to the Cleanup and Abatement Order by contracting ERCE to supervise the closure of the five known underground tanks on the property in order to determine if GLI was a contributor to the existing free product plume beneath the site.

1.2 SCOPE

As specified in GLI's "Preparation of Closure Report-Consulting Engineers Scope of Work", ERCE was retained to prepare an Underground Storage Tank (UST) System Plan of Closure, review the reports prepared for GLI by Applied GeoSystems and Kleinfelder Inc. (Kleinfelder), provide onsite coordination and inspection of the tank closure project, and prepare a Closure Report. The onsite effort included:



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Site Location Map

FIGURE 1-1

- Screening of soil samples;
- Collection and analyses of selected soil samples from all areas of detected spills and leaks;
- Collection and analyses of a free product sample from the six existing monitor wells on-site;
- Conduct of internal and external visual inspection of the tanks and piping systems; and
- Photographic documentation of the external and internal condition of the tanks and piping systems.

1.3 Preliminary Reports

Prior to the initiation of site activities, a Closure Plan (Appendix A) was prepared to detail the work tasks associated with the excavation, removal, and disposal of the five USTs, together with associated piping and conduits. Concurrently, a Health and Safety Plan was prepared to address the onsite activities (Appendix B).

SECTION 2
BACKGROUND

2.1 SITE DESCRIPTION

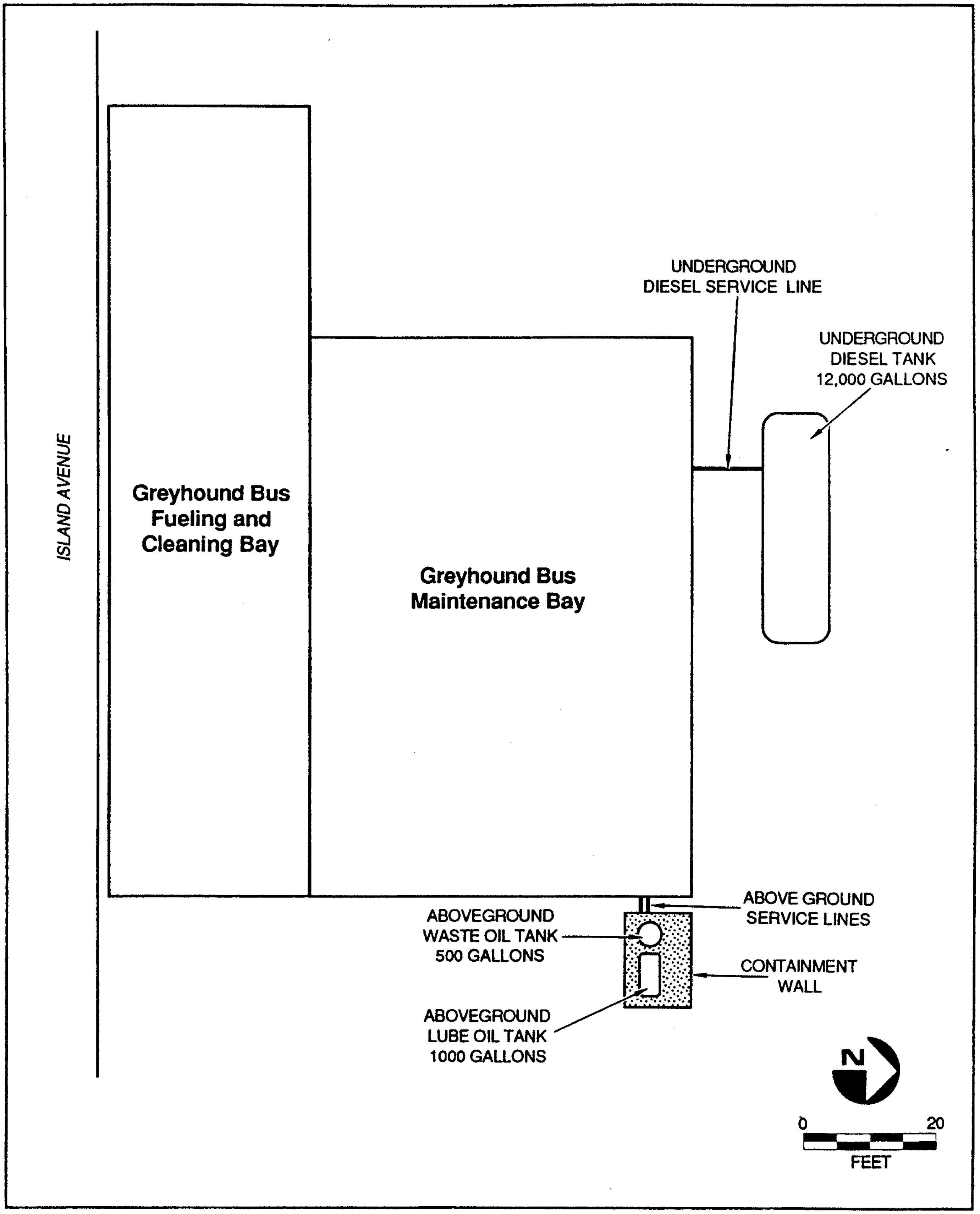
GLI owns and operates a bus maintenance facility at 539 First Avenue, San Diego. There is currently one building structure onsite. This building houses a bus servicing area, a wash bay, a refueling station, and office space. The service building is situated on the southwestern portion of the site as shown on Figure 2-1. The remainder of the site is paved with concrete and used for bus parking.

In conjunction with the service operations of GLI, a new fuel tank and associated ancillary equipment are located adjacent to the building on the north and east as depicted in Figure 2-1. The fuel tank has a 12,000-gallon capacity and is a double walled PLASTEEL composite construction. A cathodic protection and secondary leak detection system was installed with the new equipment. The new fuel service line is situated aboveground except where it connects to the underground tank. There is also a new turbine pump and fuel dispenser to accommodate the product distribution. To the east of the service building are two new aboveground oil tanks, one lube oil, and one waste oil. All new tank systems have been constructed and installed in accordance with federal, state, and local UST regulations.

2.2 CURRENT VICINITY DESCRIPTION

The site is located in an area of San Diego currently under renovation by the Centre City Development Corporation (CCDC). The area was predominantly commercial and industrial in the past, but CCDC 's current development objectives are commercially and residentially oriented.

There are two businesses adjacent to the site on the north. On the northwest side there is Ray Dobson Welding and Heli-Arc Shop. On the northeast is Don's Automotive Center, formerly a gasoline service station. There are no other businesses located on the block which GLI occupies.



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Present Storage Tank System

FIGURE 2-1

2.3 RECENT HISTORICAL DESCRIPTION

GLI has occupied the site since 1953. Prior to the construction of the existing service building in 1974, there existed a busport maintenance area on the northeastern portion of the site. This structure was constructed in 1954 and served the same purposes as the current building. Figure 2-2 presents a photograph of the former structure.

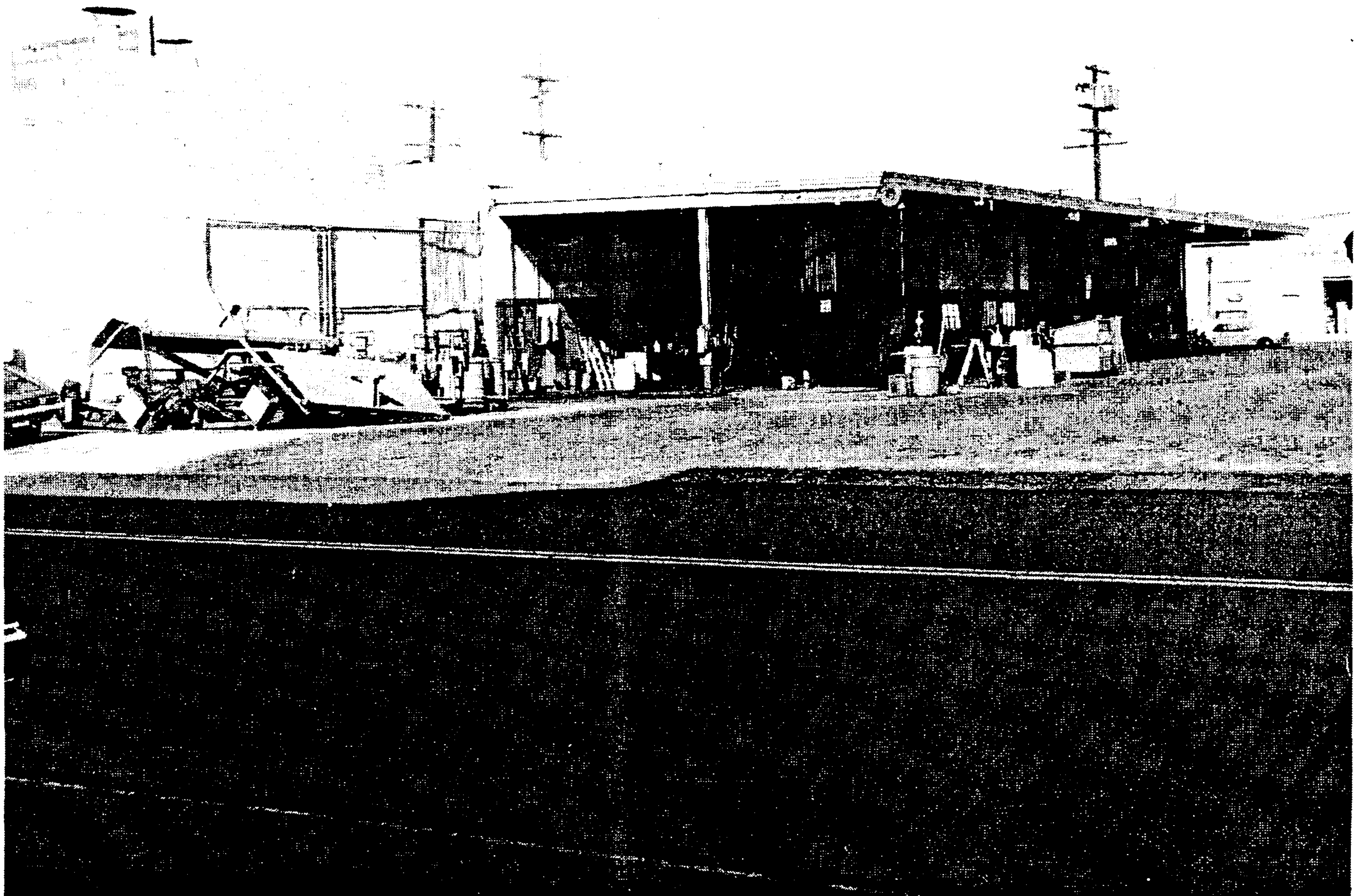
Some old site photographs were supplied to ERCE by GLI. A fueling island is shown to have existed in the north/central portion of the lot near the busport. The fueling island appeared to be supplied by a pumping station to the west. It is believed that product was pumped in an aboveground product line from the pumping station, along the northern wall, to a support column of the busport structure. It is believed that approximately 40 feet of fuel line was located underground beneath the old busport.

An investigation was conducted by ERCE inspectors to attempt to locate evidence of the old structures using the photographs as a guide. A number of old structures could be identified following this search and are depicted on Figure 2-3.

In conjunction with its service facility, GLI operated five underground storage tanks on the property. Two, 10,000-gallon fuel tanks existed on the northwestern portion of the site, with one 550-gallon abandoned waste oil tank approximately 3 feet north of the eastern tank. One 550-gallon waste oil tank, and one 8,000-gallon virgin lube oil tank, existed at the central western portion of the site. Tank locations are shown on Figure 2-4.

The 10,000-gallon fuel tanks reportedly contained leaded gasoline from installation, approximately 1954, to 1967, diesel #1-D from 1967-1973, and diesel #2-D from 1974 to the present. Prior to 1974, fuel was dispensed from lines which ran east from the pumping station and then south to the fuel dispenser (Figure 2-3). A fuel service line leading from the pumping station to a new dispenser was installed when the new maintenance building was constructed in 1974. The location of the new fuel line and dispenser location are depicted in Figure 2-4.

In 1974, the waste oil tank in the area of the diesel tanks was abandoned in favor of a new waste oil system plumbed into the new service building. The contents of the old tank were pumped out prior to its abandonment.



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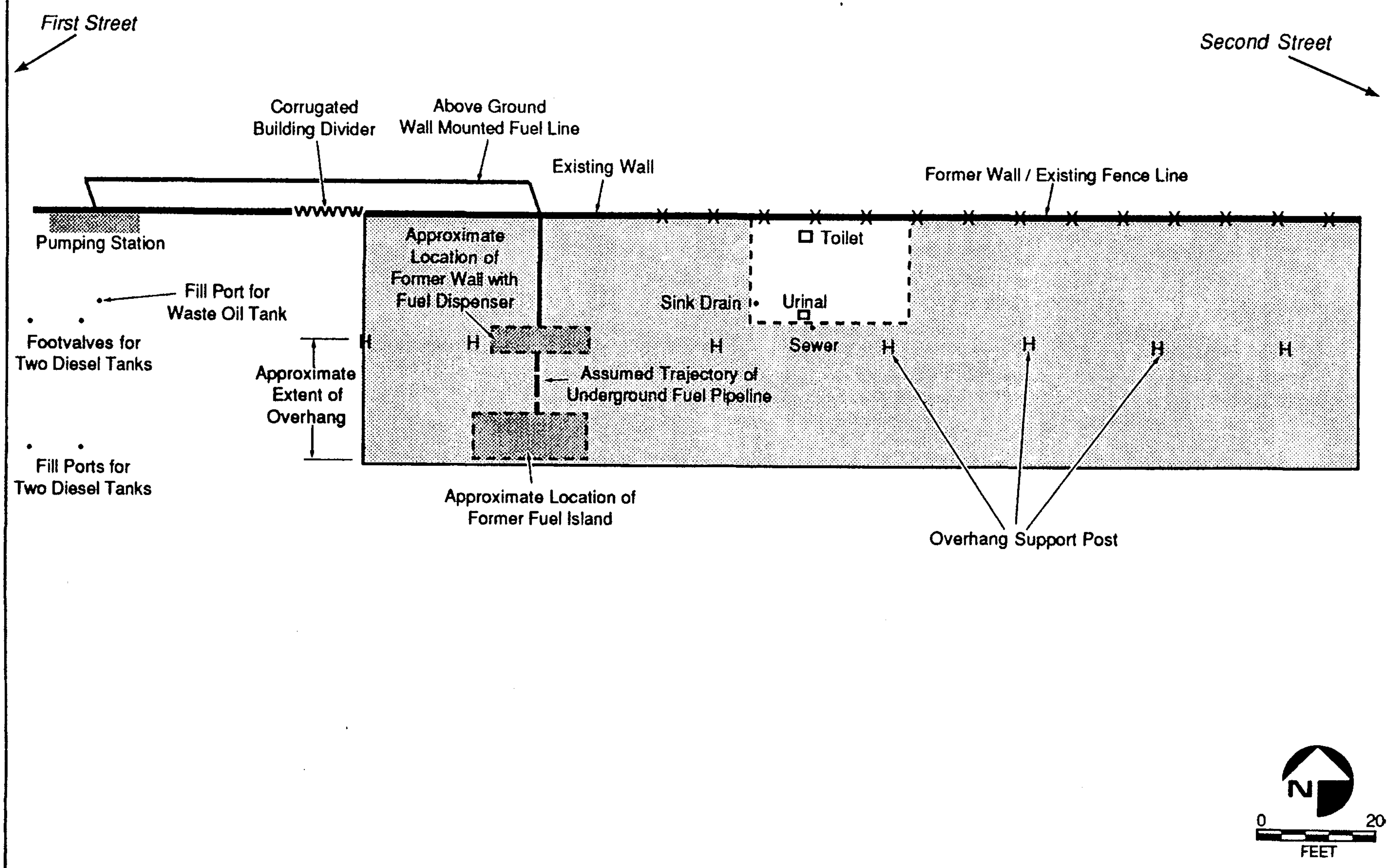
Former GLI Service Building Until 1973

FIGURE 2-2



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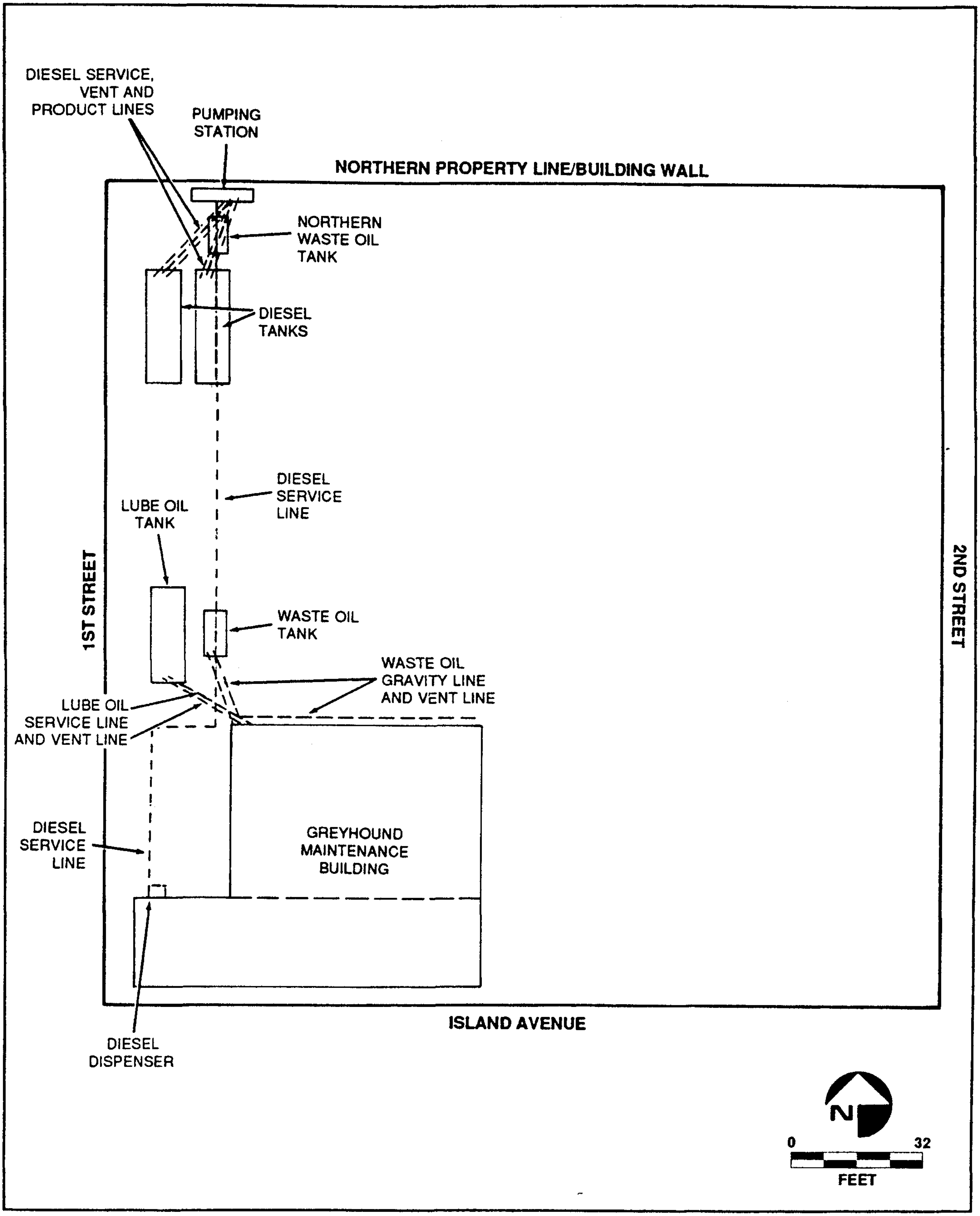
Facility Layout of Former GLI Maintenance Bay
1954 -1974

FIGURE
2-3



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Facility Layout - 1974 to September 1989

FIGURE 2-4

The 8,000-gallon virgin oil tank and 550-gallon waste oil tank were installed to service the present maintenance facility. The waste oil tank was supplied from a gravity line attached to a sump inside of the maintenance building. The virgin lube oil tank was a suction pump-activated system which serviced the facility.

2.4 Historic Site and Vicinity Description

This area of San Diego has been developed for over 100 years. Much of the development and industry for the region was centered in this part of the city. It is likely that some, if not most, of the historic property uses are obscure as regulation and reporting was not as complete historically as it is today. Following are some of the known historic uses for the block.

A Sanborn Fire Insurance Map of 1888 (Appendix C) shows the southern two thirds of the block being occupied by H. A. Perry Enterprise, a planing mill and general lumber company. The lumber operations also occupied portions of the blocks to the south and west. On the adjacent corner northwest of the site was Fashion Livery and Corral. The northern third of the Site block is unoccupied according to the map, as are the lots to the east.

A 1921 Sanborn Map (Appendix C) shows lumber activities still ongoing within the site block. On the site, there was a planing mill, lumber shed, sash and door factory, glue pot, and steam dry kiln. The steam kiln was located along what is now the northern property line of GLI.

The 1921 map also indicates that the Union Ice Company had replaced the livery and corral. The ice house was powered by steam and fuel oil. The size and location of fuel storage tanks is unknown. There may have been a central generator of steam for the area. Lots to the south of the site continued to be involved in lumber activities. Lots to the east of the site were mostly unoccupied, with the exception of a note indicating that some Chinese businesses may have been present.

Information gained from the San Diego City and County Directory (SDCCD) indicates that Dobson Brothers Blacksmiths existed to the north of the project site on the same block in 1926. Next to the blacksmiths on the east was R. Johnson's boiler works. There is no mention in this directory as to the state of the lumber company previously existing on the site. It may be unlisted, or out of business at this time.

The 1929 SDCCD indicates that the blacksmiths were still in business to the north of the site. The boiler maker company had changed names to H. K. Schockley. Now listed on the northeast corner of the block was W. Huisvel and Sons Tires.

Information for the years 1934 through 1939 indicates that the blacksmith and boilermaker (tank manufacturer) were still in business. There was a gasoline service station located at the northeast corner of the block. A radiator repair business was associated with the gas station. The gas station was at 145 Market Street and remained there under changing ownership until 1974, when the property was listed as vacant (R.L. Polk). Throughout its history, the gas station seemed to have secondary automotive and metal works associated with it. The size and location of fuel storage tanks is unknown.

2.5 HISTORIC TANK PERMITTING IN THE VICINITY

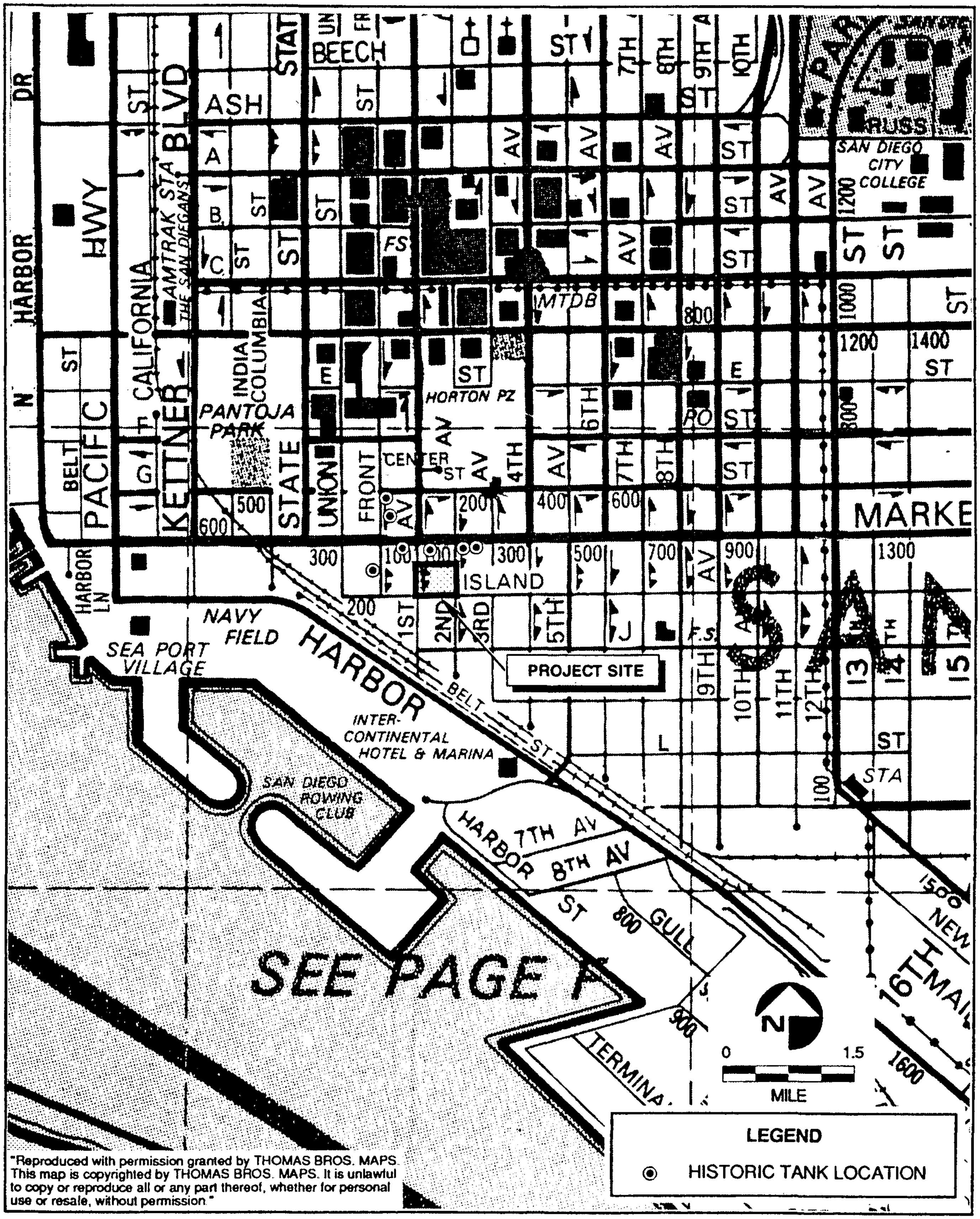
A search of the underground storage tank records of the San Diego Fire Department has uncovered a number of tank records in the vicinity of GLI. The Fire Department has the most complete historic records on tanks in the area; however, information is thought to be incomplete. A chronologic listing of permits found within a nine block circumference of the site and the location of these sites is presented below and on Figure 2-5. Some of the older permits are partially illegible, therefore some information is speculative.

- June 10, 1930. Permit issued to Union Ice Company, 541 Front St.,for one 1,000-gallon, 12-gauge steel, pump-operated, gasoline tank.

- May 2, 1931. Permit issued to West Coast Spring Company, 656 Front St., for one 250-gallon, 14 gauge, pump-operated, distillate tank.

- September 28, 1942. Permit issued to Dobson Brothers, 127 Market St., for one 280-gallon, Underwriter's Approved, pump-operated gasoline tank.

- April 24, 1946. Permit issued to Union Oil Company, 201 Market St., for 8 underground storage tanks. One 10,000-gallon, three 2,000-gallon, four 1,000-gallon capacity tanks, all pump-operated.



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Historic Tank Permit Locations

FIGURE

2-5

- April 4, 1956. Permit issued to Union Oil Company, 235 Market St. One new 2,000-gallon gasoline (?) tank. Four 1,000 gallon and two 550-gallon existing tanks reported. Two 1,000-gallon tanks to be replaced. All tanks assumed to be pump operated.

- January 15, 1960. Permit issued to Tidewater Oil Company, 145 Market St., for two 4,000-gallon and one 280-gallon tank. No notation as to the contents, but assumed to be gasoline and or diesel due to permittee operations.

- August 10, 1984. Permit issued to The Meridian Company Ltd. for one new 1,000-gallon capacity, aboveground, pump-operated, diesel storage tank. The tank was installed in the basement of 700 Front St.

2.6 PREVIOUS INVESTIGATIONS

Two environmental assessments have been conducted onsite prior to the tank closure operation. Applied Geosystems installed and sampled five monitoring wells at the end of 1987 and issued a report in February, 1988. Kleinfelder issued a second environmental assessment in December, 1988 to address issues which were not resolved by the Applied Geosystems report. Kleinfelder installed one additional monitor well onsite and monitored fluid levels in 14 wells on and near the project site. Additionally, Kleinfelder made analytically based comparisons between various hydrocarbon species found on and near the site. Each report is discussed in more detail below.

The work of Applied Geosystems included the installation and soil sampling of five monitor wells on the GLI site. The wells are labeled MW1 through MW5 and are still present. The report indicates that the monitor wells were not developed due to the presence of hydrocarbon contamination floating on the water table. They also reported that static water levels could not be accurately measured due to the thickness of free product on the site.

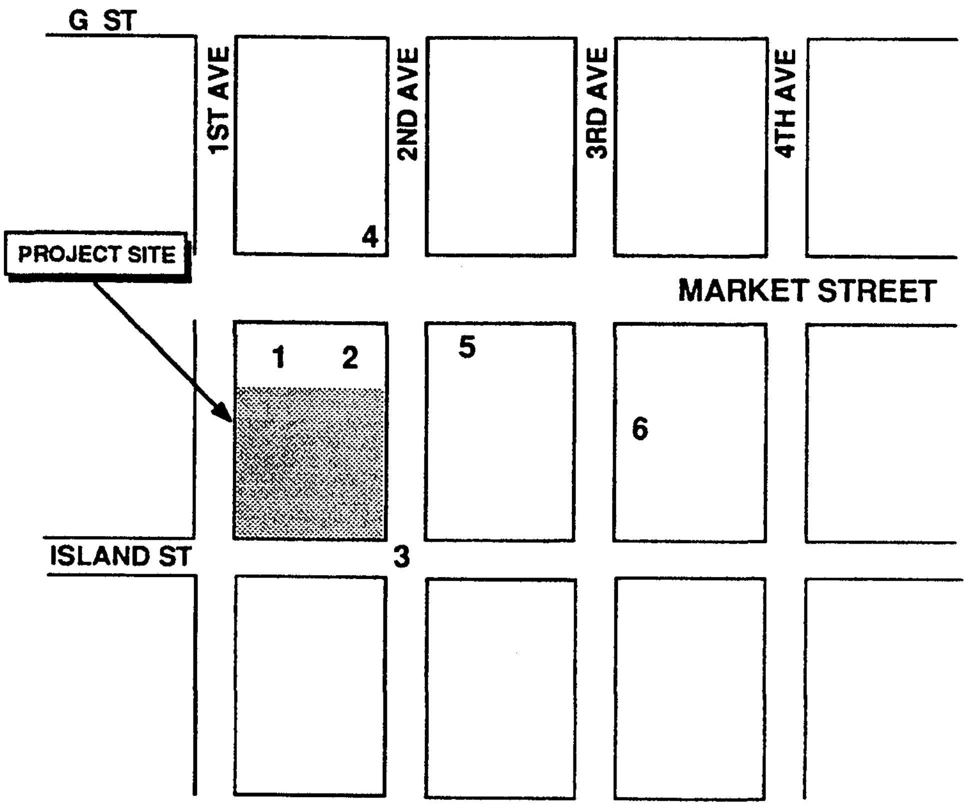
Soil samples were analyzed from depths of 15 to 20 feet below ground surface by Chemical Research Laboratories Inc., in Garden Grove, California. Reported levels of hydrocarbon contamination using EPA Method 418.1 ranged from 15 to 23,000 milligrams per kilogram (mg/kg). Most of the samples analyzed by this method showed soil contamination of over 1,000 mg/kg. Results from the EPA Method 8015 analysis yielded generally low values of contamination, ranging from <1 ppm to 230 mg/kg.

Kleinfelder issued a report in December, 1988 Their work included the installation of one additional monitor well, measuring fluid levels in fourteen monitoring wells on and near the site, and chemically comparing different fuels associated with the site.

The Kleinfelder report identified evidence that Greyhound did not contribute significantly to the free product present on the ground water beneath the site. The diesel #2-D fuel used by GLI since 1974 was not present in substantial levels in any monitor wells on or near the project site. The report indicates that the free product between Second Avenue and Fourth Avenue is predominantly leaded gasoline, and that the product between Second Avenue and Front Street, beneath GLI, is composed of a mid-range fuel in the range of diesel #1-D. Kleinfelder had their analytical laboratories compare the hydrocarbon samples by American Society of Testing Methods (ASTM) and EPA Department of Health Services (DOHS) methods to the fuel currently used at GLI. Kleinfelder stated that there was no evidence that the GLI diesel #2-D served as a source of contamination since diesel #2-D had not been detected in the free product.

During their investigation, Kleinfelder did not obtain soil samples for hydrocarbon analysis. There is, therefore, no further information on the vertical contamination profile onsite.

The Kleinfelder report made reference to an earlier report prepared for the Centre City Development Corporation (CCDC) in 1987, in which six other petroleum fuel sources were named. Figure 2-6 presents the potential sources and exhibits their close proximity to the Greyhound Maintenance property. It is believed that subsurface investigations have not been conducted at all the potential sources. Such studies should occur in an attempt to further understand plume contributors and plume migration.



LEGEND

1 - RAY DOBSON WELDING

2 - DON'S AUTOMOTIVE; PREVIOUSLY A GASOLINE SERVICE STATION

3 - SDG&E UNDERGROUND FUEL OIL PIPELINE

4 - PARKING LOT; PREVIOUSLY A SHELL GASOLINE SERVICE STATION

5 - PARKING LOT; PREVIOUSLY A UNION OIL GASOLINE SERVICE STATION

6 - PARKING LOT; PREVIOUSLY AN ARCO SERVICE STATION

N

NOT TO SCALE

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Potential Fuel Sources Referenced in Klienfelder, 1988

FIGURE 2-6

SECTION 3
LOCAL GEOLOGY AND GROUND-WATER HYDROLOGY

3.1 LOCAL GEOLOGY

The San Diego metropolitan area is underlain by sedimentary rocks of Late Cretaceous, Eocene, Pliocene, Pleistocene, and Holocene age that unconformably overlie a Mesozoic metamorphic and plutonic basement complex. An unconformity also exists between the Late Cretaceous rocks and the younger Tertiary and Quarternary sedimentary strata. These older units were deposited in a northwest-trending depositional basin known as the San Diego Embayment and are comprised of marine, lagoonal and non-marine rocks. This succession grades from nonmarine fan and dune deposits to the east to lagoonal, nearshore beach, and beach-bar deposits to continental shelf marine deposits in the west near the present coastline.

The project site is underlain by both artificial fills and native sedimentary deposits. The Pleistocene-age Bay Point Formation was observed in the walls of both tank excavations. These sediments consist of fine- to medium-grained, moderately to well-sorted, laminated silty sands which are brown to gray in color.

Within the diesel tank excavation, a fine- to coarse-grained sand, red-brown to gray in color, with varying percentages of gravel, pea gravel, and brick fragments was observed. This lithology apparently represents fill materials.

Within the lube and waste oil tanks excavation, the backfill was a fine- to medium-grained sand, gray in color, very well sorted with no gravel or rubble components.

3.2 LOCAL GROUND-WATER HYDROLOGY

Shallow ground water in the San Diego metropolitan area generally occurs under unconfined, or water-table conditions, and lies at approximately or slightly below mean sea level (MSL). The ground water in this area is part of the San Diego Mesa hydrographic subunit. The RWQCB has listed this unit as having no existing or potential beneficial uses for ground water.

Ground water was not encountered during project activities, which included excavation to a maximum depth of 16 feet below ground surface (bgs). Measurement taken in 2 existing monitor wells onsite indicated a fluid elevation of approximately 22 feet bgs. Direction and rate of ground-water flow were not determined in this investigation.

SECTION 4
ANALYTICAL APPROACH

4.1 Analytical Parameters

During removal of the 5 tanks and associated service lines, soil samples were obtained at selected locations based on visual observations, screening using a Foxboro Model 128 Organic Vapor Analyzer (OVA) and regulatory guidance from DOHS. Soil analytical parameters were selected based on the nature of contaminants expected to be present due to the historical use of the site and on the RWQCB and DOHS requirements. Analyses were performed for total petroleum hydrocarbons (TPH) using EPA Method 418.1, total fuel hydrocarbons (TFH) using EPA Method 8015 (CDOHS modified), volatile aromatics using EPA Method 8020, polynuclear aromatic hydrocarbons (PNAs) using EPA Method 8310, and organic lead using EPA Method 6010. The analytical program was aimed at assessing the nature of any site contaminants and evaluating their relation to known site activities.

Both EPA Methods 418.1 and 8015 (modified) can be used to quantify hydrocarbons, but have different applications. Method 8015 can be used to characterize the species of hydrocarbon distillate and is accurate for those distillates with boiling ranges and carbon chains between C_3 and C_{20}. Hydrocarbon products such as gasoline, diesel, kerosene and jet fuels are often found with this carbon range. EPA Method 418.1 cannot be used for characterization, but can be used to identify the presence of carbon species between C10 and C35+. Due to the extraction technique, the EPA Method 418.1 is susceptible to the loss of hydrocarbons from the low molecular weight end of the spectrum (volatiles). However, this method is particularly good for detecting semi- and non-volatile hydrocarbons such as lube oil. Therefore, results from the two analyses when performed on the same sample will rarely be equal. By performing both analyses, analytical accuracy is obtained over the entire range of hydrocarbons.

4.2 Data Review

A quality control (QC) check is administered at the time of the receipt of each analytical report. The QC procedures scrutinize the data from five approaches; completeness, analytical information, laboratory quality control, field quality control and data interpretation.

4.3 HYDROCARBON STANDARDS

The three hydrocarbon fuel standards utilized during this investigation were gasoline (used onsite from 1954-1967), diesel #1-D (used from 1967-1974) and diesel #2-D (used from 1974 to the present). The standard chromatograms were produced by Analytical Technologies, Inc. (ATI) and are located in Appendix D.

Diesel fuel can be one of three grades, #1-D, #2-D, and #4-D, depending on the refining practices employed and the nature of the crude oils from which they are produced (ASTM 1981). Diesel #2-D is the the diesel standard used at ATI. Diesel #1-D and kerosene have different uses due to a slight viscosity difference but they produce matching chromatograms (ASTM 1981). Therefore the kerosene standard produced by ATI is the same as the diesel #1-D standard for the purpose of this report.

SECTION 5
ANALYSIS OF THE FREE PRODUCT

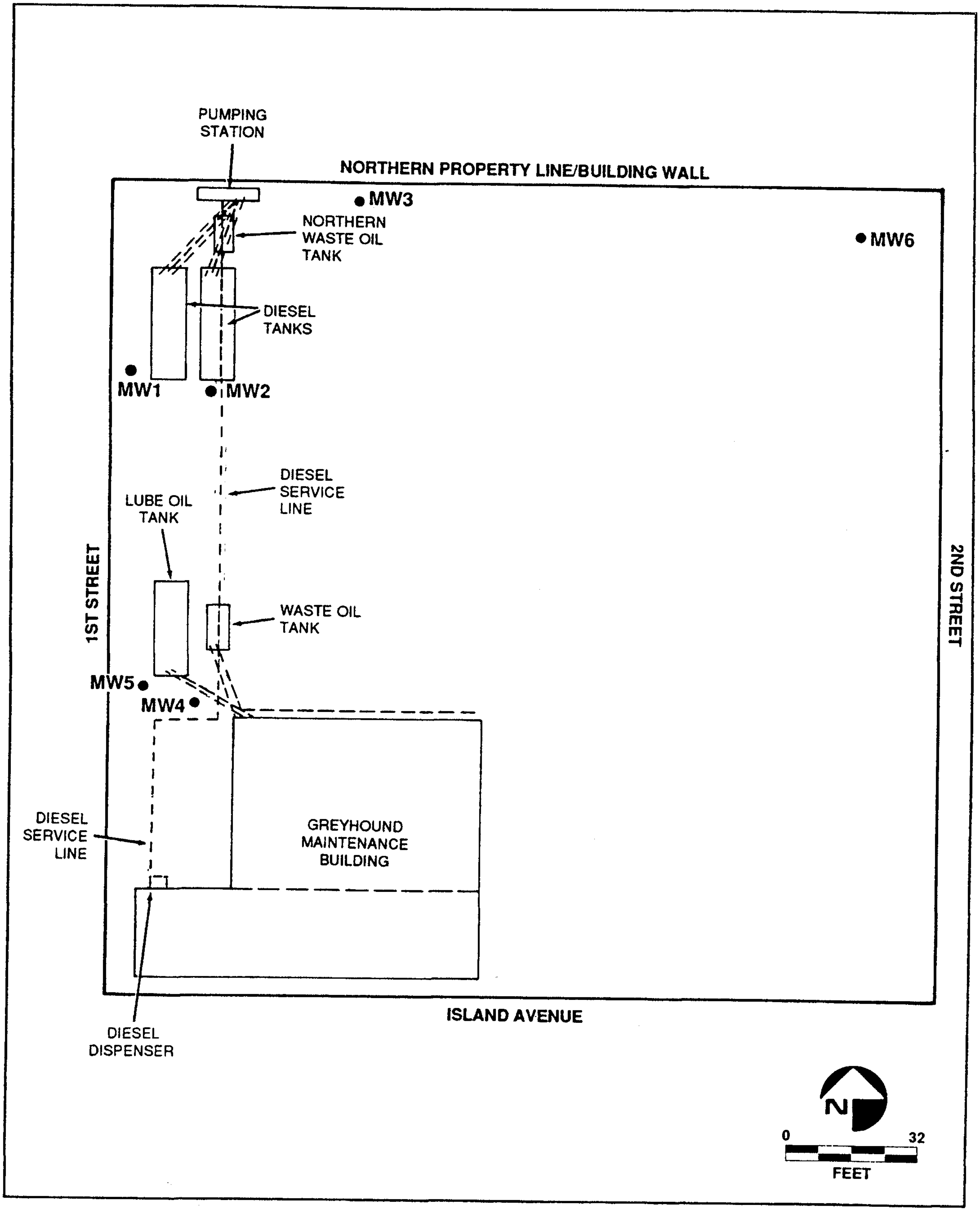
During the tank closure investigation, free product samples were collected from the six monitor wells on the property (Figure 5-1). Five of the samples were quite similar in appearance. These five products, collected from MW1 to MW5, were yellow in color, dissimilar to the sample of the Greyhound diesel #2-D which was dark amber in color. The product in MW6 was a light amber. A thin black lense was noted to be present between the product and ground water in MW1 and MW2. Figure 5-2 presents a photograph of the sample collected from MW2 located just south of the eastern diesel tank.

The free product samples were analyzed by EPA Method 8015 (CDOHS modified). This information supplemented the characterization of the free product derived during previous investigations. These samples were compared to an analysis of GLI's diesel #2-D product collected from the existing fuel dispenser and on site hydrocarbon fuel standards.

The chromatograms obtained from the EPA Method 8015 (modified) analysis of the free product samples from MW1 to MW5 are very similar. Qualitative comparisons of the free product chromatograms to gasoline, diesel #1-D and diesel #2-D standards were conducted. The free product samples have retention times almost entirely within the diesel #1-D range, with the inclusion of heavy end gasoline components. The range of retention times for these five free product samples is approximately 5 to 19 minutes, with the majority of the components detected in the 13 to 14 minute range. The diesel #1-D standard similarly exhibits a retention time range of 8 to 20 minutes, with the majority of the components detected between 13 and 15 minutes.

The chromatogram obtained from the analysis of the free product from MW6 resembles a combination of the gasoline and diesel #1-D standards. The range of retention times is approximately 1 to 17 minutes which encompasses the range of gasoline and diesel #1-D.

There is little similarity between the free products and the diesel #2-D standard. The latter has a significant percentage of components with retention times longer than that of the diesel #1-D, gasoline and free product samples. The diesel #2-D standard has a retention time range of approximately 10 to 24 minutes, with the majority of the components detected in the 18 to 19 minute range.



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Location of Monitor Wells Sampled

FIGURE 5-1

ERC
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Floating Product from Monitor Well just
South of Diesel Tank Excavation

FIGURE
5-2

The chromatograms suggest that the free product underlying the facility has analytical characteristics most similar to the diesel #1-D standard and the gasoline standard in one sample. Therefore the diesel #2-D fuel which GLI has been using since 1974 apparently has not contributed to the free product plume underlying the site.

It is current theory that more than one plume exists beneath the downtown area. Product samples MW1 to MW5 are indicative of a plume noted between Second Avenue and Front Street which is composed of mid-range fuels in the range of diesel #1-D (Kleinfelder 1988). The Fourth Avenue to Second Avenue plume is predominantly leaded gasoline (Kleinfelder 1988). Product sample MW6 appears to be a mix of the two plumes. This suggests that the Fourth to Second plume has now crossed Second Avenue.

SECTION 6
REMOVAL OF DIESEL TANKS

6.1 DIESEL TANK INSPECTION

Inspection of the diesel tanks followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling location and results are presented below in Section 6.2. Sampling methodologies are provided in Appendix F.

Two 10,000-gallon diesel tanks were removed from the northern portion of the site. Product information tags found on the tanks indicate the tanks were manufactured in 1953 by Comwel Company. The tanks were constructed of #3 U.S. gauge steel. The Underwriters' Laboratories, Inc. Registration Numbers are C-440733 and C-440736 for the east and west tanks respectively.

Removal of the concrete overlying the diesel tanks began on September 7, 1989 by Angus Asphalt. The soils immediately underlying the concrete were inspected to determine if contamination from above had occurred. It was noted during this inspection that surface contamination was present throughout the southern end of the excavation (Photo 1, Figure 6-1). Brown staining suggested that surficial contamination was associated with hydrocarbon migration from the tank fill ports which were located in this vicinity.

On September 11, 1989 excavation was resumed by Angus Asphalt. Soil and backfill materials removed were stockpiled on visqueen adjacent to the excavation as described in Appendix E. There was a range of soil types uncovered in the first lift. This included a red-brown sand denoted SP under the Unified Soil Classification System (USCS). The red-brown sand was found at the western portion of the excavation and appeared to be a native soil. There were also olive-grey and tan sands with cobble and red brick fragments (SP to SW). These soils appeared to represent backfill material (Photo 2, Figure 6-1). Cobble and red brick fragments within these soils indicated that it was backfill. Visual observations and in situ organic vapor analyzer (OVA) data indicated the presence of potential hydrocarbon contamination in the southern portion of the excavation in the two-foot lift. Apparent hydrocarbon staining was also evident in the northeastern area adjacent to the aboveground pumping station. In situ OVA readings varied from 90 parts per

Photo 1. Stained Surface Soils at South End of Diesel Tank Excavation

Photo 2. Soil Types in Diesel Excavation

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Diesel Excavation Soils

FIGURE 6-1

million (ppm) at the western wall to greater than 1000 ppm in the southern (near fill ports) and northeastern (near pumping station) portions of the excavation. In situ OVA readings in the 200 to 300 ppm range were the median for the central portions of the excavation. Soil samples TE5, TE6, TE7, TE8, TE28, TE29, and TE32 were obtained from the 2-foot lift in areas appearing to have the highest levels of contamination based on field data.

The soil types encountered in the 4-foot lift remained consistent with those described above. OVA readings ranged from 10 to greater than 1000 ppm dependent upon location. Generally, the southern end of the excavation near the fill ports remained at high levels with readings above 1000 ppm, particularly on the southeastern side. The southwestern portion had readings of 500 ppm. The central western and northwestern portions of the excavation exhibited generally low OVA readings from 10 to several hundred ppm. Soil samples TE16, TE17, TE18, TE19, and TE20 were obtained from the areas apparently containing high levels of contamination based on field data.

The tops of the diesel tanks and product lines were uncovered during the 4-foot lift. The metal surface of the diesel tanks was in good condition, with no visible signs of leakage. There was some corrosive scalloping on the surface skin of the tanks, but there did not appear to be penetration into the structure.

Each diesel tank had three service lines exiting the northern end of each tank and connecting to the pump station area. Each tank had one suction line connected to a foot valve assembly, one return line, and one vent line (Figure 6-2). These lines were made of steel and were coated with a protective tar-like substance. A close inspection for corrosion and leakage indicated that the lines were in good condition, with no indication of leakage in the pipes themselves or the surrounding soils. The lines were labeled and removed from the excavation and placed in a designated area for DOHS inspection.

Below the 4-foot level, it was not possible to sample discrete lifts due to the presence of the tanks and slumpage from the excavation. The backhoe operator was instructed by ERCE personnel to sample at specific locations during the 7-10 foot lift. Visual and OVA inspection of the soils indicated that the surficial contamination at the southern end of the excavation near the fill ports had been fully removed at this depth.

OVA readings during the 7-10 foot lift were higher at the northeastern end of the excavation, generally in the vicinity of 1000 ppm. It is believed that the levels identified in

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Suction Line, Return Line and Vent Line
from Northern End of Diesel Tank

FIGURE

6-2

this area may indicate contamination associated with the aboveground pumping station. Soil samples TE22, TE23, TE24, TE25, TE26, and TE27 were obtained during this sampling period.

The diesel tanks were inspected from above and appeared to be in good condition. The soils in contact with the diesel tanks showed no visible contamination and OVA data also suggested that leakage from the tanks had not occurred. The soils were dry, to slightly damp with water moisture.

The next sampling took place at a depth of 14 feet bgs. As above, physical entry into the excavation was not deemed safe. The soils were therefore brought to the surface by the backhoe operator at the direction of an ERCE geologist. The soils at this depth displayed less contamination than the lift above. Soils adjacent to the tanks did not register organic vapors above 50 ppm. The diesel tanks appeared to be intact and in good condition with only minor surface corrosion.

At this point in the excavation work, the tanks were completely exposed except at the base and between the two tanks, where soil remained to support the two tanks. Using the soil bridge between the two tanks as an access route, an industrial cleaning company began decontamination of the tanks. Holes were cut into the top of each tank with a pneumatic chisel (cold cut) to allow for the rinsing and internal inspection of the tanks. All liquid and solid wastes withdrawn from the tanks or created during decontamination procedures were removed and disposed of in accordance with applicable regulations.

Due to the chance of structural damage occurring to the tanks during their removal, an in situ internal inspection was conducted by ERCE personnel after each of the diesel tanks had been decontaminated. The inspector thoroughly examined the interior of each tank for corrosion, leaks, or structural damage. Photographs were taken of the interior of the diesel tanks by the inspector, and verbal assessments were documented.

The interior of the tanks exhibited good structural integrity. No points of daylight penetration were noted and all seams were in good condition. No cracking or separation along welds was observed. In the eastern diesel tank, there was roughness on the surface of the metal at the base of the tank. This appeared to be associated with diesel sludge and not corrosion of the metallic surface. In the western tank, some minor corrosion at the southern base of the tank was observed. The corrosion penetrated the metal about 1/32 to

1/16 of an inch. The scalloping appeared minor and there was no indication that the wall of the tank had been breached.

Upon removal from the excavation, the tanks and associated piping were placed in a designated area for inspection by DOHS and ERCE personnel. ERCE conducted a thorough external inspection of the tanks to verify the condition indicated by previous internal and external survey. The tanks again appeared to be in good condition and apparently had not allowed leakage of contents into the environment. Photographic documentation was taken to record the observations of the inspector. Photos in Figures 6-3, 6-4, 6-5 show the west and east diesel tanks respectively at the time of removal from the excavation.

Following inspection, the tanks were placed on a truck and transported to an approved facility as specified in the tank disposal section of the closure plan (Appendix A).

Following tank removal, visual and OVA inspection of the diesel excavation was conducted to assess the potential for soil contamination associated with the diesel fuel tanks. Based upon visual observations and soil sampling data, additional soils were removed from the pump area and from the area near the location of the fill pipes. In addition, soils directly beneath the tanks were removed.

6.2 Analytical Results

All of the soil samples associated with the diesel tanks were analyzed for TFH using EPA Method 8015 (DOHS) (Table 6-1) (Figure 6-6). Surface soil samples in the excavation were also run for TPH using EPA Method 418.1 as were the samples collected near and around the northern waste oil tank in the diesel excavation. A few samples were also run for volatile aromatics, PNAs, and organic lead.

6.2.1 Total Fuel Hydrocarbons

Thirty-three soil samples were taken proximal to the two diesel tanks at discrete depth intervals using the methodologies listed in Appendices E and F (Figure 6-6, Table 6-1). Of the four surface samples taken beneath the concrete cap, TE1, TE2 and TE3 exhibited elevated levels of TFH at 11,000 mg/kg, 10,000 mg/kg, and 1,900 mg/kg, respectively (Figure 6-7). The carbon chain ranges characterized for these samples were C_8 to C_{20}.

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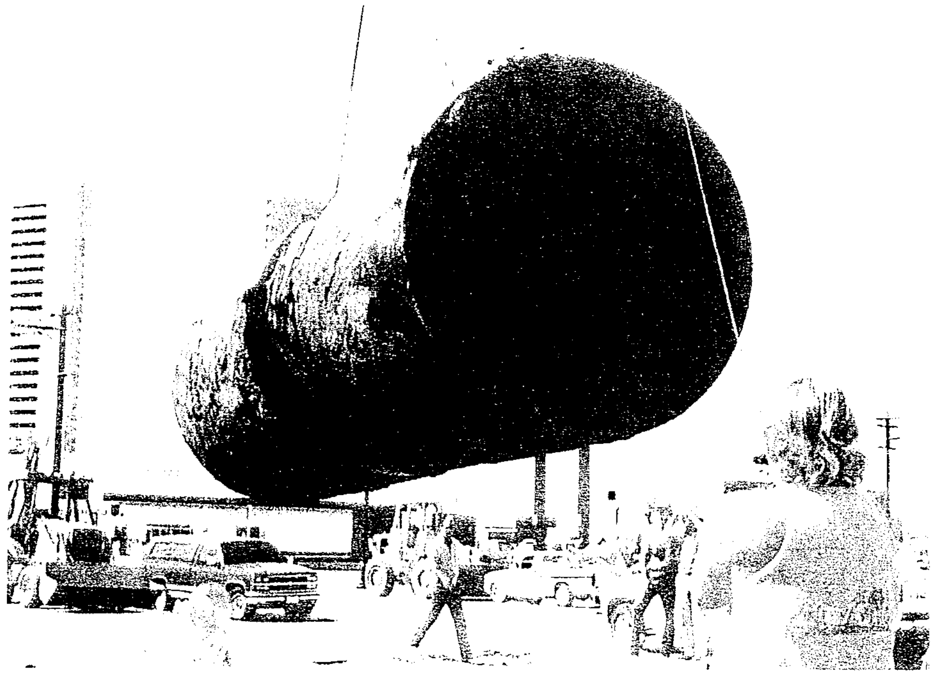
Western Diesel Tank

FIGURE 6-3



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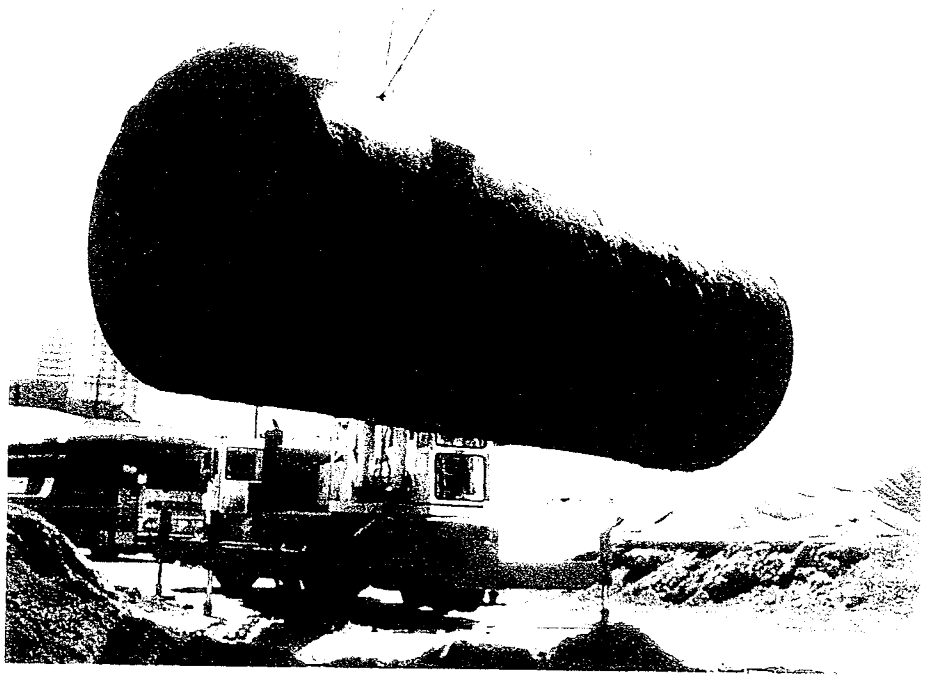
Western Diesel Tank

FIGURE 6-4



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Eastern Diesel Tank

FIGURE 6-5

Table 6-1

SOIL ANALYTICAL RESULTS FROM THE
DIESEL TANK EXCAVATION
EPA METHODS 418.1 AND 8015 (CDOHS MODIFIED)

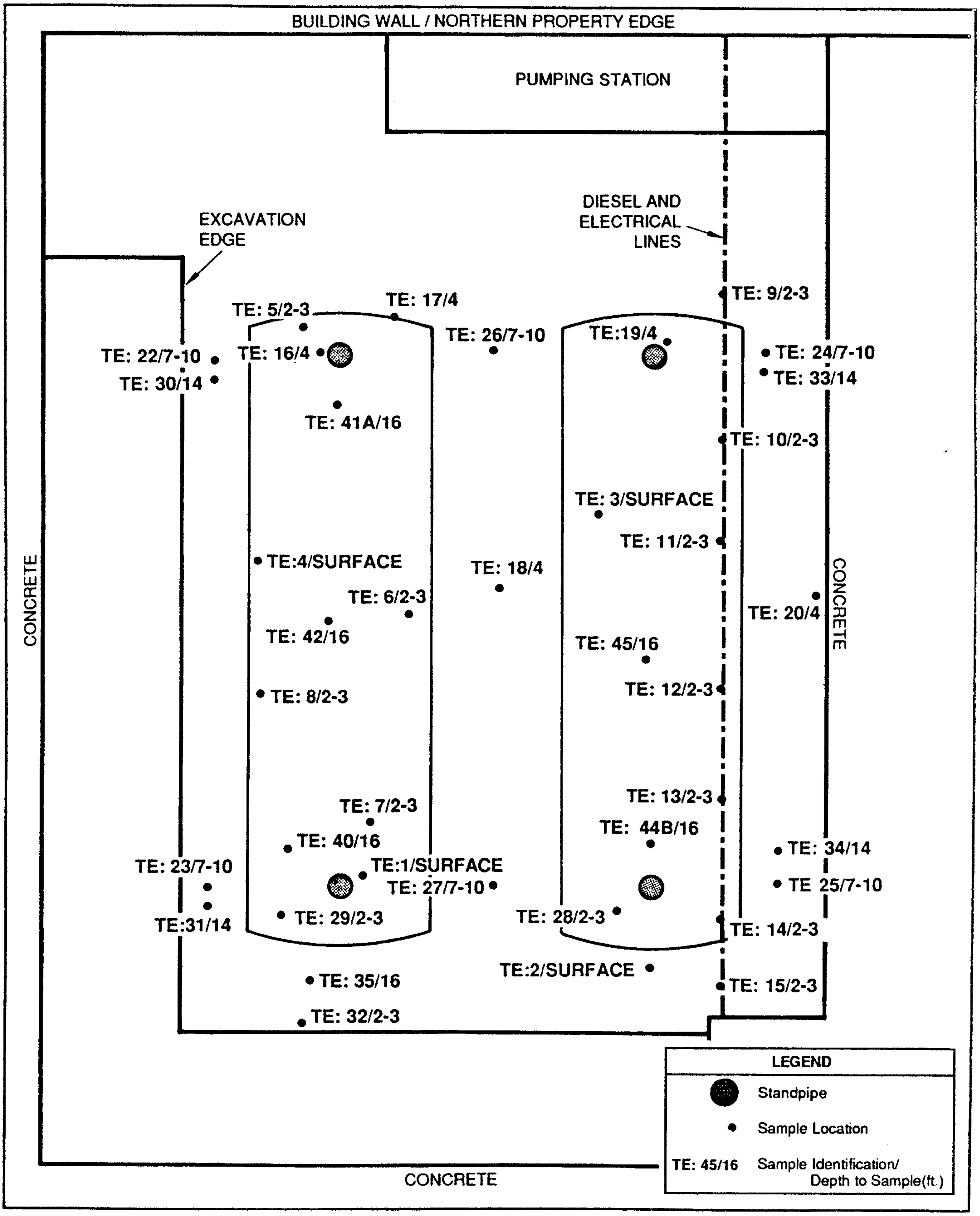
Sample Number	Date	418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
TE1	9/8/89	25,000	11,000	C_8-C_{20}	Diesel
TE2	9/8/89	16,000	10,000	C_8-C_{20}	Diesel
TE3	9/8/89	1,600	1,900	C_8-C_{20}	Diesel
TE4	9/8/89	110	7.6	C_{10}-C_{20}	Diesel
TE5	9/11/89	NA	<5	--	--
TE6	9/11/89	NA	<5	--	--
TE7	9/11/89	NA	5,800	C_8-C_{24}	Diesel
TE8	9/11/89	NA	<5	--	--
TE16	9/11/89	NA	<5	--	--
TE17	9/11/89	NA	<5	--	--
TE18	9/11/89	NA	<5	--	--
TE19	9/11/89	NA	<5	--	--
TE20	9/11/89	NA	8.0	C_{12}-C_{16}	Diesel
TE21	9/11/89	NA	9,400	C_8-C_{22}	Diesel
TE22	9/11/89	NA	1,200	C_9-C_{18}	Diesel
TE23	9/11/89	NA	<5	--	--
TE24	9/11/89	NA	1,200	C_8-C_{14}	Diesel
TE25	9/11/89	NA	19	C9-C_{14}	Diesel
TE26	9/11/89	NA	1,200	C_8-C_{24}	Diesel
TE27	9/11/89	NA	<5	--	--
TE28	9/11/89	NA	8,900	C_{12}-C_{18}	Diesel
TE29	9/11/89	NA	6,100	C_8-C_{17}	Diesel
TE30	9/11/89	NA	8.2	C_{11}-C_{14}	Diesel
TE31	9/11/89	NA	<5	--	--
TE32	9/11/89	NA	<5	--	--
TE33	9/11/89	NA	<5	--	--
TE34	9/11/89	NA	12	C_{12}-C_{15}	Diesel
TE35	9/11/89	NA	<5	--	--

Table 6-1 (Continued)

SOIL ANALYTICAL RESULTS FROM THE DIESEL TANK EXCAVATION EPA METHODS 418.1 AND 8015 (CDOHS MODIFIED)

Sample Number	Date	418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
TE40*	9/12/89	NA	6,100	C_8-C_{17}	Diesel
TE41*	9/12/89	NA	3,400	C_{11}-C_{18}	Diesel
TE42	9/12/89	NA	4,600	C_8-C_{18}	Diesel
TE43	9/12/89	NA	670	C_8-C_{17}	Diesel
TE44*	9/12/89	NA	4,200	C_8-C_{21}	Diesel
TE45	9/12/89	NA	8,200	C_8-C_{17}	Diesel
TE46A*	9/12/89	NA	5,200	C_8-C_{17}	Diesel
TE50	9/13/89	1,600	230	C_9-C_{16}	Diesel
TE52	9/14/89	2,100	6,900	C_8-C_{23}	Diesel
TE53	9/14/89	2,000	NA	NA	NA
TE54	9/14/89	7,700	NA	NA	NA
TE55	9/14/89	NA	30,000	C_8-C_{24}	Diesel
TE61	9/14/89	NA	<5	--	--
TE65	9/18/89	<10	<5	--	--
TE66	9/18/89	NA	6,000	C_{10}-C_{18}	Diesel
TE67	9/18/89	13,000	7,000	C_{11}-C_{20}	Diesel

*INDICATES CDOHS SAMPLE
NA - NOT ANALYZED BY THIS METHOD



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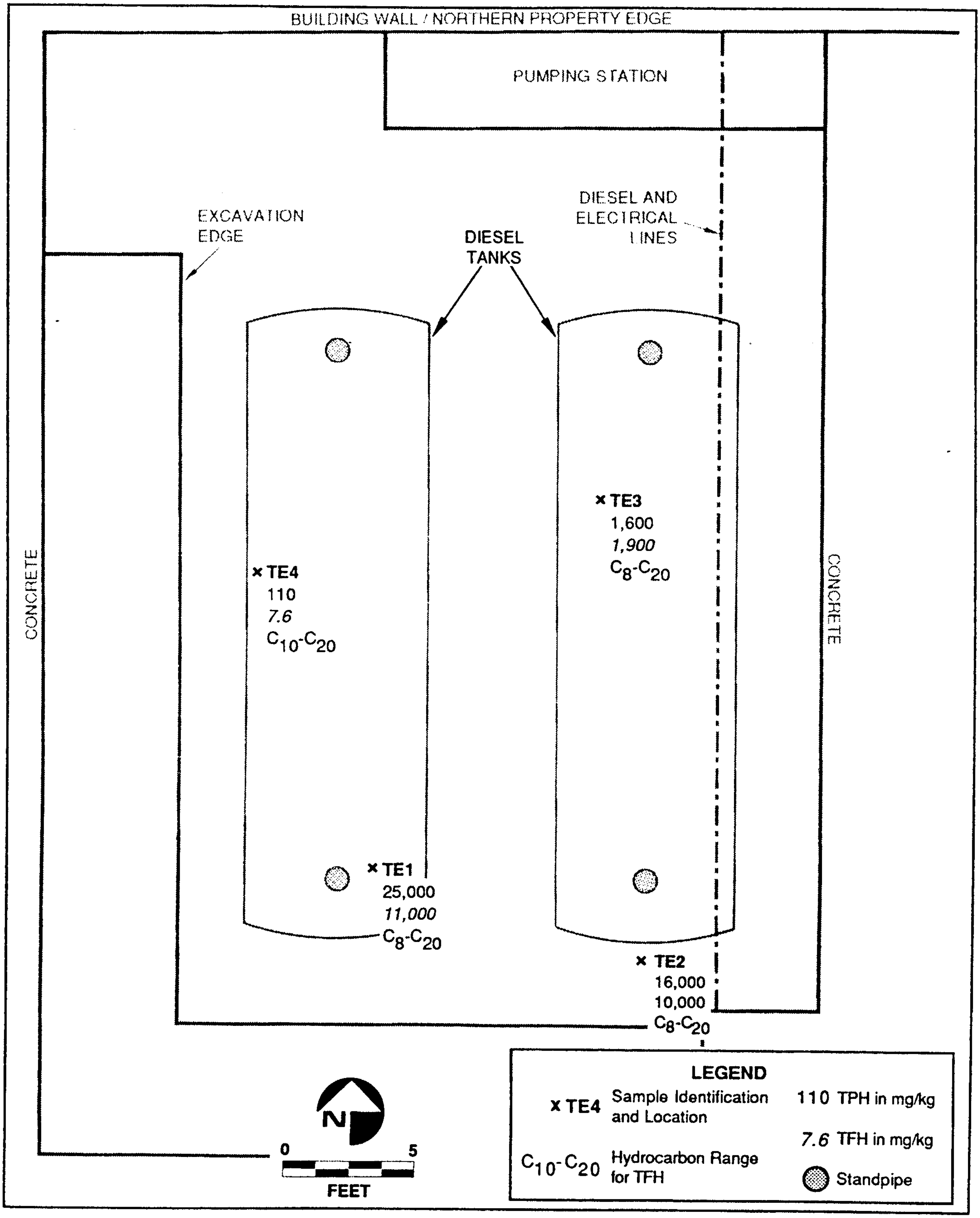
Diesel Excavation Soil Samples — Location and Depths

FIGURE 6-6



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TPH and TFH Results in Surface Soil Samples (Obtained Immediately Below Concrete) in the Diesel Excavation

FIGURE **6-7**

In the 2- to 3-foot soil lift, seven samples were taken (Figure 6-8). TFH was not detected in four of the samples but three samples collected adjacent to the fill ports on the southern end of the tanks, TE7, TE29, and TE28 contained levels of 5,800, 6,100, and 8,900 mg/kg TFH, respectively.

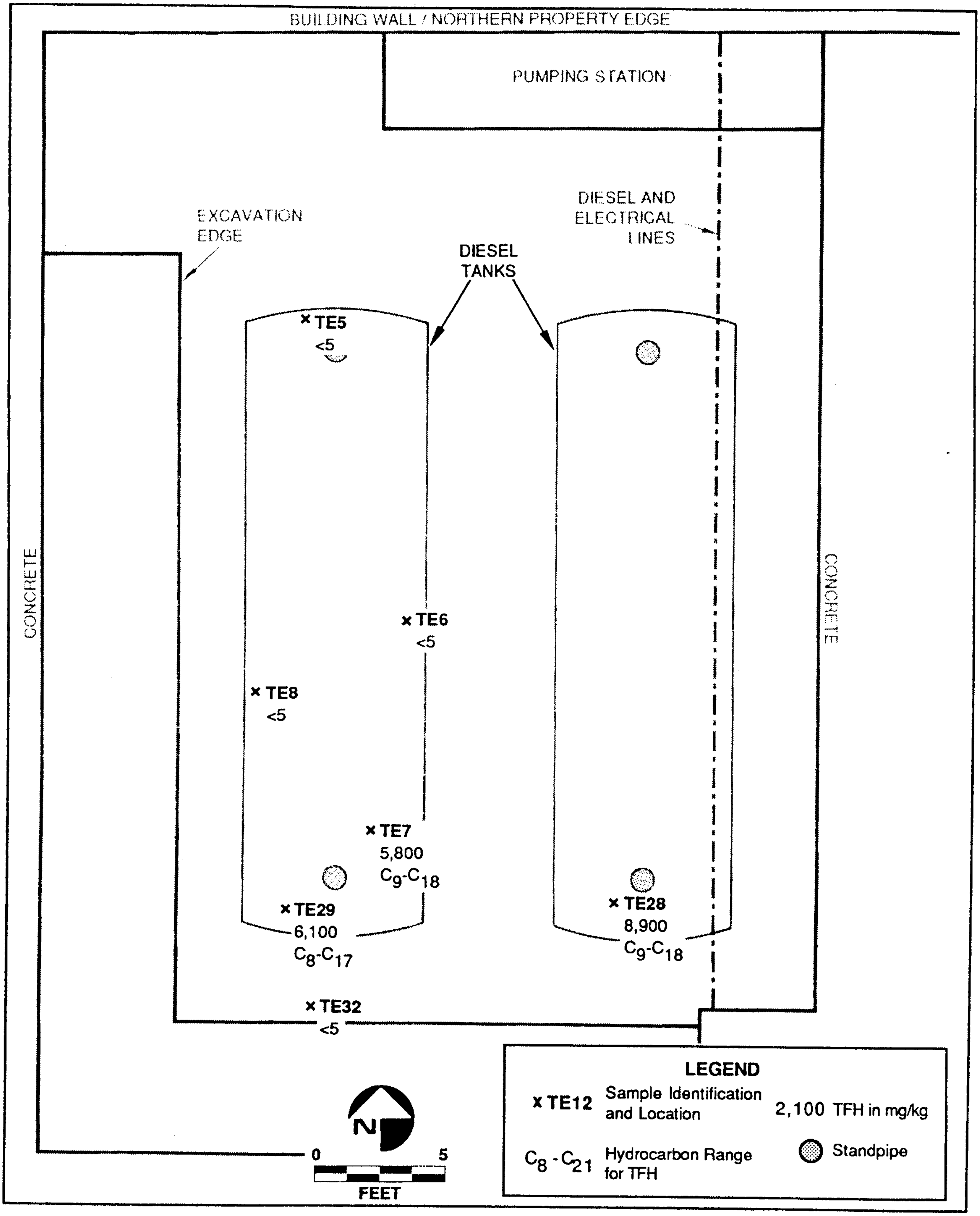
Four soil samples taken above the two diesel tanks at a depth of four feet below ground surface did not show detectable levels of TFH (Figure 6-9). One of the four samples, TE20, collected in the east wall of the excavation at this depth, contained a very minor level of 8 mg/kg TFH. Two other samples taken during the four-foot lift, TE-21 and TE66, were collected north of the diesel tanks. TE21, located above the waste oil tank, detected 9400 mg/kg TFH and TE66, collected beneath the pumping station, contained 6,000 mg/kg.

Six samples were retrieved in the 7- to 10-foot soil lift (Figure 6-10). The three samples taken in the southern area of the excavation indicated very minor or non-detectable levels of TFH. TE22, TE24 and TE26 acquired from the northern area each contained 1,200 mg/kg TFH. The carbon chains for TE22 and TE26 are similar, with species ranging from C_9 to C_{18} and C_8 to C_{24}, respectively. However, a much narrower range of C_8 to C_{14} was characterized for TE24.

At the 14-foot soil lift (Figure 6-11) the 4 samples collected all contained minor (less than 20 mg/kg) or non-detectable levels of TFH. Soil samples from the 16-foot soil lift were collected from the tank beds and one from the excavation wall (Figure 6-12). The samples from the tank beds indicated elevated levels of TFH within the range of 4,200 to 8,200 mg/kg, except TE41A which contained only 34 mg/kg. TE35, taken south of the west tank and in the sidewall of the excavation, did not contain detectable TFH.

6.2.2 Total Petroleum Hydrocarbons

The four surface samples taken beneath the concrete cap were also analyzed for TPH (Figure 6-6). TE1 and TE2, located near the fill ports in the south end of each tank indicated TPH levels of 25,000 and 16,000 mg/kg respectively. TE3 had 1,600 mg/kg, while TE4 contained only 110 mg/kg TPH.



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TFH Results in the Soil Samples from the 2-3 Foot Lift in the Diesel Excavation

FIGURE 6-8

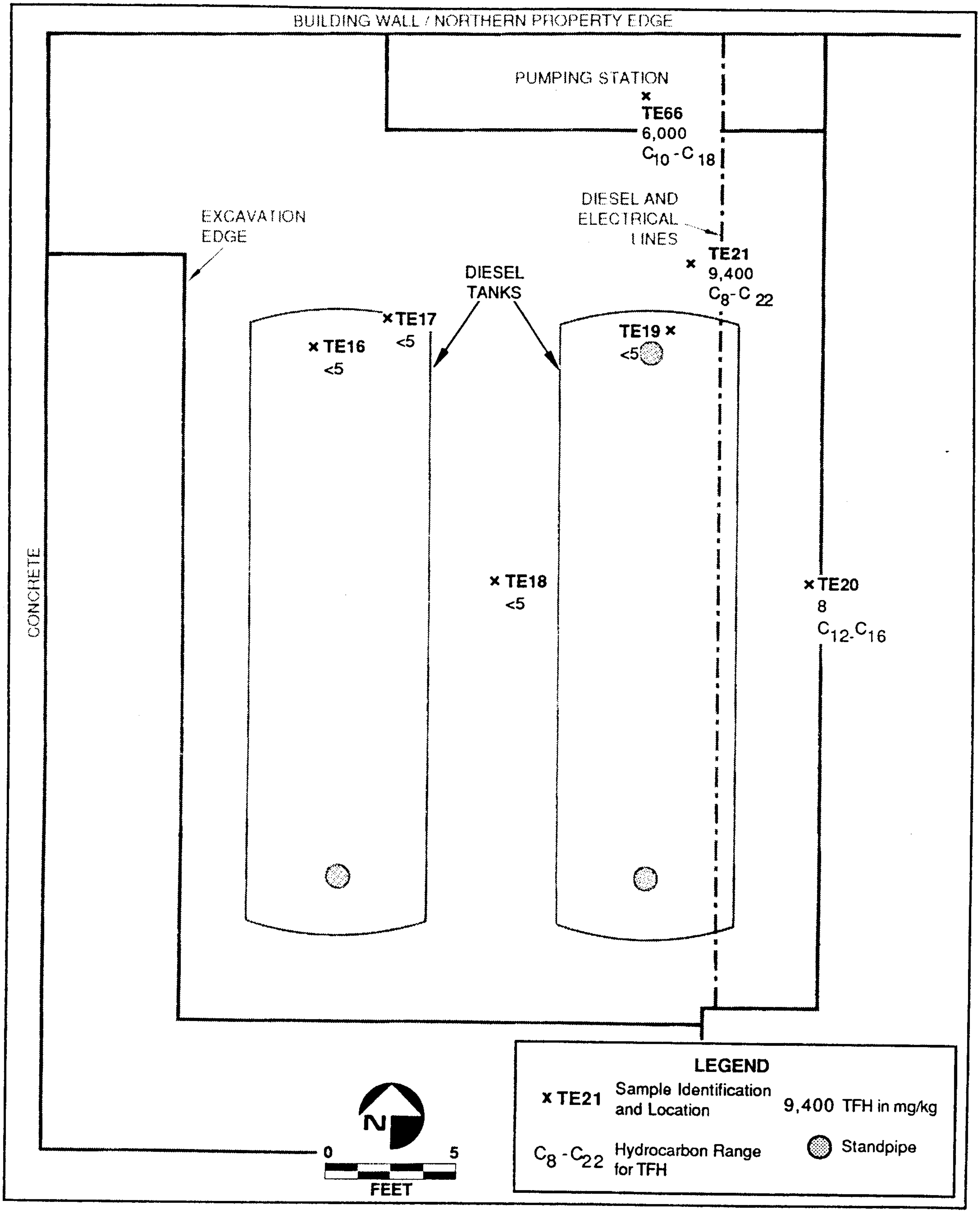

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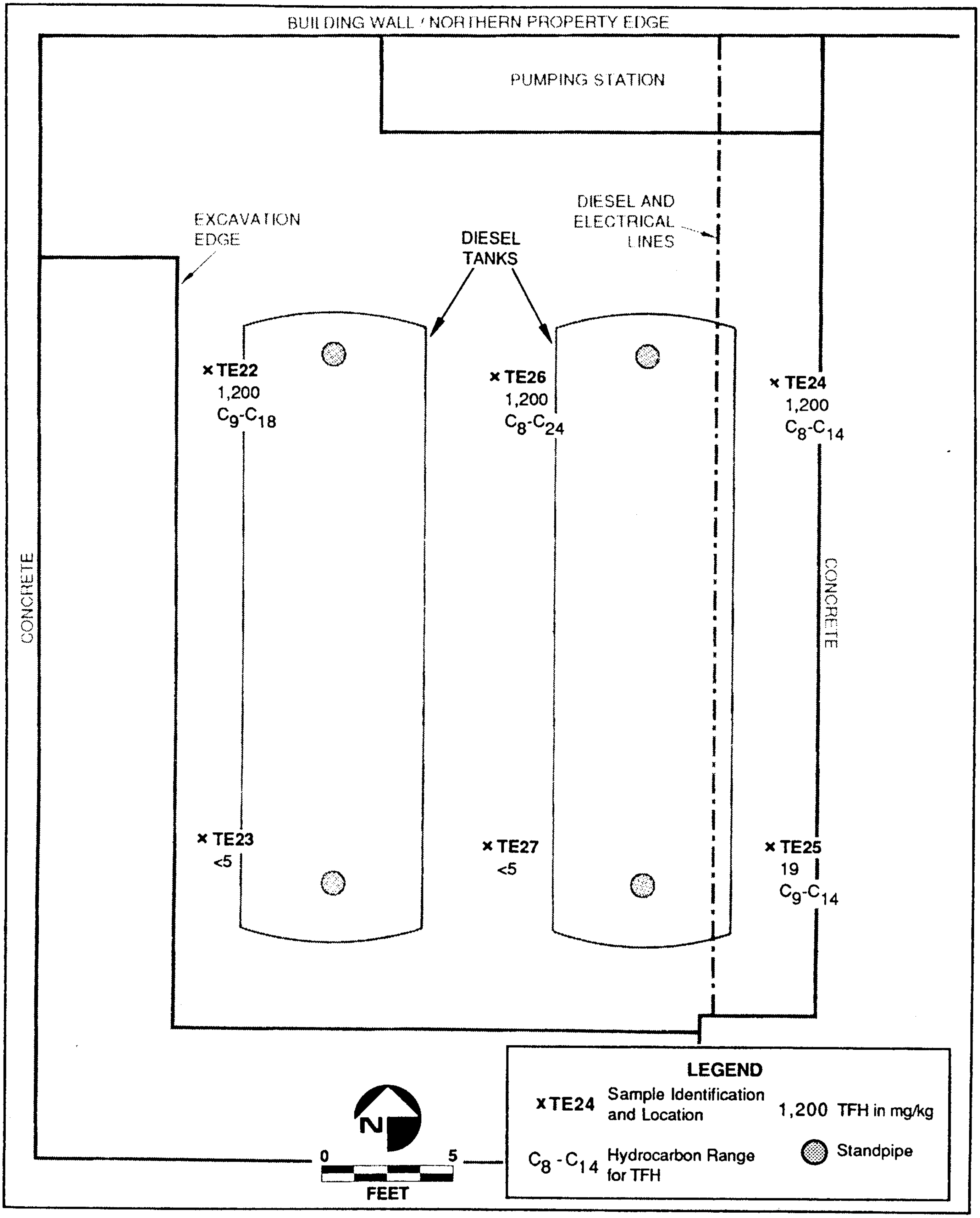
FIGURE 6-9

TFH Results in the Soil Samples from the 4 Foot Lift in the Diesel Excavation



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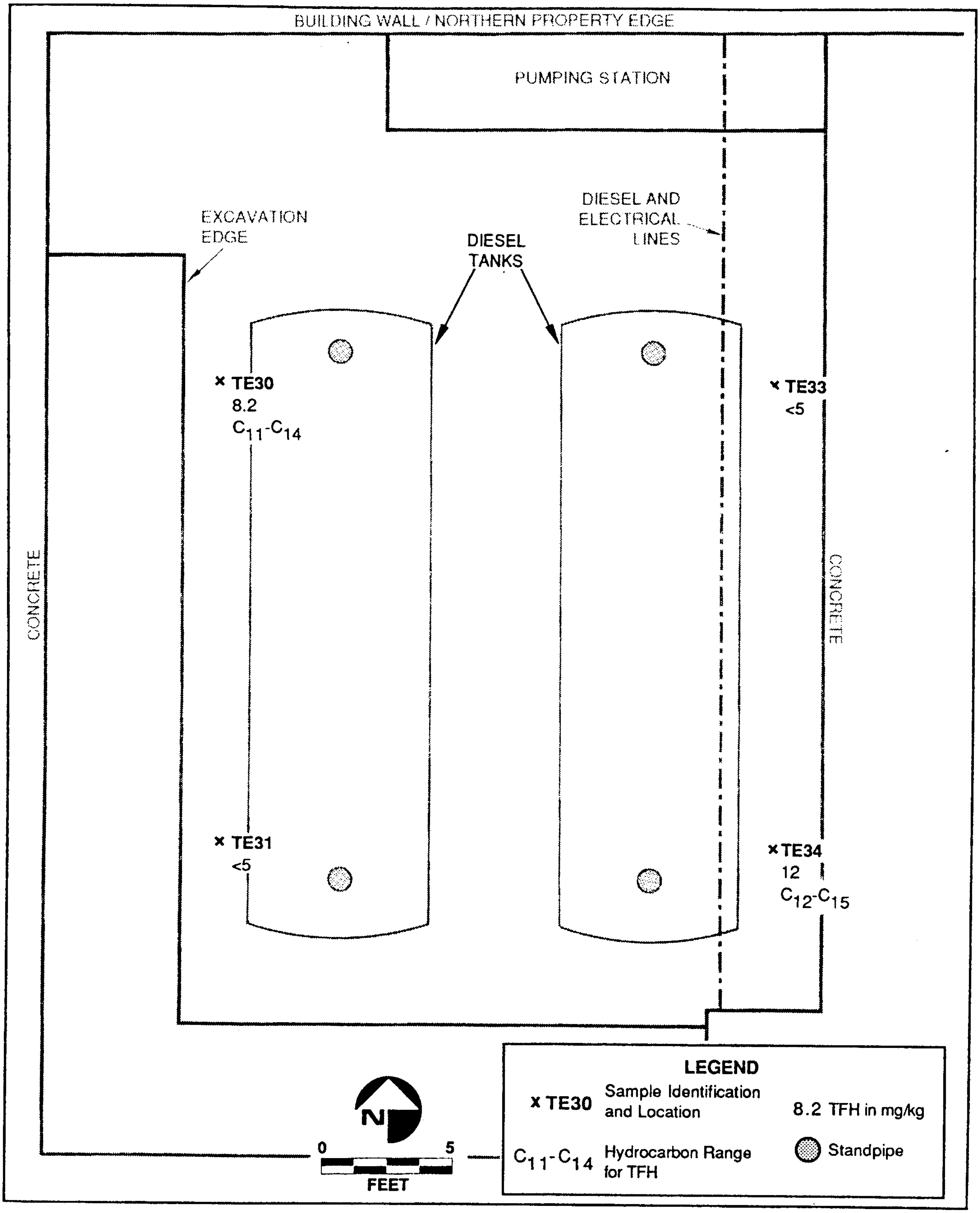
TFH Results in the Soil Samples from the 7-10 Foot Lift in the Diesel Excavation

FIGURE **6-10**



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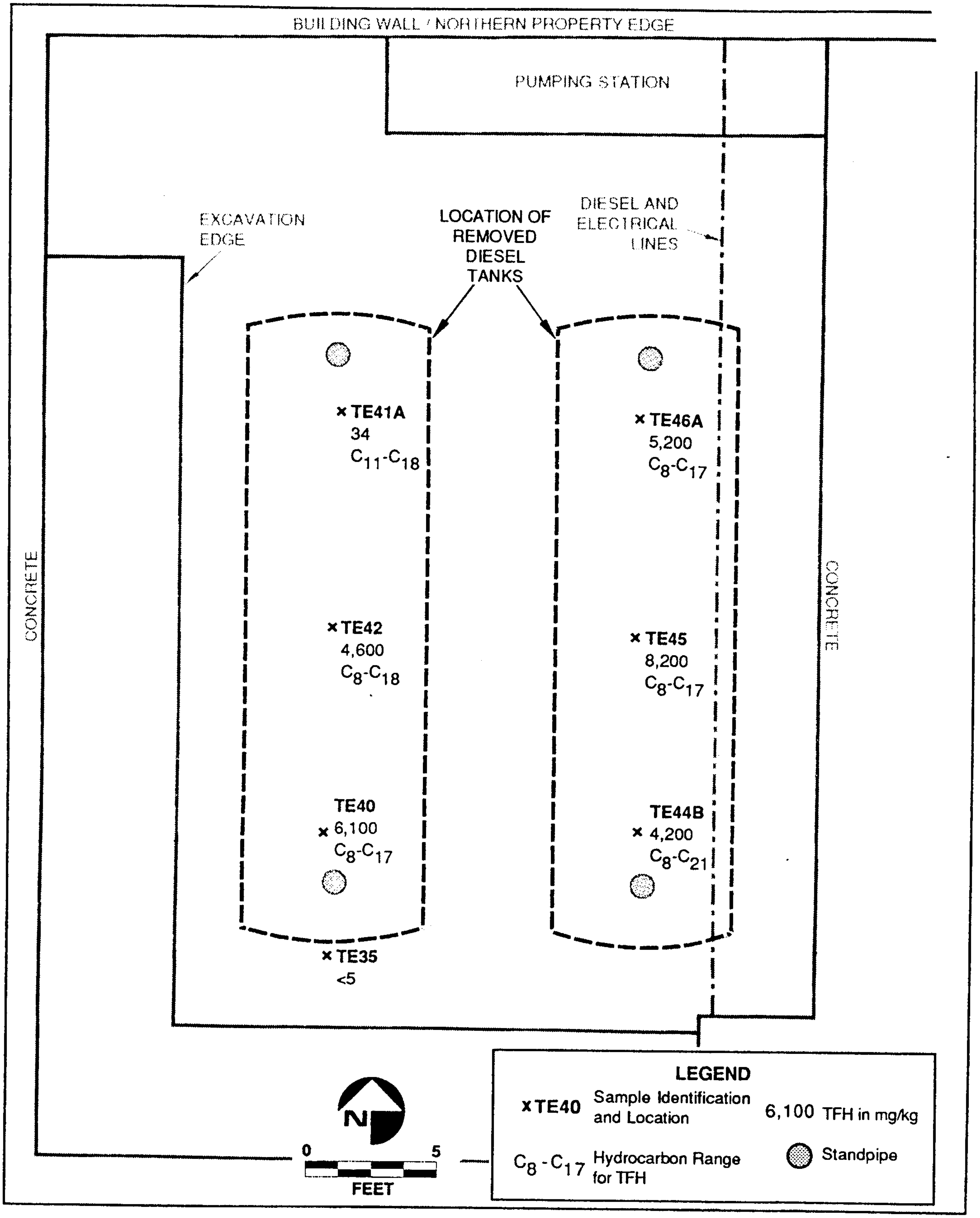
TFH Results in the Soil Samples from the 14 Foot Lift in the Diesel Excavation

FIGURE 6-11



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TFH Results in the Soil Samples from the 16 Foot Lift in the Diesel Excavation

FIGURE 6-12

6.2.3 Volatile Aromatics

Thirteen soil samples collected from the diesel excavation were analyzed for volatile aromatics. The results, presented in Table 6-2 and on Figure 6-13, indicate only a minor presence of these light end hydrocarbons. Benzene concentrations were not detected in any sample. Toluene was detected in 3 samples but only in TE28 was the concentration significant, at 150 mg/kg. Concentrations of ethylbenzene were detected above 1 mg/kg in 2 samples; TE28 with 1.7 mg/kg and TE44B with 1.9 mg/kg. Meta-xylene was detected in 6 of the soil samples but only exceeded 1 mg/kg in two samples; TE28 with 1.8 mg/kg and TE44B with 3.8 mg/kg. Ortho and para Xylene were found at elevated concentrations in TE28 and TE44B, which had 5.0 and 23 mg/kg, respectively. TE7 also contained concentrations of ortho and para xylene at a level of 13 mg/kg.

6.2.4 Polynuclear Aromatics

The analysis for PNAs was run on 5 soil samples from the diesel excavation (Table 6-3). Low levels, below 5 mg/kg, of fluorene and napththalene were found in TE28 and TE44B. TE44B also contained 1 mg/kg of acenaphthene.

6.2.5 Organic Lead

Seven samples from the diesel excavation were analyzed for organic lead to assess if any soil contamination had been caused by a leaded hydrocarbon product. The samples, taken from different depths and locations within the excavation (Figure 6-14 and Table 6-4), did not indicate the presence of organic lead above the detection limit of 0.3 mg/kg (Table 6-4).

6.3 ANALYTICAL DISCUSSION

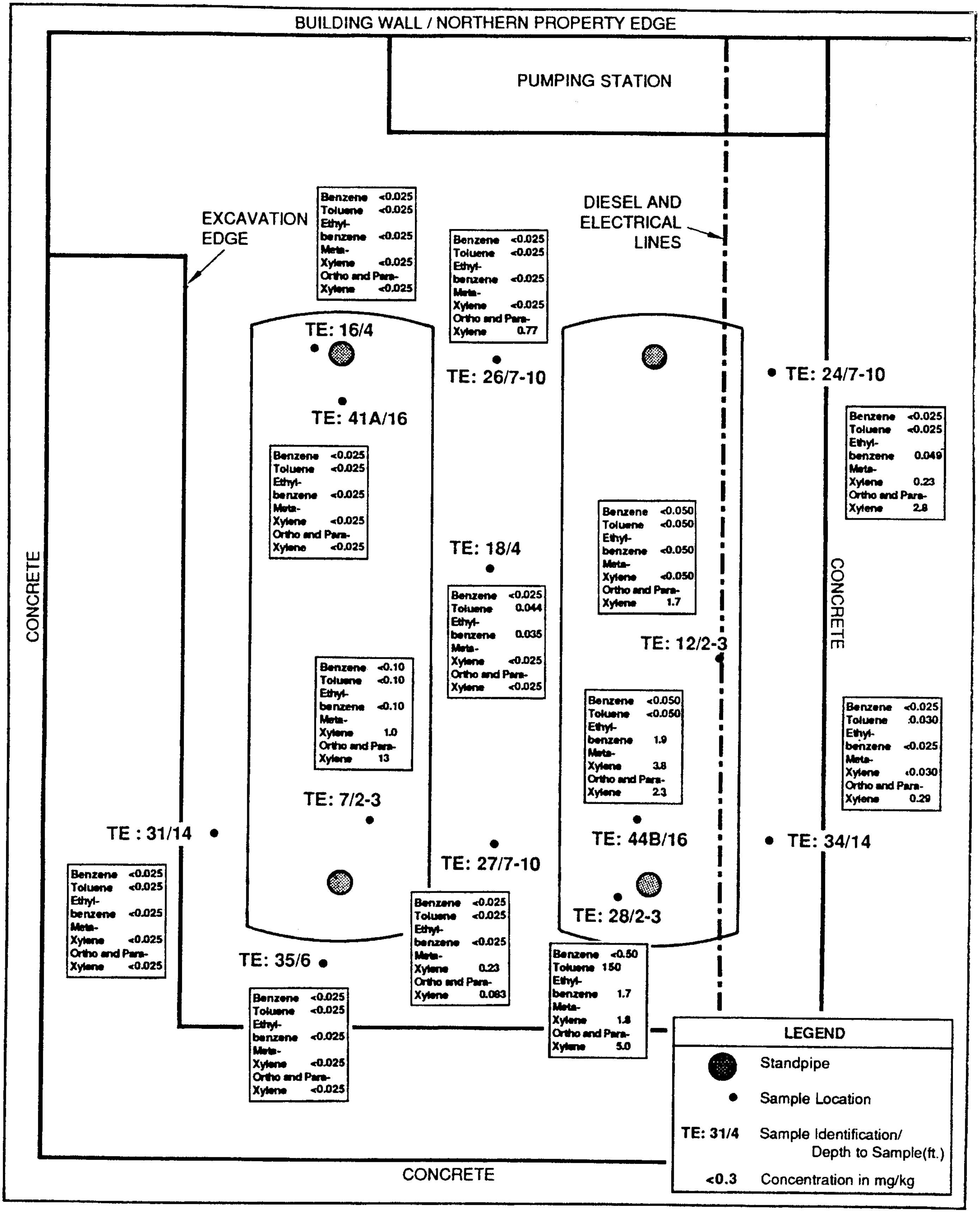
6.3.1 Surface Samples

The presence of contamination was indicated by the analytical data in the surface soils underlying the concrete cover at the south end of the excavation and probably represents spillage associated with the fill ports located in this area. The retention times of the contamination suggest that the source had a composition within the diesel fuel range. The soil samples show a tailing off of contaminant species sooner than the compounds in the

Table 6-2

SOIL ANALYTICAL RESULTS FROM THE DIESEL EXCAVATION EPA METHOD 8020

Sample Number	Date	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Meta Xylene mg/kg	Ortho and Para Xylene
TE7	9/11/89	<0.10	<0.10	<0.10	1.0	13
TE12	9/11/89	<0.050	<0.050	<0.050	<0.050	1.7
TE16	9/11/89	<0.025	<0.025	<0.025	<0.025	<0.025
TE18	9/11/89	<0.025	0.044	0.035	<0.025	<0.025
TE24	9/11/89	<0.025	<0.025	0.049	0.23	2.8
TE26	9/11/89	<0.025	<0.025	<0.025	<0.025	0.77
TE27	9/11/89	<0.025	<0.025	<0.025	0.23	0.083
TE28	9/11/89	<0.50	150	1.7	1.8	5.0
TE31	9/11/89	<0.025	<0.025	<0.025	<0.025	<0.025
TE34	9/11/89	<0.025	0.030	<0.025	0.030	0.29
TE35	9/11/89	<0.025	<0.025	<0.025	<0.025	<0.025
TE41A	9/12/89	<0.025	<0.025	<0.025	<0.025	<0.025
TE44B	9/12/89	<0.50	<0.50	1.9	3.8	23



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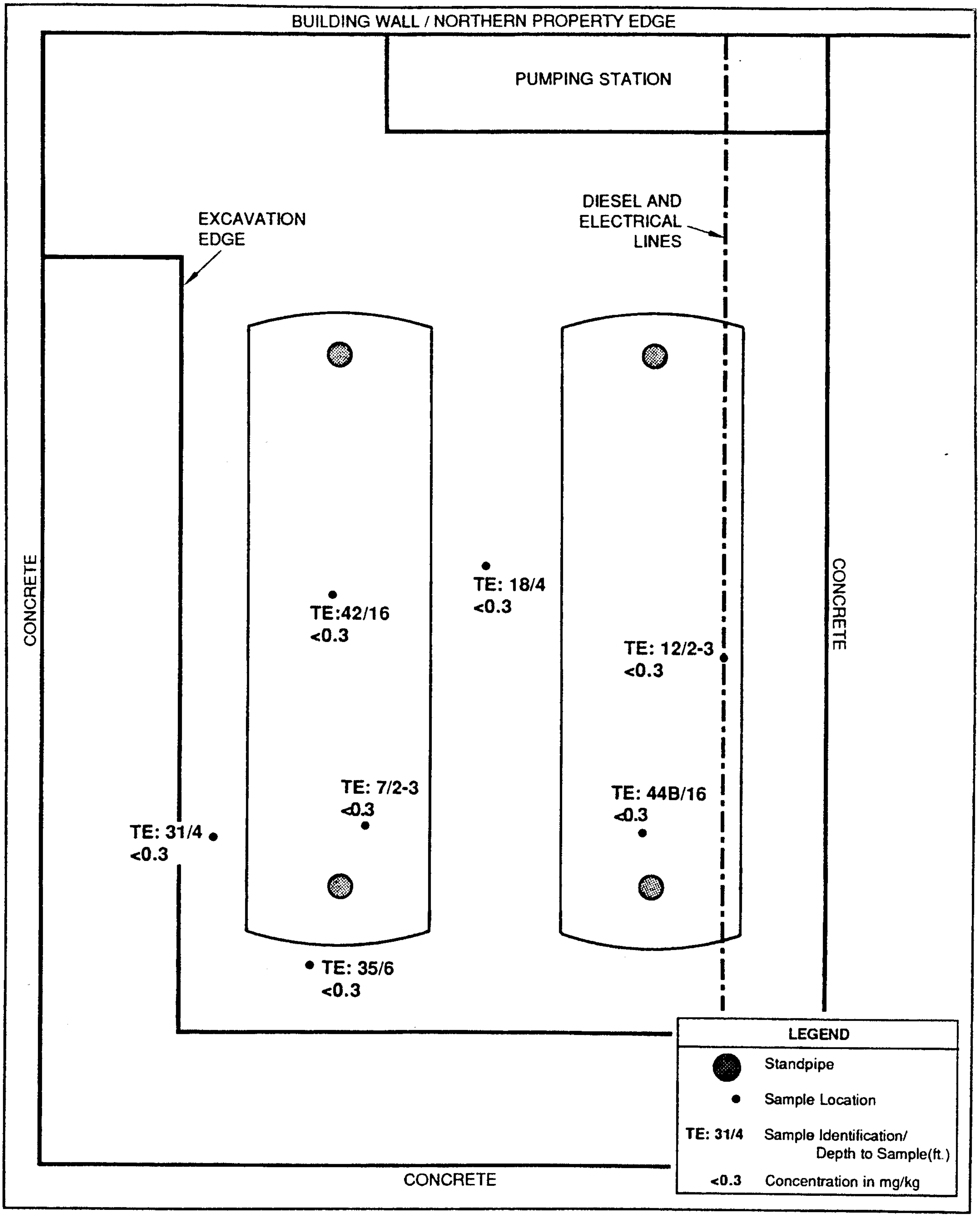
Volatile Aromatic Results in Soil Samples From Diesel Excavation

FIGURE 6-13

Table 6-3

SOIL ANALYTICAL RESULTS FROM THE DIESEL EXCAVATION EPA METHOD 8310 POLYNUCLEAR AROMATICS

Sample Number	Date	Location	Fluorene mg/kg	Acenaphthene mg/kg	Acenaphthylene mg/kg	Napththalene mg/kg	Phenanthrene mg/kg
TE16	9/11/89	Diesel Excavation	<0.17	<0.83	<0.83	<0.83	<0.17
TE18	9/11/89	Diesel Excavation	<0.17	<0.83	<0.83	<0.83	<0.17
TE28	9/11/89	Diesel Excavation	0.23	<0.83	<0.83	1.1	<0.17
TE34	9/11/89	Diesel Excavation	<0.17	<0.83	<0.83	<0.83	<0.17
TE44B	9/12/89	Diesel Excavation	0.36	<0.83	1.0	4.8	0.79
TE52	9/12/89	Northern Waste Oil	4.6	<0.83	<0.83	4.5	3.4



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Organic Lead Results From Soil Samples in Diesel Excavation

FIGURE 6-14

Table 6-4

SOIL ANALYTICAL RESULTS
FROM THE DIESEL EXCAVATION
EPA METHOD 6010 FOR ORGANIC LEAD

Sample Number	Date	Location	OPb mg/kg
TE7	9/11/89	Diesel Excavation	<0.3
TE12	9/11/89	Diesel Excavation	<0.3
TE18	9/11/89	Diesel Excavation	<0.3
TE31	9/11/89	Diesel Excavation	<0.3
TE35	9/11/89	Diesel Excavation	<0.3
TE42	9/12/89	Diesel Excavation	<0.3
TE44B	9/12/89	Diesel Excavation	<0.3

diesel #2-D standard. The chromatogram is more suggestive of the diesel #1-D standard. This may suggest that the source pre-dates the use of diesel #2-D onsite in 1974.

Sample TE1, obtained near the western tank's fill port, was analyzed by both EPA Method 8015 and 418.1. The EPA Method 418.1 indicates significantly higher levels of contamination than does the EPA Method 8015. The EPA Method 418.1 cumulatively measures all hydrocarbon species present in the sample, including those higher weight compounds which are not amenable to the EPA Method 8015. This difference in the analytic results may indicate that the surface soil was also contaminated by a higher weight hydrocarbon which could not be quantified by the gas chromatograph. It is possible that motor oil spilled from buses may be a source of the higher molecular weight hydrocarbon contamination in this area.

TE2, collected near the eastern tank's fill port, had high levels of contamination. The chromatogram for this sample indicated the same carbon range as TE1, again suggesting that the dominant contaminant was not the diesel #2-D currently used on site. TE3, in the central eastern portion of the excavation, also followed this pattern.

6.3.2 2- To 3-Foot Samples

The 2 to 3-foot lift contained contamination in the southern portion of the excavation. The hydrocarbons present in the soil at this depth appeared similar to the diesel #1-D standard and the chromatograms of the soil samples from above. The retention times of the contaminant species present in the soil partially overlap those of diesel #2-D, but again fall short of the total retention times noted for the diesel #2-D. The contamination at this depth is apparently associated with the fill ports of the storage tanks and the main mass of contamination likely occurred prior to the 1974 use of diesel #2-D on site.

6.3.3 4-Foot Samples

The 4-foot lift has two samples located at the northeastern end of the excavation with high levels of contamination. The chromatograms for these samples suggest a contamination mix of the diesel #1-D and diesel #2-D. Due to the proximity of these samples to the product pumping station, it is possible that the contamination emanated from this area. The suggested mixture of diesel products is conceivable since both were used at different times at the site.

There is no indication of contamination at the southern end of the excavation at this depth, suggesting that shallower contamination, likely associated with the fill ports, had been removed during excavation procedures.

6.3.4 7- to 10-Foot Samples

The 7- to 10-foot lift of soil yielded moderately high levels of contamination at the northern end of the excavation. TE22 had a contaminant retention time and mass curve indicating a mixture of diesel #1-D and diesel #2-D range contamination. TE24 falls entirely in the range of a diesel #1-D product, as does TE26. These results suggest, as they did for the previous soil lift, that contamination in this area and depth is associated with more than one source. The suggestion is that the source area is the pump area and the product changed when the fuel supply onsite was altered.

The southern end of the excavation displayed very low levels of contamination at this depth, generally below detection limits. Chromatograms cannot be assessed when samples are at low concentrations of detectability. These samples support the information from the 4-foot lift which suggest that contamination had been removed in this area.

6.3.5 14-Foot Samples

Soils from the 14-foot lift of soil contain very low to non-detectable levels of hydrocarbon contamination throughout the excavation. These samples suggest that all contamination associated with the tanks had been removed through excavation. As discussed above, useful comparative chromatograms are not generated at low hydrocarbon concentrations.

6.3.6 16-Foot Samples

Soil samples obtained from the 16-foot lift show a remarkable increase in contaminant concentrations. All samples, with the exception of TE41A and TE35 show hydrocarbon concentrations above 4,000 ppm. This shows an abrupt increase in contamination within a 2-foot depth interval. The chromatograms obtained from this depth exhibit contamination entirely within the diesel #1-D range for all samples except TE44B, which appears to be a diesel #1-D and diesel #2-D mix.

The abrupt increase in contaminant levels coupled with the lack of tank system corrosion suggests that contamination is the result of either vapor phase or capillary fringe contamination associated with the free product underlying the site. This conclusion is further supported by the close match between the chromatograms of soil at this depth and the free product chromatograms. The low levels of hydrocarbons contained in TE35 and TE41A at 16 feet bgs, is surprising. Contamination due to capillary action would be expected to be relatively continuous at a given depth. These anomalies, however, can be attributed to changes in lithology or the inexactness of bucket sampling.

SECTION 7
REMOVAL OF DIESEL LINES

7.1 Diesel Line Inspection

Inspection of the diesel lines followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results as presented below in 7.2. Sampling methodologies are provided in Appendix F.

The diesel lines associated with the active system were removed in stages, dependent upon location. This methodology was selected to minimize the operational impacts to the Greyhound Maintenance Center.

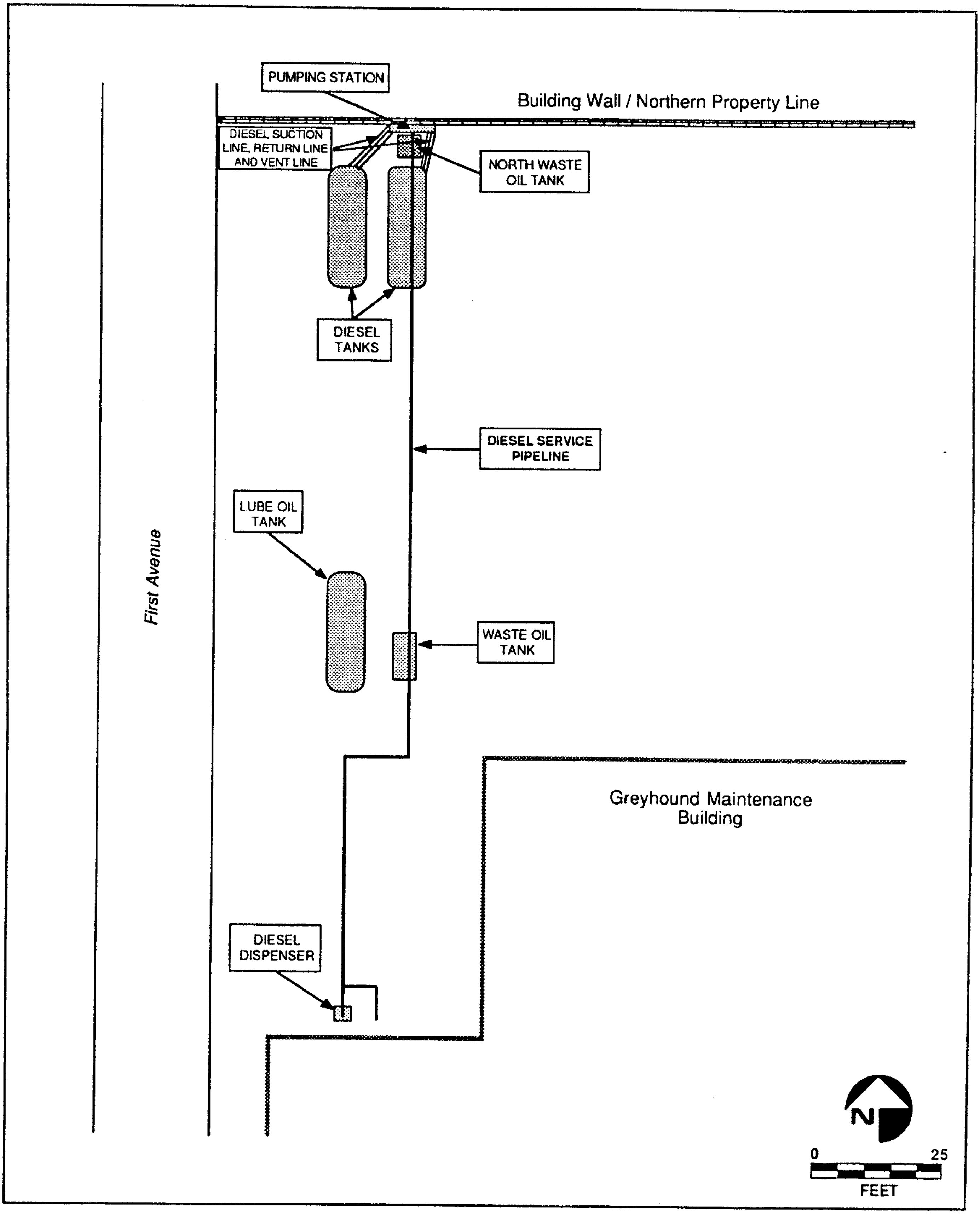
The fuel product line ran from the aboveground pumping station south to the fuel dispenser near the wash bay (Figure 7-1). Three service lines were associated with each diesel tank. Following is the inspection discussion of the product and service lines.

7.1.1 Diesel Service Line from Pumping Station to Fuel Dispenser

On September 11, 1989, a portion of the diesel service line was removed where it crossed the diesel tank excavation. This portion of the line ran from the aboveground pumping station to the southern extent of the diesel excavation and passed over the east diesel tank approximately 2 feet bgs. A photo of the pumping station is presented in Figure 7-2. Exposure of the line in this area coincided with excavation work for the diesel tank closure. Surface soil was removed to expose the top of the line. The soil was carefully removed by manual excavation to assure that there would be no damage to the service line.

The service line was inspected in-place by ERCE personnel to more accurately assess the operational state of the line. The line was made of fiberglass and appeared to be in very good condition. The exterior of the line was dry, clean, and had a glossy surface suggesting that no degradation of the fiberglass line had occurred.

The line was gently shifted from its resting place to allow for inspection of the soil beneath. Soil underlying the line was inspected for signs of diesel leakage such as staining and odor.



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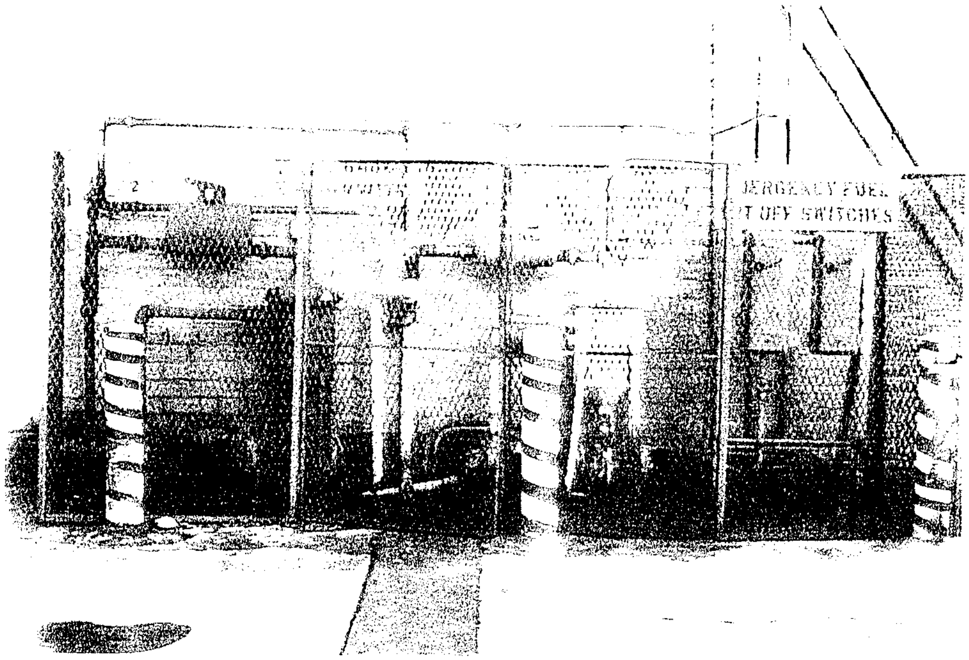
Diesel Service Line

FIGURE 7-1



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Pumping Station

FIGURE
7-2

Insitu OVA sampling yielded a variety of results ranging from low to moderate levels of hydrocarbon vapor. The readings were low at the northern portion of the excavation, ranging from 55 to 90 ppm. From the middle of the diesel excavation to the southern extent, readings ranged from 400 to 900 ppm.

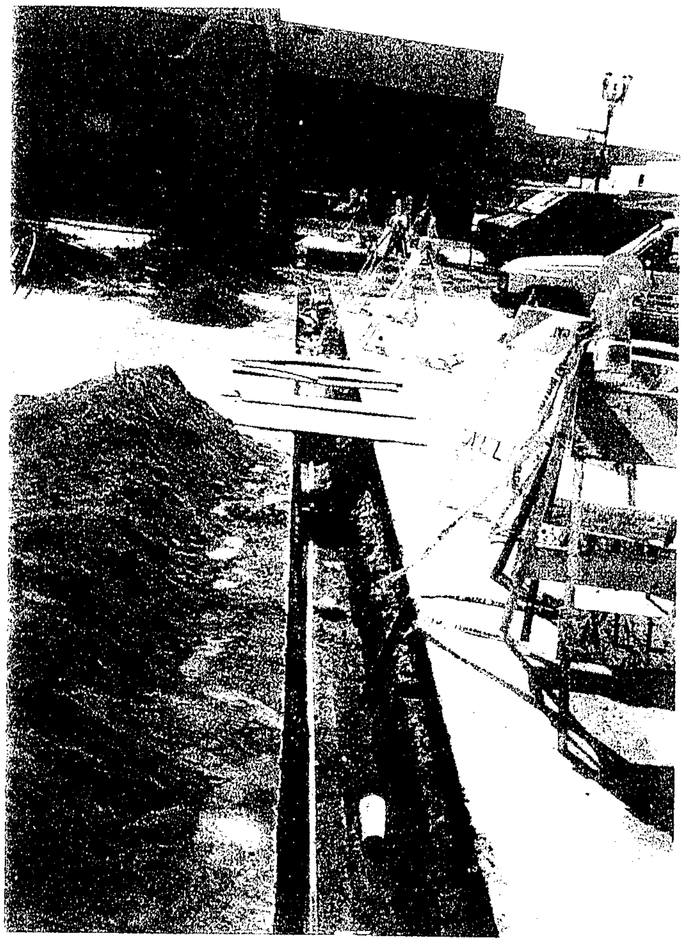
There was not any obvious correlation between the OVA readings and the visual inspection. As noted above, the visual inspection indicated that the line was intact. It is possible that the observed OVA readings resulted from leakage associated with the fill ports for the diesel tanks. The diesel line and backfilled trench also could have served as a conduit for a surface source of contamination.

The fiberglass line was left in place until September 14, 1989. The line was then removed, labeled, and placed in a designated area for inspection by DOHS personnel. Soil samples TE9 through TE15 were obtained from this area.

On September 13, 1989, during the lube oil and waste oil tanks excavation, the diesel service line was uncovered crossing the eastern portion of that excavation. The line was carefully exposed and inspected in situ along with the surrounding soil. The soil surrounding the line was damp and a medium grey in color. There were no diesel fuel odors emanating from the area although a septic odor was associated with the diesel line trench. It was noted that an oil/water separator existed about 30 feet to the south of the lube oil and waste oil tanks excavation, near the diesel line location. It is possible that wastewater from this separator could be the source of the odor if leakage had occurred into the line trench at some time in the past. After inspection and sampling, the line was sawcut, capped, labeled and removed from the oil tank excavation. Soil samples OE20 and OE21 were obtained from this area.

On September 9, 1989, the remaining portions of the diesel service line were exposed. The line remained in place between the diesel tanks and the lube oil and waste oil tanks excavations, and at the southern extent near the fueling bay awaiting DOHS inspection. The service line and surrounding soil were closely inspected by an ERCE geologist.

The diesel line running north/south between the lube oil and waste oil tank excavation and the diesel tank excavation appeared to be in good condition (Figure 7-3). The bonds between joints were strong with no signs of leakage or degradation. The line trench was dry with no staining or odor, except at the north segment, closest to the diesel excavation.



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Diesel Service Line Excavation
South of Former Tanks

FIGURE 7-3

It is thought that this contamination is associated with the nearby diesel fill port, rather than the diesel service line. Soil samples OE51 and OE52 were acquired from this section of the service line trench.

In the area south of the lube oil and waste oil tanks excavation, there was moisture and an odor of sewage associated with the service line trenching (Figure 7-4). The line itself was in good condition, but was damp due to the general wetness of the soil. There was no indication that the moisture was due to the diesel service line.

There was visually contaminated soil noted near the terminus of the service line to the dispenser station (Figure 7-5). The service line split into two sections as it approached the dispenser. The easterly section was the active service line. The westerly section was capped beneath the service island. The sources of soil contamination in this vicinity appeared to be associated with the dispenser and/or the service line at the "T" intersection.

7.1.2 Diesel Service Lines From Tanks to Aboveground Pump Station

The service lines for the suction pump system were uncovered between 2 and 4 feet below ground surface during the diesel tank excavation on September 11, 1989. There were three service lines associated with each diesel tank, all constructed of tar-coated steel. There was one suction line from the foot valve on each tank to the aboveground pump station, one return line to the storage tank, and one vent line which connected to a capped standpipe (Figure 7-1).

The diesel suction lines were uncovered manually to allow in place observation of their condition. The connections into the diesel tanks were closely inspected for signs of leakage and none was noted. The steel lines appeared in good condition and the protective coating on the lines was fresh and tacky. Soil contamination was noted in the northeastern portion of the excavation near the aboveground pump station. It is thought that the soil contamination was associated with seeps from the pumping station itself, and not active leaks in the service lines. This is supported by OVA and visual evidence which shows contamination levels increasing as the pumping station is approached.

The lines were saw cut above the elbows at the diesel tank to allow for removal of the tanks from the excavation. No leakage occurred during the cutting procedure. The diesel service

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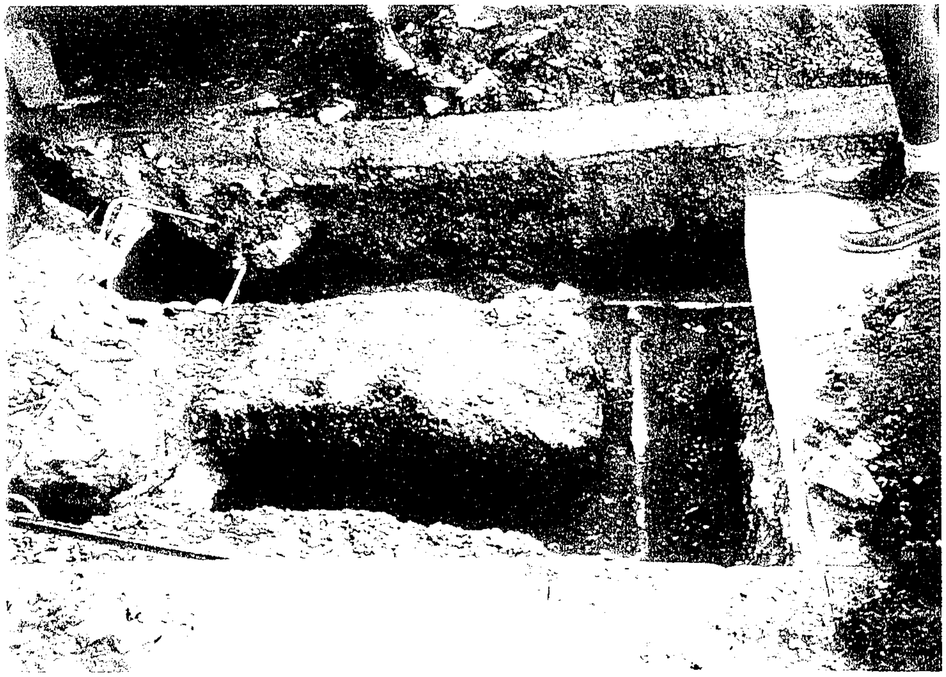
Diesel Service Line Excavation
South of Former Tanks

FIGURE

7-4



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Diesel Service Line Excavation
Former Dispenser

FIGURE
7-5

lines were removed on 9/14/89 with the aid of the backhoe. The pipes were bent by the backhoe upon removal but were still determined to have good integrity. The lines were labeled and placed in an assigned area for DOHS inspection.

7.2 ANALYTICAL RESULTS

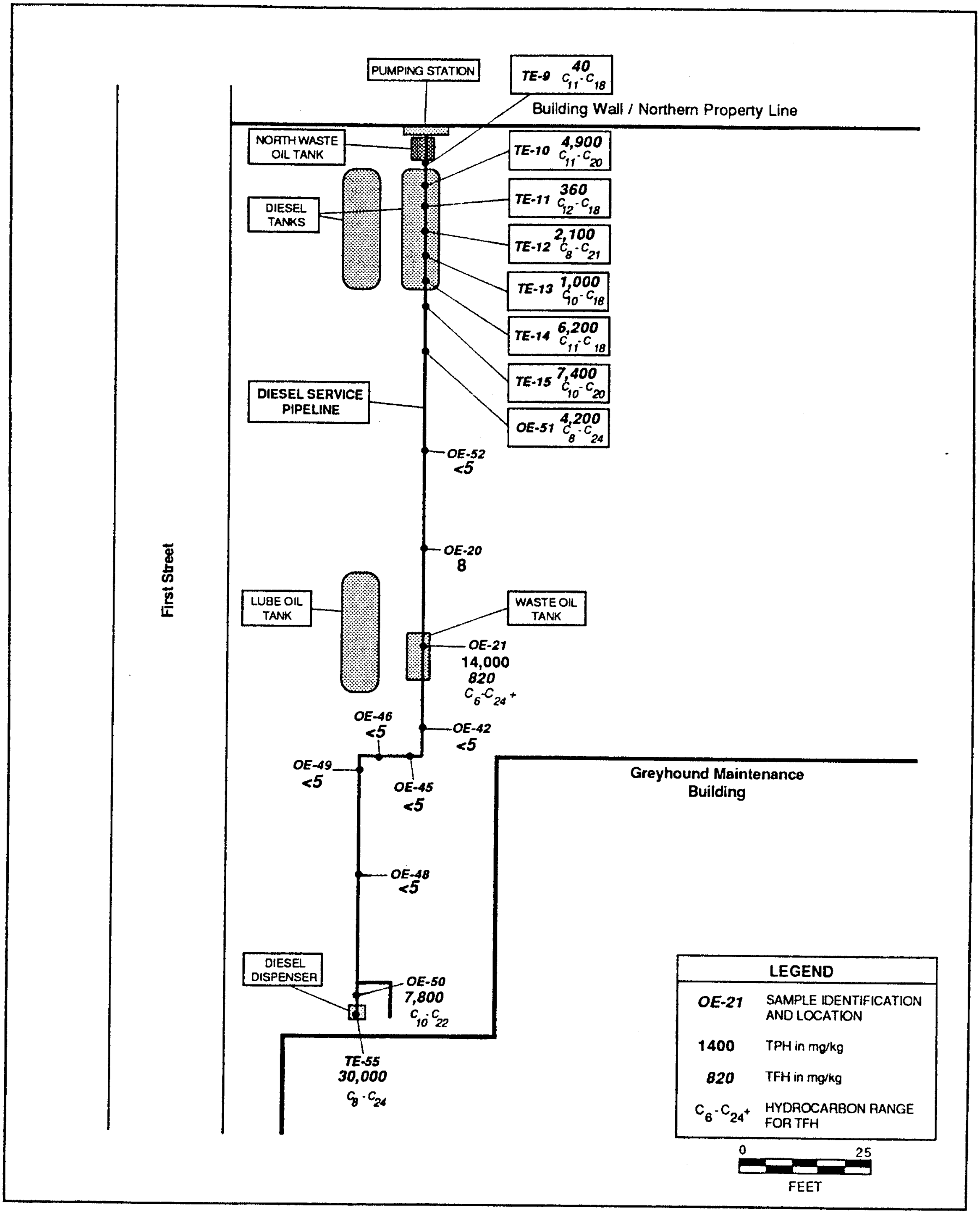
The diesel service line extended from the pumping station near the northern property line to the former diesel dispenser under the bus fueling/cleaning bay. Eighteen soil samples were collected beneath the pipeline (Figure 7-6 and Table 7-1).

TE14,TE15 and OE51 acquired near the fill port on the south end of the eastern diesel tank, all contained elevated TFH levels of 6,200, 7,400, and 4,200 mg/kg. The contaminated soil beneath the pipeline in the diesel excavation was removed during the 4 through 10-foot lifts. Soil samples taken at 14 feet bgs, beneath TE14 and TE15 did not detect fuel hydrocarbons.

The contaminated sample OE51, noted beneath the pipeline just south of the diesel excavation, was further excavated to remove all contaminated soil and to attain confirmatory samples. Four samples collected from a depth of eight feet below ground surface in this area showed no visible signs of contamination and head space analyses were below 50 ppm. All samples, analyzed for total fuel hydrocarbons, did not indicate TFH above the level of detectability (<5 mg/kg). The samples taken along this stretch of pipeline had hydrocarbon chains within the C8 to C24 range.

Two samples were taken along the service line within the lube oil and waste oil tanks excavation (OE20 and OE21). OE20 detected 8 mg/kg TFH. OE21, which had a sewage odor, indicated a TPH concentration of 14,000 mg/kg and a TFH level of 820 mg/kg with a carbon range quantified as C6 to C24+. The contaminated soil was removed during excavation of the lube oil and waste oil tanks.

No levels of TFH were detected south of the oil tanks except at the dispenser location where OE50 and TE55 were collected. TE55, located 1.5 feet below ground surface, indicated a TFH level of 30,000 mg/kg and a carbon range of C8 to C24. OE50,taken at three feet below ground surface, contained a TFH level of 7,800 mg/kg with carbon range of C10 to C22.



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TPH and TFH Results Along Diesel Service Pipeline

FIGURE 7-6

Table 7-1

SOIL ANALYTICAL RESULTS FROM THE DIESEL LINE TRENCHES EPA METHODS 418.1 AND 8015 (CDOHS MODIFIED)

Sample Number	Date	Methods 418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
TE9	9/11/89	NA	40	C_{11}-C_{18}	Diesel
TE10	9/11/89	NA	4900	C_{11}-C_{20}	Diesel
TE11	9/11/89	NA	360	C_{12}-C_{18}	Diesel
TE12	9/11/89	NA	2100	C_{8}-C_{21}	Diesel
TE13	9/11/89	NA	1000	C_{10}-C_{18}	Diesel
TE14	9/11/89	NA	6200	C_{11}-C_{18}	Diesel
TE15	9/11/89	NA	7400	C_{10}-C_{20}	Diesel
OE20	9/13/89	8	NA	NA	NA
OE21	9/13/89	14,000	820	C_{6}-C_{24+}	Diesel
TE55	9/14/89	NA	30,000	C_{8}-C_{24}	Diesel
OE42	9/18/89	NA	<5	--	--
OE45	9/18/89	NA	<5	--	--
OE46	9/18/89	NA	<5	--	--
OE48*	9/26/89	NA	<5	--	--
OE49*	9/26/89	NA	<5	--	--
OE50*	9/26/89	NA	7800	C_{10}-C_{22}	Diesel
OE51*	9/26/89	NA	4200	C_{8}-C_{24}	Diesel
OE52*	9/26/89	NA	<5	--	--

*INDICATES CDOHS SAMPLE

NA - NOT ANALYZED BY THIS METHOD

7.3 Diesel Lines Discussion

Contamination detected along the diesel service line was identified at several locations with levels exceeding 1000 mg/kg. The higher levels of contamination occurred near the diesel excavation (fill ports), the diesel dispenser, and the waste oil tank. The samples were collected at 1.5 bgs.

Since the product line appeared to be in good condition, it does not appear to be the cause of the shallow soil contamination. It is possible that the pipeline excavation, which contains fill material that is more permeable than the formation adjacent to it, acted as a migration pathway for contamination. Sources of mitigation contamination might include surface spills or leakage near the diesel fill ports. Most of the chromatograms generated for samples along the diesel line are very suggestive of the diesel #2-D standard.

A contaminated area noted beneath the service line above the southern waste oil tank was run for TPH and TFH. The TPH result was 14,000 mg/kg while the TFH was 820 mg/kg. The sample was not hydrocarbon stained, however the soil was damp and smelled strongly of sewage. It is thought that the TPH analysis was potentially quantifying hydrocarbons which were present and associated with the sewage rather than the petroleum hydrocarbon source. This is supported by the fact that the soil sample contained no oily residue. In addition, the hydrocarbon chain range C_6-C_{24}+ quantified by the TFH analyses is much broader than would be expected for diesel contamination.

SECTION 8
DIESEL FUEL DISPENSER AREA

8.1 INSPECTION

Inspection of the diesel fuel dispenser followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented below in Section 8.2. Sampling methodologies are provided in Appendix F.

The active diesel dispenser is the termination point of the active product line. On September 14, 1989, as the diesel line was uncovered at its southern extent, an inspection was performed on the soils underlying the dispenser. The dispenser and associated diesel lines are depicted in Figure 7-4.

The diesel line has a "T" junction five feet north of where the line connects to the dispenser. From the "T", a line extends to the east 7 feet then south 5 feet. This second line apparently was installed coincidentally with the diesel service line in order to have the option of installing a second diesel dispenser. GLI personnel indicated that this line was never used.

The soil between the "T" and the dispenser was a damp gray, medium sand (SP), with a strong hydrocarbon odor. The sand appeared to be the same as the backfill material noted in the lube oil tank excavation (Section 11). Contamination was evident within the area bounded by the "T" in the diesel lines (Figure 7-3).

There were no active leaks evident at the time of the line removal, but it is thought that there was a leak associated with the diesel line filter coupling. This was suggested by the backfill soil being saturated with hydrocarbon and having a strong diesel odor.

On October 23, 1989 the active diesel dispenser was moved to the east 12 feet, since the extent of contamination could not be ascertained with the dispenser in its former place. On October 25, a 10- x 14-foot rectangle of concrete was broken and removed from the area of the former diesel dispenser. Soil was removed to a depth of 3 feet bgs. A copper water line was noted to run diagonally across the excavation at a depth of 2 feet bgs. The line was manually exposed with a shovel to avoid potential damage using a backhoe. The two samples collected at 3 feet bgs were odriferous and appeared visually contaminated, so excavation proceeded to 6 feet bgs at which time three more soil samples were collected. Soil staining was patchy in the six-foot lift and was most severe in the corners of the excavation with the exception of the northeast corner.

On October 31, excavation in the dispenser area was continued to a depth of 9 feet bgs due to the high contaminant concentrations identified in previous soil samples. Four samples were obtained from this depth from in each corner. Staining was apparent in the western half of the excavation and a diesel odor was noted.

On November 8, excavation was continued laterally and vertically as seen in the photo in an attempt to establish the extent of fuel contamination (Figure 8-1). An additional 70 square feet of concrete was removed to enlarge the excavation to the south. Soil was removed to a depth of 12 feet bgs in the new and existing parts of the excavation. Four samples were collected from the floor of the excavation at 12 feet bgs and a wall sample was collected from each wall at 6 feet bgs. During removal of the soil from 9 to 12 feet bgs, a fairly strong degraded diesel odor was noted.

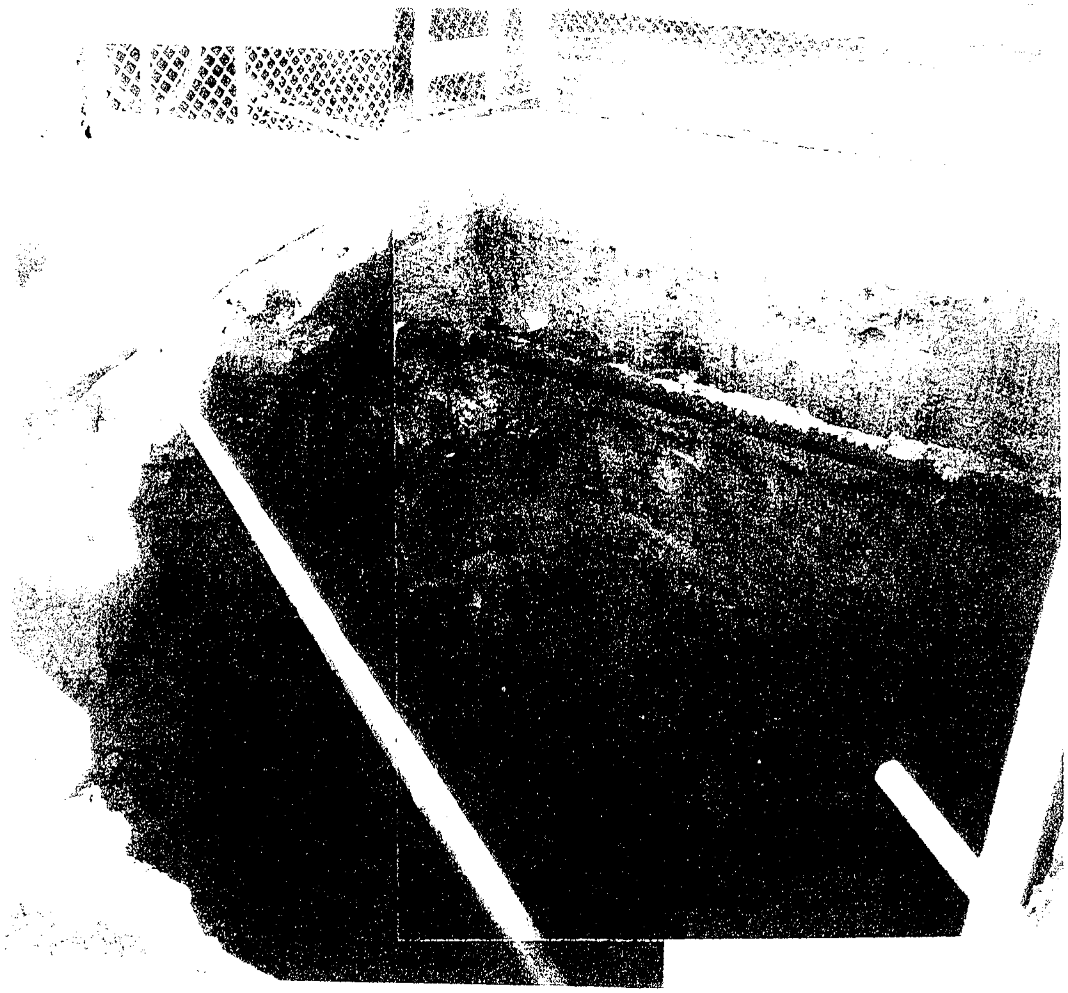
Two black lenses of wood were noted on the south and the east wall at 2.5 and 6.5 feet bgs. The lenses were approximately 3 inches thick and discontinuous. A sewer pipe discovered in the south end of the excavation ran east-west and was 2 feet bgs. Soil around the pipe was very moist and had a sewage odor.

On November 16, the dispenser excavation was backfilled and a new concrete cap was poured.

8.2 Analytical Results

8.2.1 Near Surface

On September 14, 1989, one soil sample underlying the fuel dispenser was taken in order to characterize the contamination noted there. TE55 was taken at 1 1/2 feet below ground surface, directly under the dispenser. On 9/26/89, another sample was acquired beneath the dispenser area, under DOHS direction. Sample OE50 was taken from 2 1/2 feet



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Diesel Dispenser Excavation

FIGURE
8-1

below ground surface. Both samples were analyzed by EPA Method 8015 (Modified) for TFH. The sampling locations are shown in Figure 7-4, the results are given in Table 7-1.

TE55 had TFH levels of 30,000 mg/kg, and sample OE50 contained TFH levels of 7800 mg/kg. These high levels of contamination were expected from the inspection of the area, which indicated high levels of contamination being present.

8.2.2 3-Foot Lift

Two samples were taken from the 3-foot lift in areas of visually contaminated soil (Figure 8-2). TE70 obtained from the northeast corner, detected 2100 mg/kg TFH. TE71, collected from beneath the former dispenser, detected 6700 mg/kg.

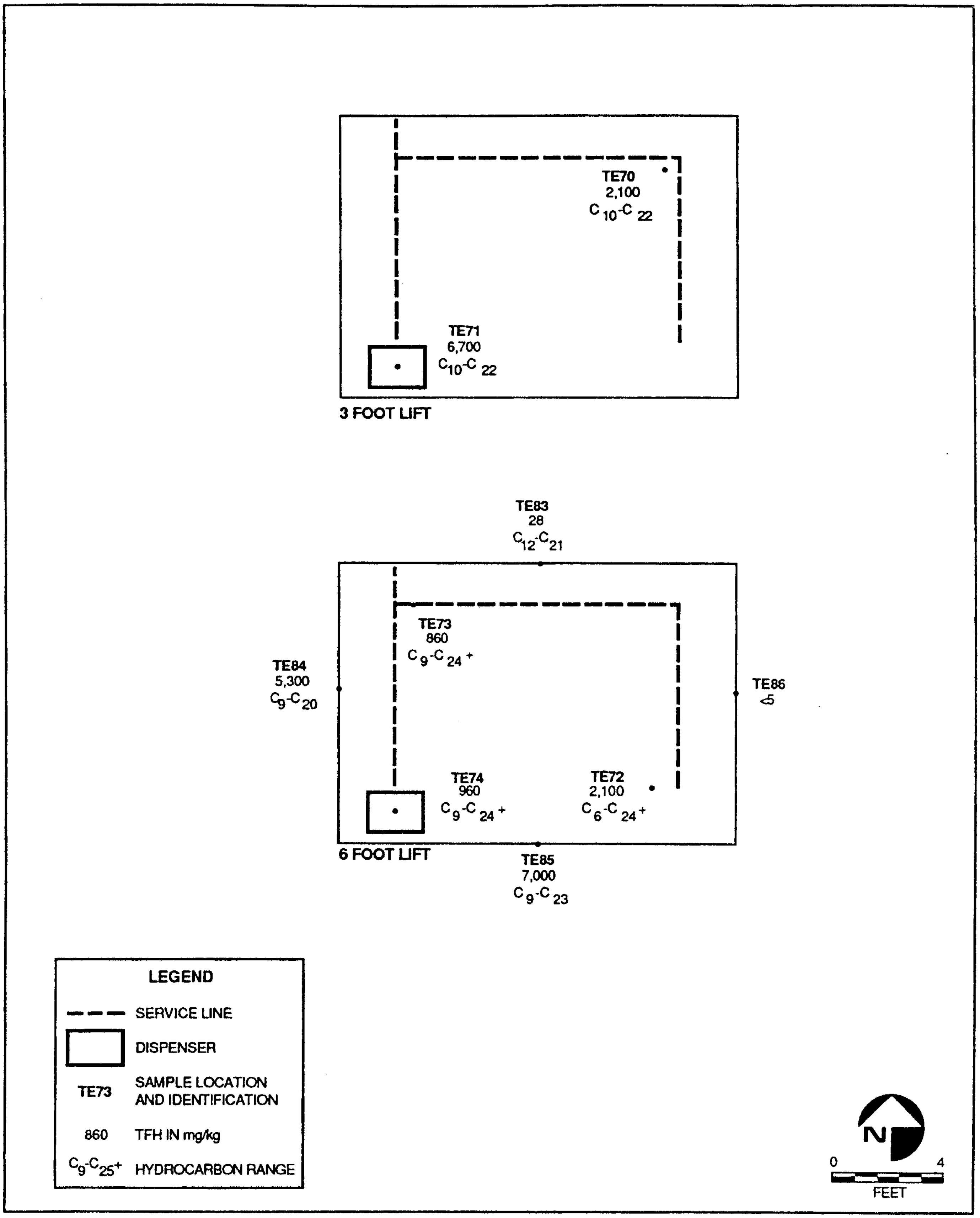
8.2.3 6-Foot Lift

Samples TE72 to TE74 were collected from a depth of 6 feet bgs (Figure 8-2). TE72, obtained below the termination of the secondary line, contained 2100 mg/kg TFH. TE74, below the former dispenser, and TE73, below the "T" junction, contained 960 mg/kg and 860 mg/kg TFH, respectively. TE83, from the north wall, contained 28 mg/kg and TE86, from the east wall, had non-detectable levels of TFH.

Four wall samples were collected. TE84 and TE85, obtained from the west and south wells, contained 5300 mg/kg and 7000 mg/kg TFH, respectively.

8.2.4 9-Foot Lift

Samples TE75 to TE78 were taken in the corners of the excavation from a depth of 9 feet bgs (Figure 8-3). TE75 contained 2700 mg/kg TFH and was obtained below the former dispenser. A TFH level of 2200 mg/kg was detected in TE76, which was collected beneath the "T" in the diesel line. TE78 was taken from the northeast corner of the excavation and contained 180 mg/kg TFH. TE77, obtained below the termination of the secondary line, did not contain any level of TFH.



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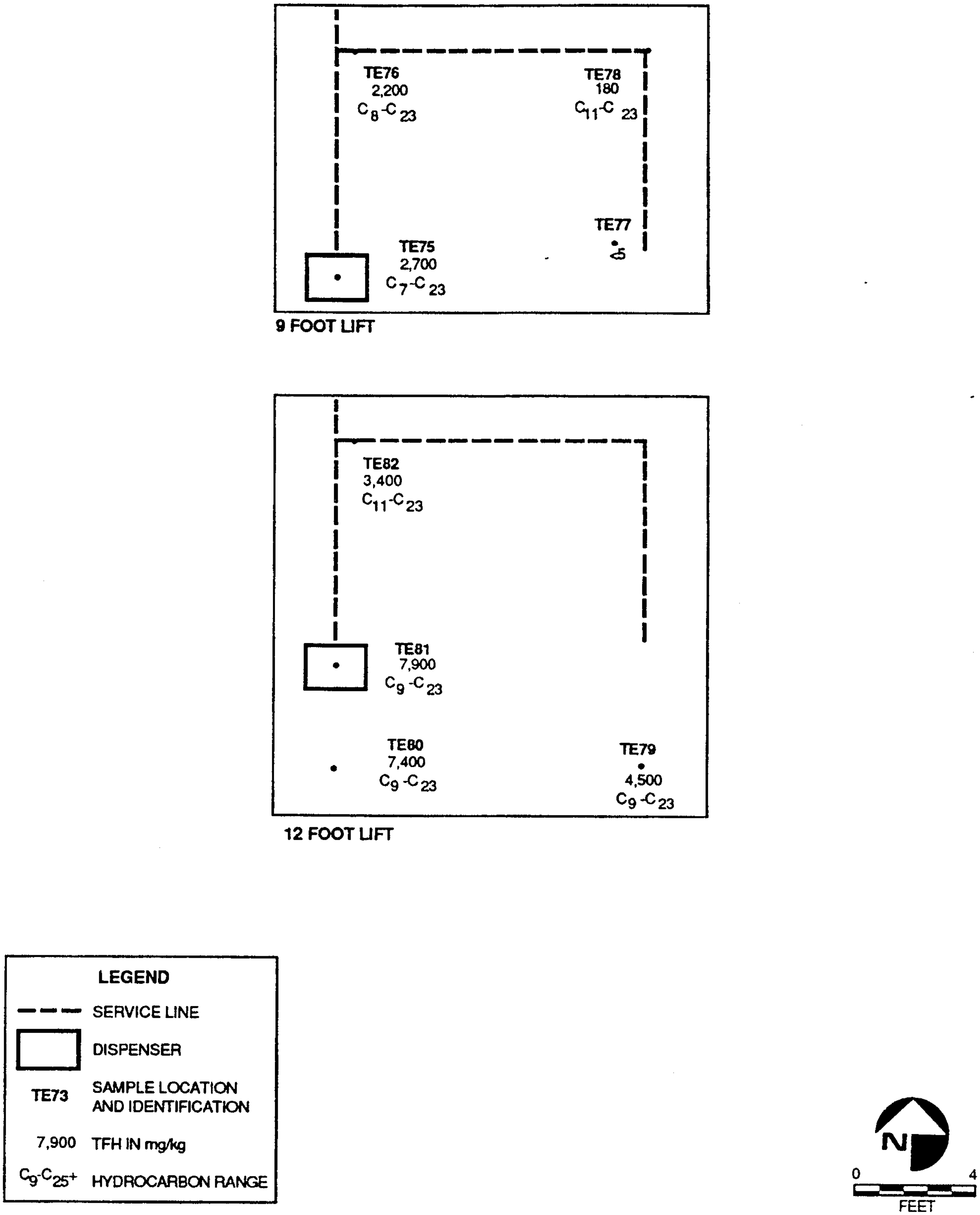
TFH Results in Soil Samples Collected in the Former Diesel Dispenser Area

FIGURE

8-2



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TFH Results in Soil Samples Collected in the Former Diesel Dispenser Area

FIGURE

8-3

8.2.5 12-Foot Lift

Samples TE79 to TE82, taken at 12 feet bgs indicate that fuel contamination is still significant at this depth. TE82, obtained below the "T" in the service line contained 3400 mg/kg. A TFH level of 7900 mg/kg was detected in TE81, which was collected below the former diesel dispenses. Samples TE80 and TE79 were collected south and southeast of the former diesel dispenser. These samples contained TFH concentrations of 7400 mg/kg and 4500 mg/kg, respectively.

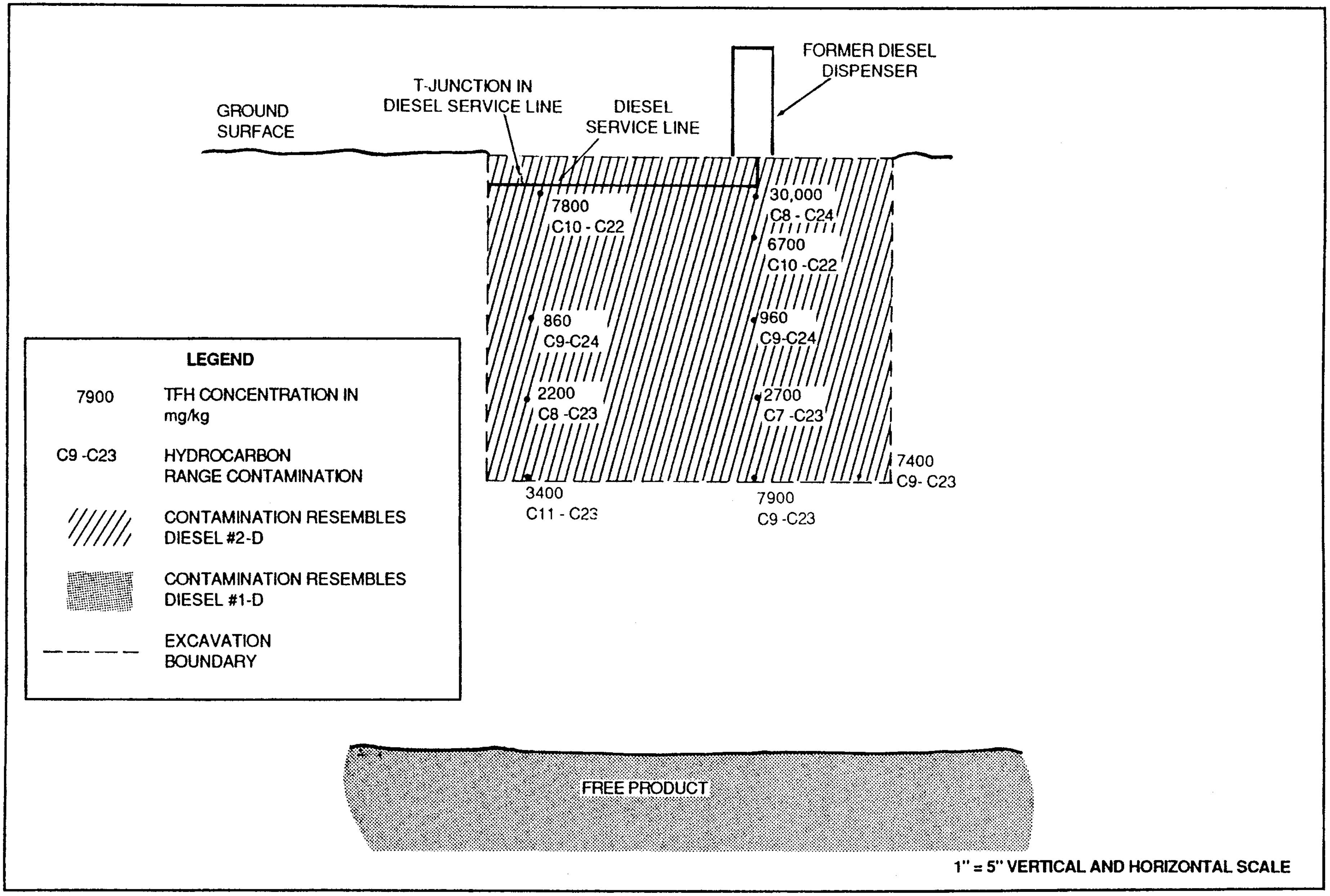
8.3 Analytical Discussion

Near surface soil samples and the samples from depths down to 12 feet bgs indicate that moderate to high levels of TFH contamination were present in the fuel dispenser area. The chromatograms (Appendix D) for all samples taken in this area are similar to each other and suggest that the source of fuel hydrocarbons was diesel #2-D. The chromatograms for these samples bear close resemblance to the chromatograms of the GLI diesel #2-D fuel as well as the diesel standard.

A decrease of concentration with depth is expected for a surface source of contamination. In the fuel dispenser area, TFH levels declined from the near surface samples to the 6-foot bgs samples. However, concentrations increased from 6 to 9 feet bgs and from 9 to 12 feet bgs (Figure 8-4). This increase in contamination with depth could be attributed to the inconsistencies incurred by backhoe sampling.

Soil contamination in the dispenser area was remediated to the north and east by soil removal. Contamination to the south, west, and vertically was not fully remediated due to the close proximity of the building foundation and underground utilities.

It is believed that diesel #2-D contamination does not extend to the water-table because the free product samples taken from MW3 and MW4 located near the dispenser area resemble diesel #1-D. There is no evidence that diesel #2-D has been introduced into the plume.



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Cross-section View of Excavation Beneath
Diesel #2-D Dispenser, Looking East

FIGURE

8-4

SECTION 9
REMOVAL OF FORMER DIESEL/GASOLINE LINES

9.1 INSPECTION OF FORMER LINES

Inspection of the diesel/gasoline lines followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgment. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented below in Section 9.2. Sampling methodologies are provided in Appendix F.

On September 14, 1989 three parallel steel lines were uncovered during excavation of the area below the pumping station (Photo 1, Figure 9-1). The lines appeared to run along the northern property edge in an easterly direction from the pumping station. The northernmost two lines terminated at uncapped standpipes which surfaced at the pumping station. The southernmost line did not surface in this area. All three lines were cut and capped so that excavation in this area could proceed. The southern line, when cut, leaked water which was stagnant and rusty. The northern lines were empty but a hydrocarbon odor was noted. By inserting a rod down the two northern lines it was determined that they ran 45 feet east of the pumping station along the northern property edge. It was assumed that the lines either terminated or changed course at this position.

On September 26, 1989 the concrete was sawcut, broken, and removed from above the three lines. The soil was manually excavated from above the lines. Two samples were collected from beneath the lines as directed by a DOHS inspector. The soil beneath the lines appeared unstained and dry along most of the trench. The sample collected beneath a joint and near the point 45 feet east of the pumping station was stained and had a hydrocarbon odor.

On September 27, 1989 the lines were further uncovered. The southern, water line, continued to run eastward parallel to the northern property edge. The other two lines turned south at a point 45 feet east of the pumping station. At this time, the excavated area was broadened to an approximate rectangle which was 7.5 feet wide and extended 16 feet south of the northern property line. Exposing this rectangle revealed the termination of the two lines which had turned south (Figure 9-2).

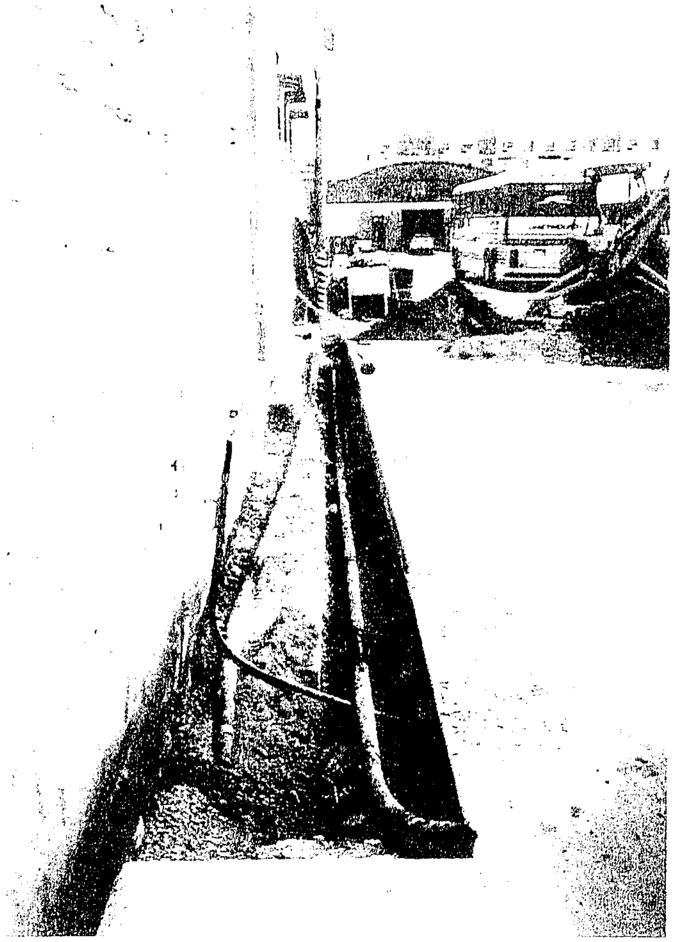

Photo 1. Former fuel lines along northern property edge

Photo 2. Looking south at former fuel lines

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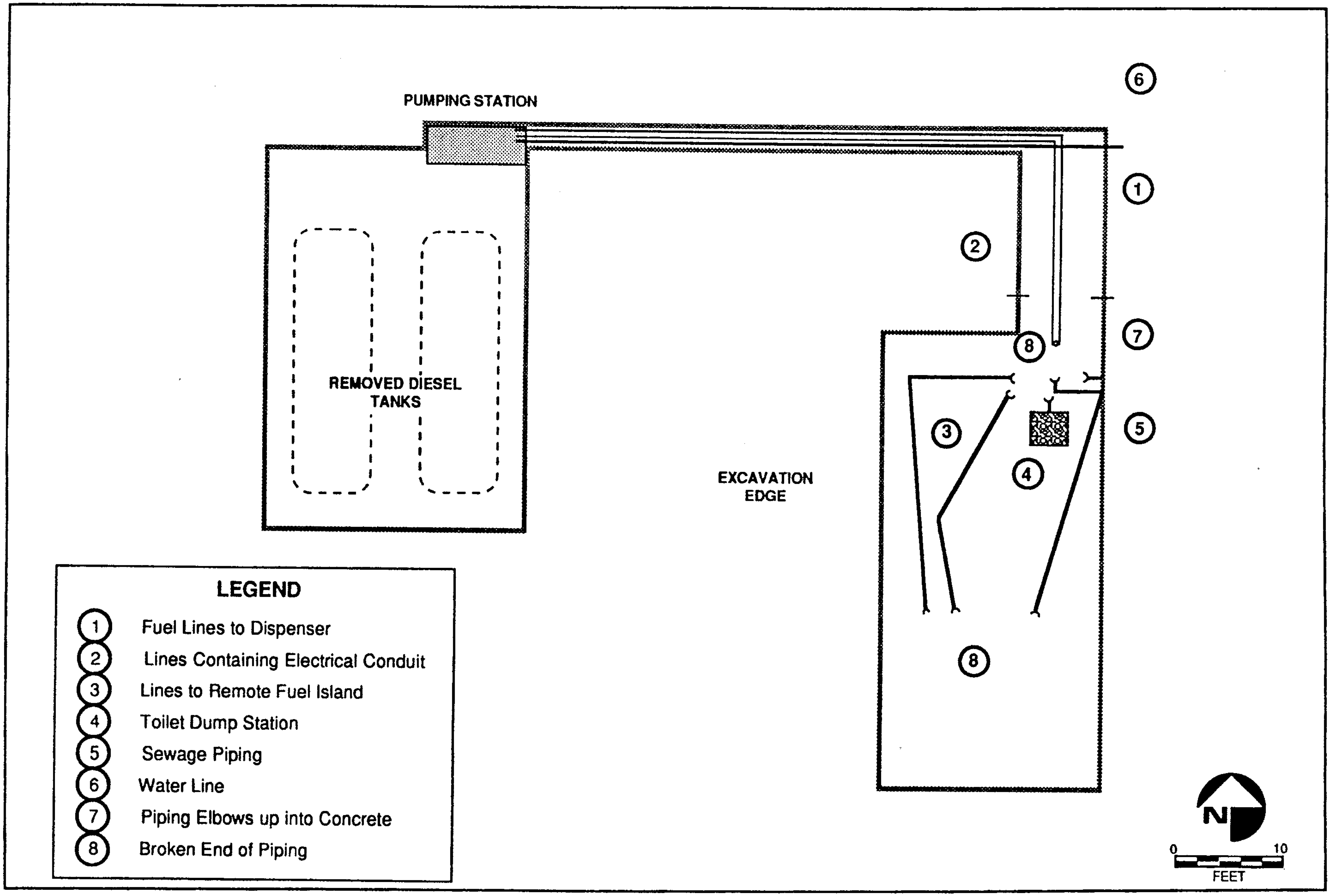
Former Gasoline/Diesel #1-D Lines

FIGURE 9-1



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Structures Exposed During Excavation of Pre-1974 Pipelines

FIGURE 9-2

The two lines, apparently associated with the fueling operations at GLI prior to 1974, extended approximately 18 feet south of the property and then elbowed up into the concrete. Corrosion was present along these lines especially where they terminated. This location appears coincident with a location of a wall-mounted fuel dispenser associated with the former service bay structure (Section 2.3).

A number of other lines, of varying function, were located during this phase of excavation. Two pipe segments were noted running parallel to 12 feet south of the northern property line. The segments were found on either side of the excavation. The piping connecting them was broken and pieces were removed by the backhoe. An electrical conduit was noted in the piping. Both pipes were highly corroded and partially disintegrated.

Two pipe segments were noted 1 foot bgs in the west wall in the southwest corner of the excavation. One pipe, 19-feet south of the property edge, headed west and the other, 21-feet south, headed southwest. The soil surrounding these pipes was stained. Both of the lines were in a degraded state, with corrosion holes and rust prevalent.

Two pipes were noted on the south wall of the excavation. One of these was located 2-feet bgs, the other 1-foot bgs. The latter pipe went east 6 feet and then appeared to turn.

One sewer pipe segment was noted in the east wall, 2.5-feet bgs and 20-feet south of the property edge.

On October 2, 1989 the area was excavated to a depth of 8 feet and samples were collected. The soil still appeared stained and gave off a hydrocarbon odor similar to the shallow soils. To locate the destination of the two lines heading west and southwest, more concrete was broken and removed on October 9, 1989.

The earlier noted line that headed west, turned south at a swivel joint. The southwest heading line turned south at an elbow joint. These two lines and a third line heading south terminated 38.5 feet south of the northern property edge as seen in Photo 2 in Figure 9-1. These lines had not been placed in backfilled trenches, rather lay unprotected just beneath the concrete slab. The lines appeared to be tar coated, but in most areas the coating had flaked off the lines. The eastern and central line were in the best shape. The western line, however, was quite corroded and was underlain in some spots by severely stained soil. The soil emitted a degraded hydrocarbon odor. None of the lines were capped at the ends.

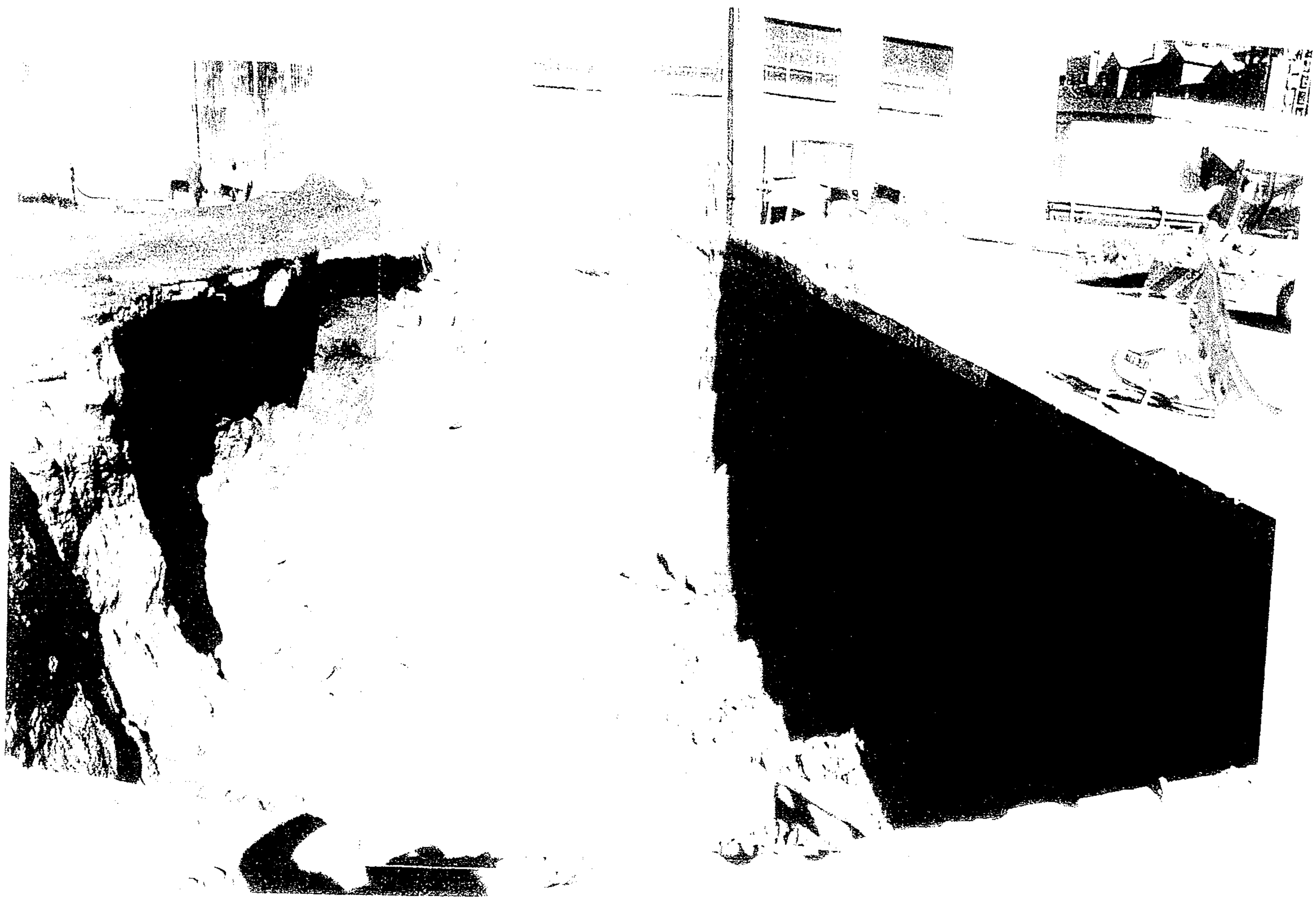
The area of termination of these lines appears similar to the area of the former fuel island associated with the pre-1974 GLI structure (Figure 2-3).

On October 10, 1989 excavation continued until a depth of 13 feet was achieved throughout the area where concrete had been removed. Stained and odoriferous soils were present in the northern part of the excavation during all activities. A pipe segment noted on 10/2/89 connected into an historic toilet dump station. The toilet dump station was discovered 22 feet south of the property line and 8-inches bgs. It was metal and had been filled with concrete.

During the excavating, a new pipe segment was noted in the west wall of the excavation, 1.5-feet bgs and 50-feet south of the property line. This pipe headed southwest. Concrete was broken and removed above this line for 5 feet and the line was manually exposed. This line appeared to be much older than the others found in the excavation. It was made of metal which shattered upon touch. A carbonate scale was observed inside the pipe up to half an inch thick. The soil beneath and beside this pipe segment was neither stained nor odoriferous. This line was assumed to be a steamline, associated with the lumberyard occupying the site prior to the 1954 presence of GLI. It is known from historic research that a large steam kiln was operated in this vicinity. This line was not further exposed since it was deemed not to be associated with GLI and not a contaminant source.

On October 31, 1989, 20 soil samples were collected in a grid pattern from the excavation floor at a depth of 13 feet bgs. These samples were obtained to assess the extent and pattern of soil contamination along the floor of the excavation. The samples from the northern third of the excavation were severely stained, and emitted a strong diesel and occasionally gasoline odor.

On November 8, 1989, due to the continued high levels of contamination along the floor of the excavation the grid pattern sampling method was conducted again at 15.5 feet bgs and 17 feet bgs. Thirty-four soil samples were collected during this phase; seventeen at each depth. The samples at 15.5 and 17 feet bgs appeared severely stained. The samples at 17 feet bgs had an overwhelming odor and appeared to have at some time been saturated with free product. Following the grid sampling, the excavation was enlarged in the northwest corner. Samples were collected from 5, 8 and 13 feet bgs. The excavation at this time was 20 feet by 64 feet and 15.5 feet deep (Figure 9-3).



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Extent of Excavation Below Pre-1974 Fuel Lines

FIGURE 9-3

9.2 Analytical Results

Soil samples were taken in conjunction with the removal of the former diesel/gasoline lines and other unknown lines during the excavation of contaminated soils beneath these lines. All the samples collected were analyzed by EPA Method 8015 modified (CDOHS method) for total fuel hydrocarbons.

Seven samples were collected immediately beneath piping (Figure 9-4). OE53 and OE54, along the northern property edge, detected less than 5 mg/kg and 3,500 mg/kg TFH, respectively. OE55, collected beneath the point where the lines turned 90 degrees south, contained 6300 mg/kg TFH. OE56, collected beneath a joint in the piping, contained 3700 mg/kg. UE3,UE4 and UE5 were taken beneath the three pipeline segments which had been placed immediately below the concrete and apparently went to the pre-1974 fuel island. UE3, from beneath the west line, contained 7900 mg/kg. UE4, from beneath the central line, contained 640 mg/kg. UE5, from beneath the east line 21,000 mg/kg TFH. UE1 and UE2 were collected at 8 feet bgs and below the lines extending from the northern property edge to the pre-1974 fuel dispenser (Figure 9-4). These samples detected 3100 mg/kg and 6400 mg/kg, respectively.

Two samples collected south and west of the former fuel lines also contained elevated TFH concentrations (Figure 9-4). EF56, collected 5 feet bgs, contained 6700 mg/kg. EF30, from 8 feet bgs, contained 14,000 mg/kg.

Twenty-seven samples were taken from the floor of the excavation, at a depth of 13 feet bgs, in a tight grid pattern (Figure 9-5). The samples in the southern half of the excavation did not detect levels of TPH except EF2 with 24 mg/kg. The northern samples had elevated TPH levels ranging from 1600 to 16,000 mg/kg.

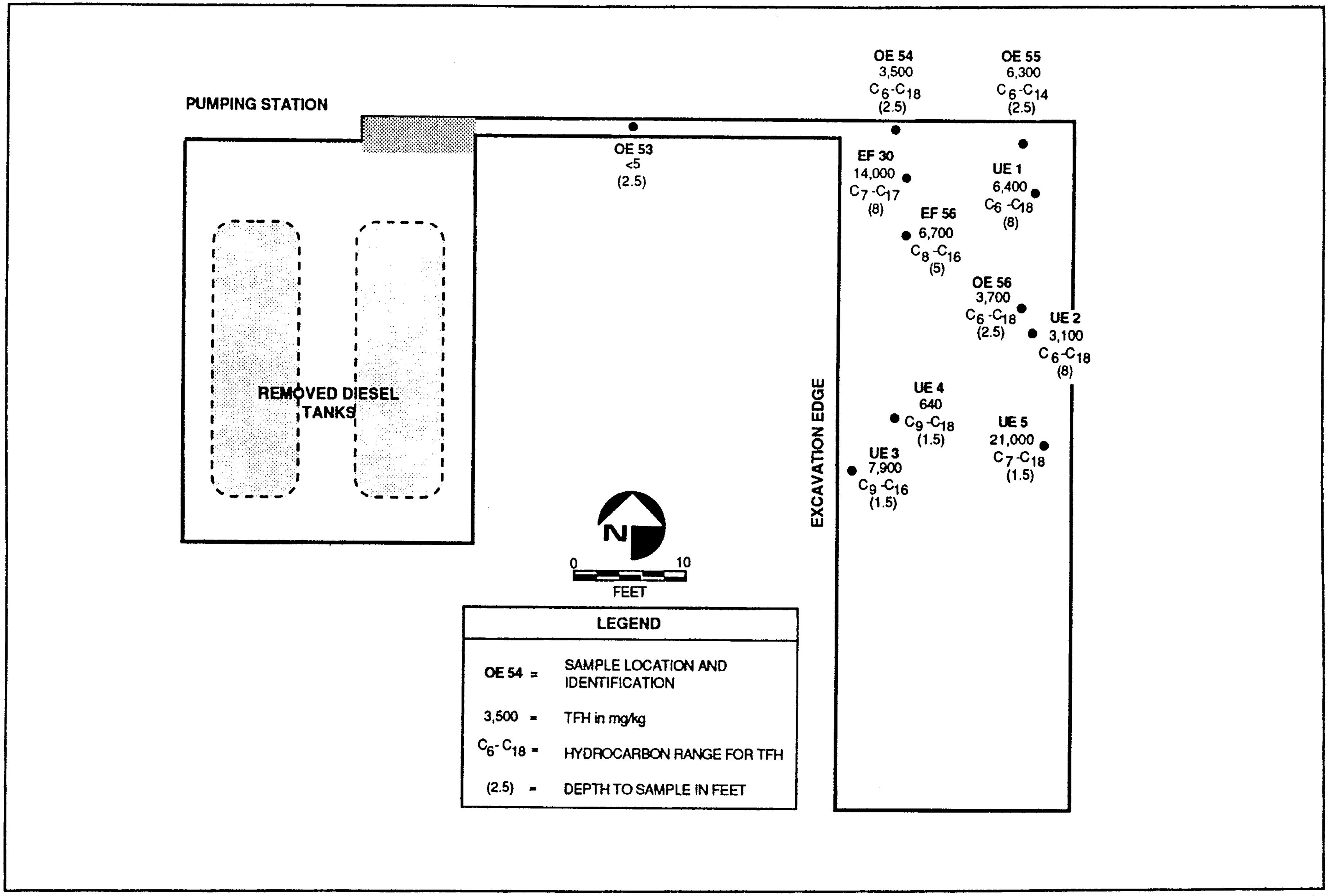
Seventeen samples were taken from the floor of the northern half of the excavation, at 15.5 feet bgs (Figure 9-6). The samples had significantly elevated TFH levels ranging from 890 mg/kg to 20,000 mg/kg, with seven of the sample's TFH levels exceeded 5000 mg/kg and six of these seven situated in the western half of the excavation.

Seventeen samples were taken from the northern half of the excavation at 17 feet bgs (Figure 9-7). The TFH levels in the samples ranged from 1500 mg/kg to 14,000 mg/kg. Thirteen of the samples' TFH levels exceeded 5000 mg/kg.

Table 9-1

SOIL ANALYTICAL RESULTS FROM BENEATH THE FORMER GASOLINE/DIESEL LINES (13-FEET BGS) EPA METHOD 8015 TOTAL FUEL HYDROCARBONS

Sample Number	Date	8015 mg/kg	Hydrocarbon Range	Quantified With
UE6	10-10-89	14,000	C_6-C_{18}	Diesel
UE7	10-10-89	320	C_9-C_{18}	Diesel
UE10	10-11-89	<5	--	
UE11	10-11-89	<5	--	
UE14	10-11-89	<5	--	
EF1	10-31-89	<5	--	--
EF2	10-31-89	24	C_{12}-C_{21}	Diesel
EF3	10-31-89	<5	--	--
EF4	10-31-89	<5	--	--
EF5	10-31-89	250	C_{10}-C_{16}	Diesel
EF6	10-31-89	28	C_{11}-C_{15}	Diesel
EF7	10-31-89	<5	--	--
EF8	10-31-89	<5	--	--
EF9	10-31-89	6300	C_6-C_{22}	Diesel
EF10	10-31-89	5300	C_7-C_{19}	Diesel
EF11	10-31-89	2400	C_8-C_{19}	Diesel
EF12	10-31-89	<5	--	--
EF13	10-31-89	1600	C_9-C_{18}	Diesel
EF14	10-31-89	7200	C_7-C_{17}	Diesel
EF15	10-31-89	2800	C_9-C_{18}	Diesel
EF16	10-31-89	1600	C_9-C_{18}	Diesel
EF17	10-31-89	2100	C_9-C_{18}	Diesel
EF18	10-31-89	8500	C_{10}-C_{17}	Diesel
EF19	10-31-89	8300	C_{10}-C_{17}	Diesel
EF20	10-31-89	660	C_6-C_{19}	Diesel



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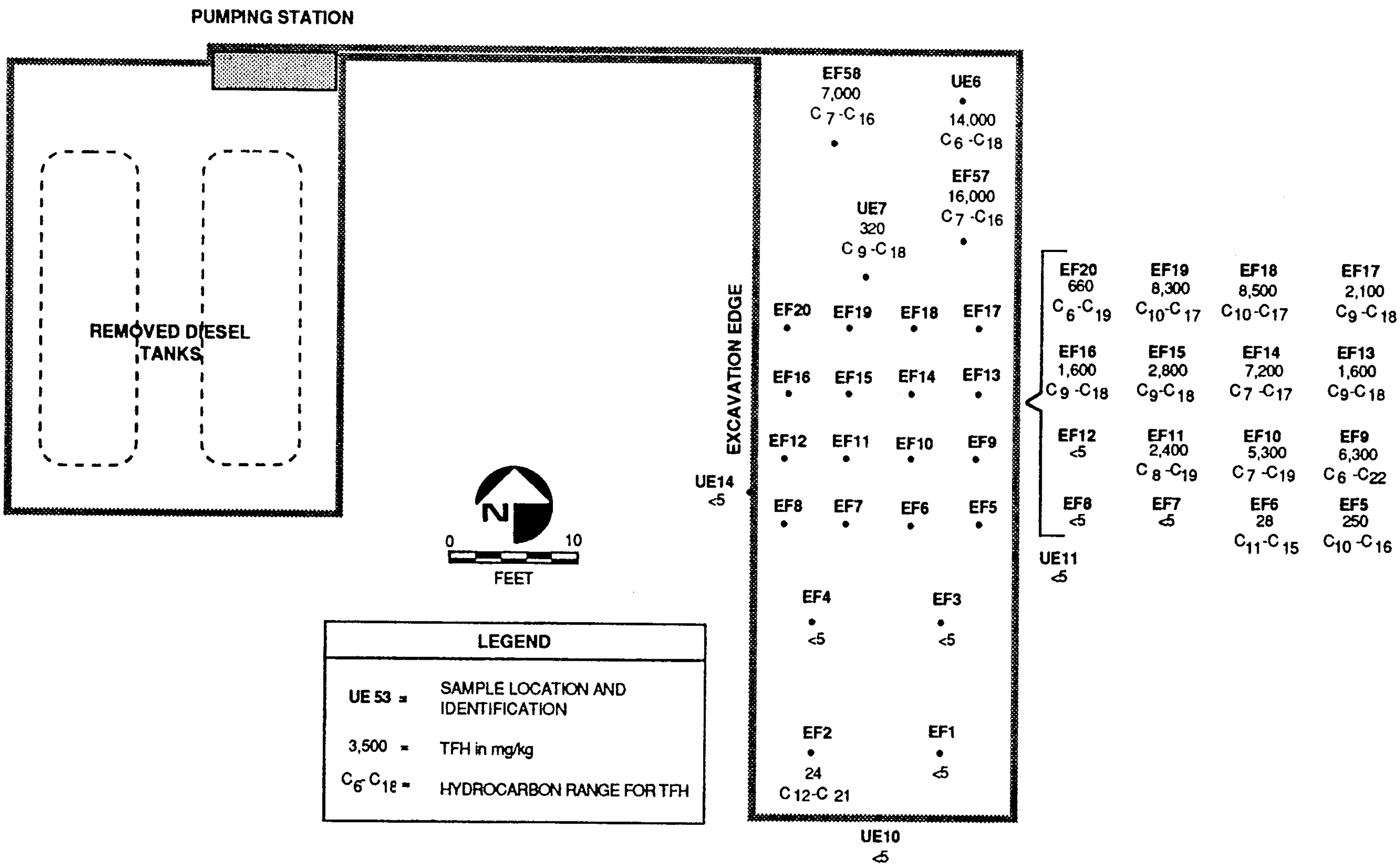
TFH Results in Soil Samples Beneath Pre-1974 Pipeline

FIGURE 9-4



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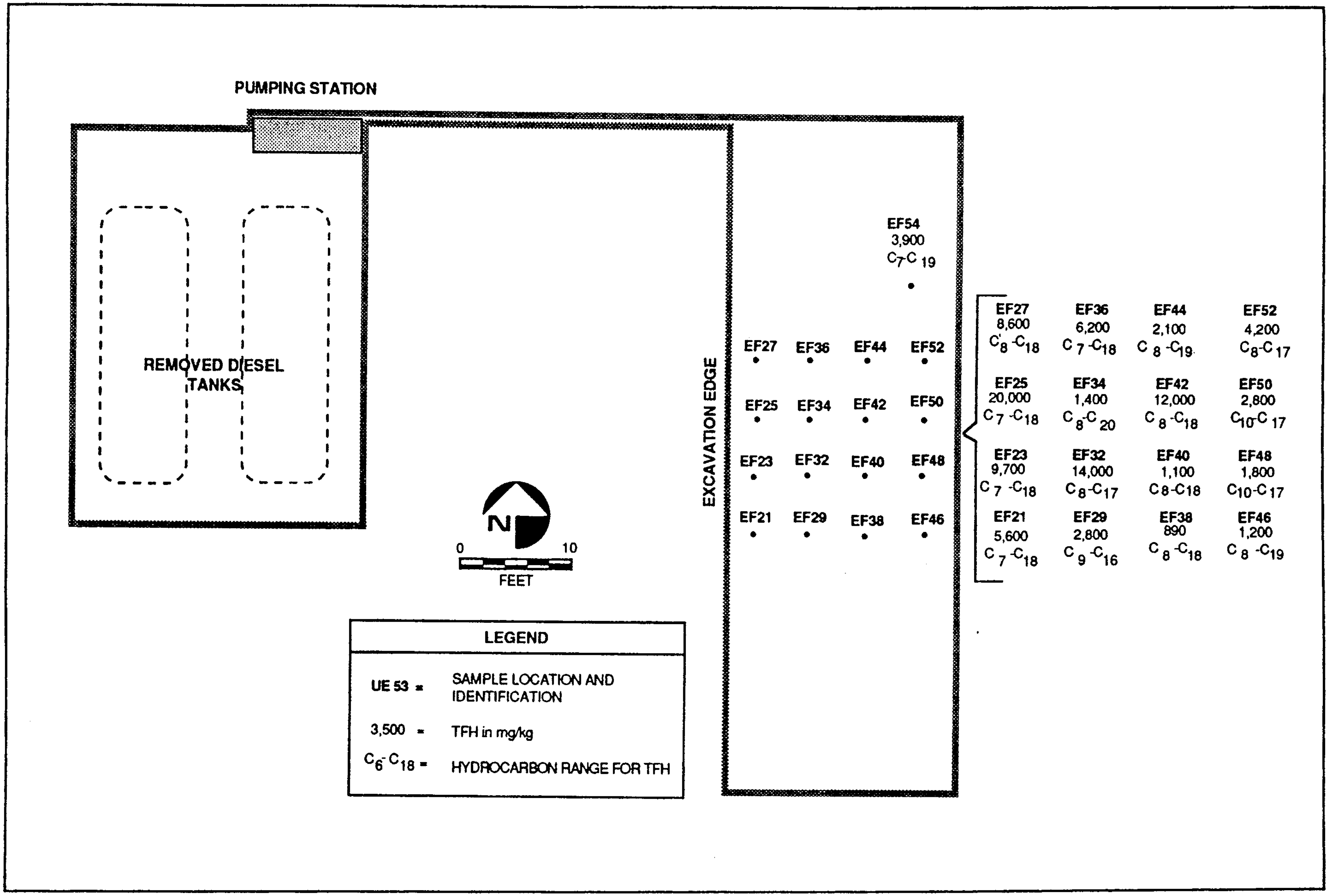
TFH Results in Soil Samples from 13 ft. Below Ground Surface

FIGURE 9-5



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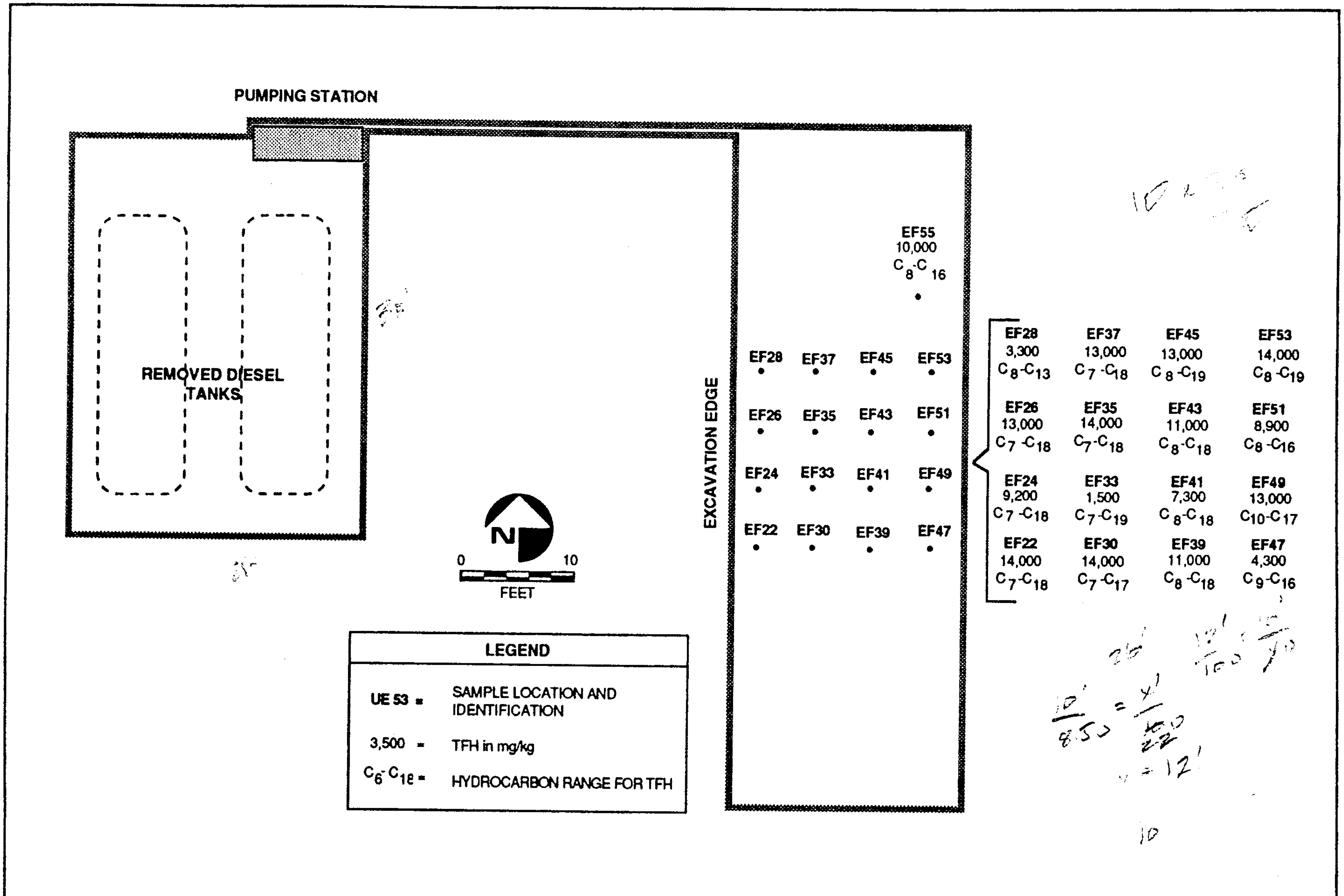
TFH Results in Soil Samples from 15'6" Below Ground Surface

FIGURE 9-6



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TFH Results in Soil Samples from 17 ft. Below Ground Surface

FIGURE 9-7

9.3 DISCUSSION

9.3.1 Surface to 8-Foot Samples

Of the seven samples collected beneath piping all contained elevated levels of TFH with the exception of OE53. The chromatograms (Appendix D) of soil samples OE54 to OE56, UE1, UE2, EF30 and EF56 have a contaminant retention time range and mass curve indicating a mixture of gasoline and diesel #1-D contamination. Samples UE3 to UE5, however, appear to have only a diesel #1-D source.

9.3.2 13-Foot Samples

Soil samples obtained from the excavation floor at the 13-foot depth still exhibit at relatively high levels of contamination. The most contaminated samples were collected from beneath the corner where the two fuel lines running alongside the building turned south, and beneath the termination of these lines into the concrete. The chromatograms for these samples indicate both a gasoline and diesel #1-D source.

Of the samples collected from the floor in the large area of the excavation, ten of twenty-seven samples contained levels of TFH exceeding 1000 mg/kg. This area of most severe contamination is found in the northern half of the excavation. The chromatograms of all the samples detecting TFH are similar to that of the diesel #1-D standard. Some of the samples (EF14, EF13, EF10, EF9, and EF20) also show a gasoline contaminant component.

Wall samples and the southern samples collected at this depth indicate that contamination has been removed laterally except to the north.

9.3.3 15-Foot and 17-Foot Samples

Soil samples from the 15- and 17-foot soil lifts exhibit severe levels of fuel contamination. The chromatograms indicate both a gasoline and diesel #1-D source, as similar to that seen in the shallower samples.

The chromatograms of all the samples resembled diesel #1-D. Some of the samples show a mixture of gasoline and diesel #1-D. The gasoline contaminated samples tend to be located proximal to the northern property edge.

Generally the concentration of TFH in the soil samples increases from 13 to 15.5 feet bgs and from 15.5 to 17 feet bgs. This suggests that capillary action on the free product below has impacted soils at 15.5 feet bgs and deeper.

9.3.4 General Discussion

The pipelines removed from this area were observed to be in varying degrees of integrity. Some holes in the piping walls and areas with severe corrosion were noted, especially at piping joints. A considerable amount of deterioration could have occurred since these lines were abandoned 15 years ago.

The fact that soil contamination resembling gasoline and diesel #1-D was detected in this area, coupled with the fact that gasoline and diesel #1-D were dispensed in the vicinity from 1954-1974, implies that it is likely that the lines are the source of the TFH in the soils. However, it is uncertain whether this source of contamination contributed to the plume.

SECTION 10
NORTHERN WASTE OIL TANK REMOVAL

10.1 NORTHERN WASTE OIL TANK INSPECTION

Inspection of the northern waste oil tank followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented in Section 10.2. Sampling methodologies are provided in Appendix F.

One steel waste oil tank existed on the northern portion of the site. The tank was installed in 1954 with the two diesel tanks and was used from 1954-1974. A product information tag found on the tank was only partly legible. The 550-gallon tank was manufactured by Rheem Manufacturing Company in 6/51 and was constructed of 12 gauge steel.

The abandoned waste oil tank was uncovered on September 14, 1989 following the removal of the diesel fuel tanks from the same area on an earlier date. Once uncovered, an industrial cleaning company cold cut the top of the tank and triple rinsed the interior. Inspection followed the industrial cleaning.

A close visual inspection of the interior of the tank showed the tank as being in very good condition (Figure 10-1). No corrosion was noted to breach the tank wall and all seams were intact. The bottom of the tank had a dull metallic sheen, suggesting little corrosion.

The soils surrounding the waste oil tank were generally in good condition, with some staining noted around the northern portion of the tank area. The staining did not appear to be that indicative of waste oil, but seemed to be associated with the diesel pumping station. The staining worsened with approach to the pump area, supporting this contention. There were no service lines associated with the abandoned tank, just a fill port and a vent line.

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Northern Waste Oil Tank

FIGURE 10-1

SECTION 11
LUBE OIL AND WASTE OIL TANKS

11.1 OIL TANK INSPECTION

Inspection of the oil tanks followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented in Section 11.2. Sampling methodologies are provided in Appendix F.

One 8,000-gallon lube oil and one 550-gallon waste oil tank existed in the central western portion of the site. Product information tags were found on both but were mostly illegible. The 8,000-gallon lube oil tank had an Underwriters Laboratories Registration No. 0806420 and was constructed of steel. The 550-gallon waste oil tank was manufactured by Joor Manufacturing of 12 gauge steel in 1970. The Underwriter's Laboratories registration number on this tank was illegible. These tanks were installed in 1974 during construction of the present maintenance center.

Removal of the concrete overlying the oil tanks begun on 9/13/89 by Angus Asphalt. The soils immediately underlying the surface cover were inspected to determine if contamination from above had occurred. The soils appeared to be in good condition, with minor staining existing only in the areas immediately surrounding the fillpipes.

Soil and backfill materials removed were stockpiled on plastic adjacent to the excavation as described in Appendix D. The piles were segregated according to depth in order to facilitate stockpile characterization.

The first 2-foot lift of soil revealed three main soil types including a native, red-brown fine-grained, sand (SP), a light gray medium-grained sand (SP) and a tan fine- to medium-grained sand (SP). The native soil was located in the western portion of the excavation. It was noted in earlier work, however, that native soil existed further to the east in the new diesel tank area. It may be that the tan soil, which was structurally quite similar to the red-brown soil, was native. The gray medium-grained sand appeared to be backfill.

The grey sand was anomalous from other soils discovered onsite in both color and odor. The odor originating from this material seemed to be that of sewage. This odor was particularly strong in damp areas beneath the diesel product line which crossed the central east side of the excavation. There is an oil/solids separator located approximately 30 feet to the south of the lube oil tank excavation. The diesel line trench crossed very near the separator area. It is hypothesized that the separator may have leaked into the diesel line trench at some time(s) in the past. The clean and permeable, medium-grained sand could have served as a conduit for migration of the waste waters.

The soil types encountered in the 4-foot lift remained consistent with those described above. The gray sand was dominant in the excavation, apparently being the fill soil associated with the tank installation. The odor of sewage was diminished slightly in this lift from that above. Though the sand was a gray color, there did not seem to be contamination in the soil from the oil tank system. There were no oily soils or stains anywhere in the proximity of the tanks and ancillary lines.

The tops of the tanks and product lines were uncovered during the 4-foot lift. The metal surface of both tanks was in good condition, with no visible signs of leakage. The lube oil tank had two fiberglass service lines, one suction and a vent line associated with it. The waste oil tank had a similar set up with both lines being constructed of steel. The joints and elbows connecting the service lines to the tanks were all in good condition, with no signs of degradation or leakage into the surrounding soil materials. The lines were labeled and removed from the excavation and placed in a designated area for CDOHS inspection.

Below the 4-foot level, it was not possible to inspect discrete lifts due to the presence of the tanks and slumpage. Samples were acquired using a backhoe. The backhoe operator was instructed by an ERCE inspector as to the necessary sampling locations. Soil at this lift was again dominantly composed of the gray backfill sand. Red-brown native soil existed at the east and west walls of the excavation. The native soil was best exposed along the western wall where the excavation was deepest. The eastern wall was shallow because of the small size and easy access to the waste oil tank. Soil contamination was not visually evident in this lift.

The oil tanks were inspected from above and appeared in good condition (Photo, Figure 11-1). No signs of leakage or corrosion of the underground system was noted.

10.2 ANALYTICAL RESULTS

10.2.1 Total Petroleum Hydrocarbons

Eight soil samples were collected from the waste oil tank excavation (Table 10-1 and Figure 10-2) and analyzed for TPH (EPA method 418.1). Five samples taken from 3 to 5 feet below ground surface contained levels of TPH above 1000 mg/kg and three of these exceeded 5000 mg/kg. At a depth of nine feet below ground surface, analyses of soil samples TE57 and TE56 taken from the tank bed indicated that TPH levels had dropped to below 300 mg/kg.

10.2.2 Total Fuel Hydrocarbons

TFH analyses was also run on four soil samples (Table 10-1). TE67, TE50, and TE21 taken at a depth of 3 feet, contained 7,000, 230, and 9,400 mg/kg respectively. TE67 had a carbon range of C11 to C20 and TE21 had a range of C8 to C22, while TE50 had a narrower range of C9 to C16. TE65, collected from the tank bed, did not contain any detectable fuel hydrocarbons.

10.3 DISCUSSION

The TPH data indicate that soil contamination exceeding 1,000 mg/kg was present down to a depth of five feet below ground surface in the vicinity of the northern waste oil tank. Soil excavation occurred in this area down to 10 feet below ground surface. Two confirmatory samples, collected from 9.5 feet below ground surface contained TPH in the range of 250 mg/kg and a third obtained at a depth of nine feet below the pumping station did not show detectable levels of TPH. The waste oil tank was noted to have a very high degree of integrity with no observable corrosion, leaks or structural damage. This suggests that the source of contamination in this area was from the surface or from the pumping station.

The analytical data and chromatograms indicate that two different types of hydrocarbon contamination were present in the subsurface soils in the north waste oil tank area. Samples TE67 and TE50 were analyzed for both TPH and TFH. The TPH results indicate significantly higher levels of contamination than do the TFH results. The TPH data points

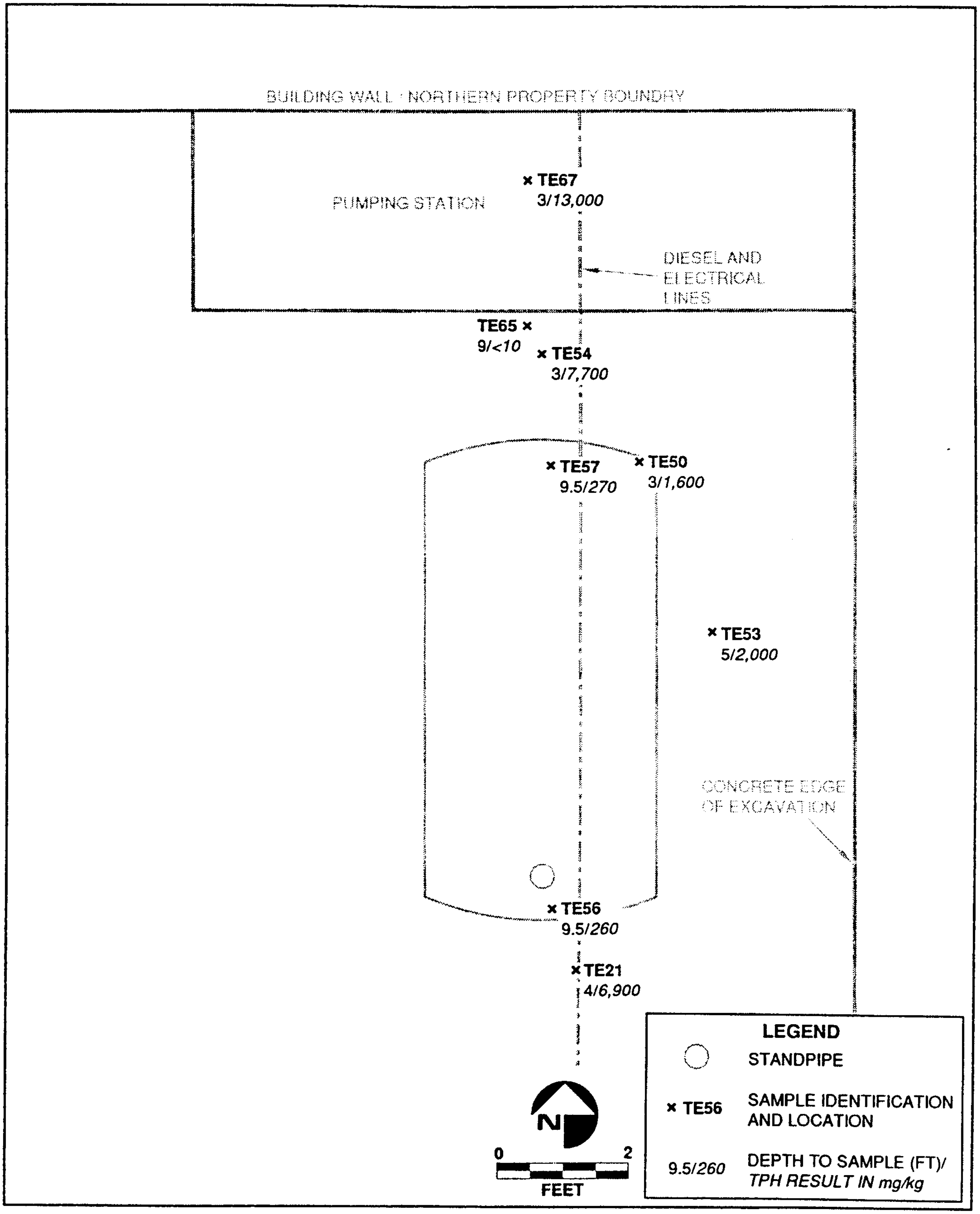
Table 10-1

SOIL ANALYTICAL RESULTS FROM THE NORTH WASTE OIL TANK EPA METHODS 418.1 AND 8015 (CDOHS MODIFIED)

Sample Number	Date	418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
TE21	9/11/89	6,900	9,400	C_8-C_{22}	Diesel
TE50	9/13/89	1,600	230	C_9-C_{16}	Diesel
TE53	9/14/89	2,000	NA	NA	NA
TE54	9/14/89	7,700	NA	NA	NA
*TE56	9/14/89	260	NA	NA	NA
*TE57	9/14/89	270	NA	NA	NA
TE65	9/18/89	<10	<5	NA	NA
TE67	9/18/89	13,000	7,000	C_{11}-C_{20}	Diesel

NA - NOT ANALYZED BY THIS METHOD

* - SAMPLES TAKEN FOR CDOHS



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TPH Results in Soil Samples from Northern Waste Oil Excavation

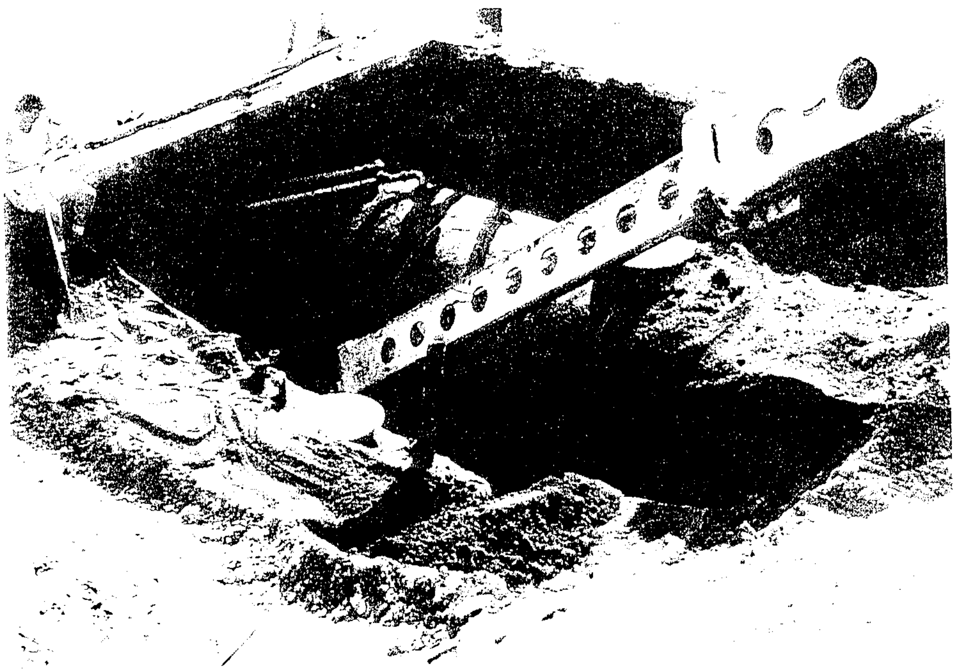
FIGURE **10-2**

to a higher weight hydrocarbon such as waste oil, which could not be quantified by the GC. The TFH data indicates that there is also the presence of a lower weight hydrocarbon.

The chromatogram for TE50 is suggestive of the diesel #1-D standard. The retention times of the contaminant species in the soil match those of this standard.

The chromatogram for sample TE67 indicates an apparent mix of diesel #1-D and diesel #2-D. The retention times of the initial contaminant masses match those of diesel #1-D and are earlier than for diesel #2-D. The ending retention times of the contaminant species are longer than for diesel #1-D and appear to match those of diesel #2-D. The chromatogram for TE21 again shows some overlap, but is a much better match with the diesel #2-D standard.

The mixture of hydrocarbon products in the soil that has been removed could be attributed to waste oil spilled near the tank's fill port, and diesel #2-D (post-1974) and diesel #1-D (pre-1974) spilled at the pumping station or at the northern fill port of the eastern diesel tank.



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Lube Oil and Waste Oil Tanks Partially Exposed

FIGURE 11-1

Soil in contact with the tanks was loose, fairly dry, and unstained. The gray sands did, however, exhibit an organic odor similar to sewage.

The final excavation lift proceeded to a depth of 12 feet below ground surface. As mentioned above, physical entry into the deep portion of the excavation was not deemed safe. The soils were therefore brought to the surface by the backhoe operator at the direction of an ERCE inspector. The soils at this depth again did not display contamination. Soils adjacent to the tanks were loose, fairly dry, and unstained.

At this point in the excavation work, the tanks were almost fully exposed. The oil tanks were in good condition with only very minor surface corrosion. All evidence indicates that the tanks were structurally intact with no breaches of integrity. Soil remained in contact with the tanks at the base and partially at the side walls. The area between the two tanks was completely exposed. An industrial cleaning company began the final decontamination of the tanks by removing the manhole cover in the center of each tank (Figure 11-1) The underground storage tanks were double rinsed prior to excavation and the final rinsing and inerting was completed at that time. All liquid and solid wastes withdrawn from the tanks or created during decontamination procedures were removed and disposed of in accordance with federal, state, regional, and local regulations.

After the underground oil tanks had been decontaminated, an inspector examined the interior of each tank for corrosion, leaks, or structural damage. The interior of the tanks exhibited good structural integrity. No points of daylight penetration were noted and all seams were in good condition. No cracking or separation along welds was observed. The tanks appeared to be in good condition and had not allowed escape of any contents into the environment.

Upon removal from the excavation, the tanks and associated piping were placed in a designated area for inspection by DOHS-HMMD and ERCE personnel. ERCE conducted a thorough external inspection of the tanks to verify the condition of the tanks as indicated by previous internal and external survey. Photographic documentation was taken to record the observations of the inspector. Following inspection, the tanks were placed on a truck and transported to an approved facility as specified in the tank disposal plan (Appendix A).

Following tank removal, inspection of the excavation was conducted. This was done to determine whether additional soils needed to be removed from the oil tank excavation due to contamination associated with the those tanks. It was determined that visual or OVA-detected contamination did not exist at the 12-foot or preceding lifts and that further excavation was unnecessary.

11.2 Analytical Results

11.2.1 Total Petroleum Hydrocarbons

The TPH concentrations from the 14 soil samples in the excavation ranged from non-detectable to 14,000 mg/kg, with twelve of the results below 100 mg/kg (Table 11-2). Within the excavation, six samples were collected from the surface and the 2-foot soil lift (Figure 11-3). The highest levels of contamination were noted in OE22, taken adjacent to the fill port of the lube oil tank and in OE21, acquired from above the waste oil tank. In the 4- to 6-foot soil lift, two samples, OE33, and OE34, contained very minor TPH levels of 7 and 5 mg/kg respectively (Figure 11-4). After the two tanks were removed from the excavation, six samples were collected from the soils underlying the tanks at locations selected by DOHS and ERCE personnel (Figure 11-5). All samples indicated non-detectable to minor levels of TPH contamination with no sample results exceeding 100 mg/kg.

11.2.2 Total Fuel Hydrocarbons

Five soil samples associated with the oil excavation and pipelines were analyzed for TFH. OE15 and OE19 were located at the surface near the fill port and product lines, respectively. At both locations, no fuel hydrocarbon component was detected (Figure 11-3). OE21 was collected from beneath the diesel line over the waste oil tank (Figure 11-3). A TFH concentration of 820 mg/kg was detected. The carbon range was characterized to be C6 to C24+. Samples OE40 was taken beneath the lube oil tank in the center of the tank bed (Figure 11-4). A TFH level of 15 mg/kg was detected with a carbon range to C11 to C18 characterized. Sample OE31 was also taken after the tanks were removed. In this sample, no fuel hydrocarbons were detected.

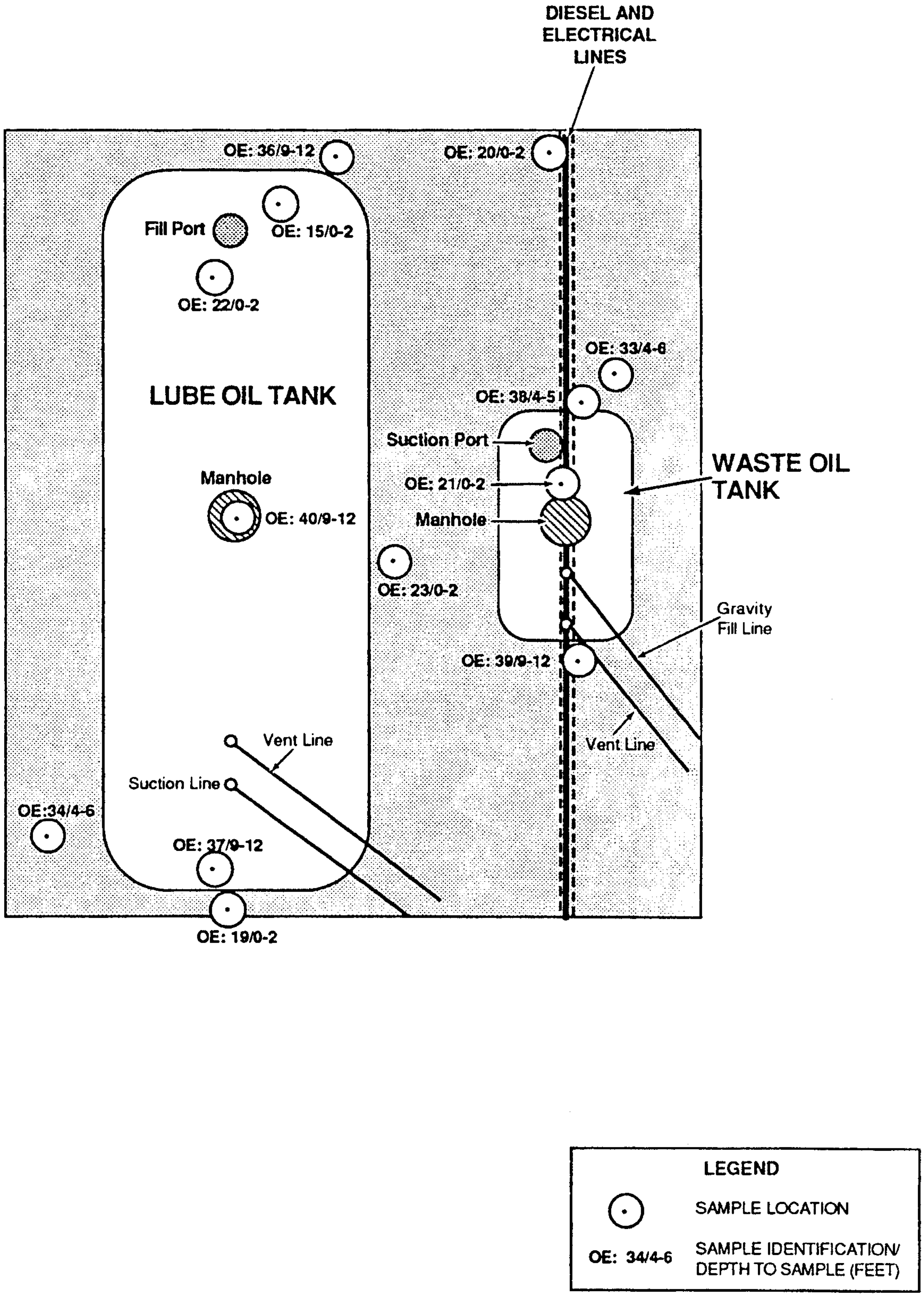
Table 11-1

SOIL ANALYTICAL RESULTS EPA METHODS 418.1 AND 8015 (MODIFIED) FROM THE OIL EXCAVATION

Sample Number	Date	418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
OE15	9/13/89	<10	<5	--	--
OE19	9/13/89	38	<5	--	--
OE20	9/13/89	8	NA	NA	NA
OE21	9/13/89	14,000	820	C_6-C_{24}+	Diesel
OE22	9/13/89	14,000	NA	NA	NA
OE23	9/13/89	37	NA	NA	NA
OE31	9/13/89	33	<5	--	--
OE33	9/13/89	7	NA	NA	NA
OE34	9/13/89	5	NA	NA	NA
OE36*	9/14/89	<10	NA	NA	NA
OE37*	9/14/89	61	NA	NA	NA
OE38*	9/14/89	3	NA	NA	NA
OE39*	9/14/89	<10	NA	NA	NA
OE40*	9/14/89	16	NA	NA	NA

*INDICATES CDOHS SAMPLE

NA - NOT ANALYZED BY THIS METHOD



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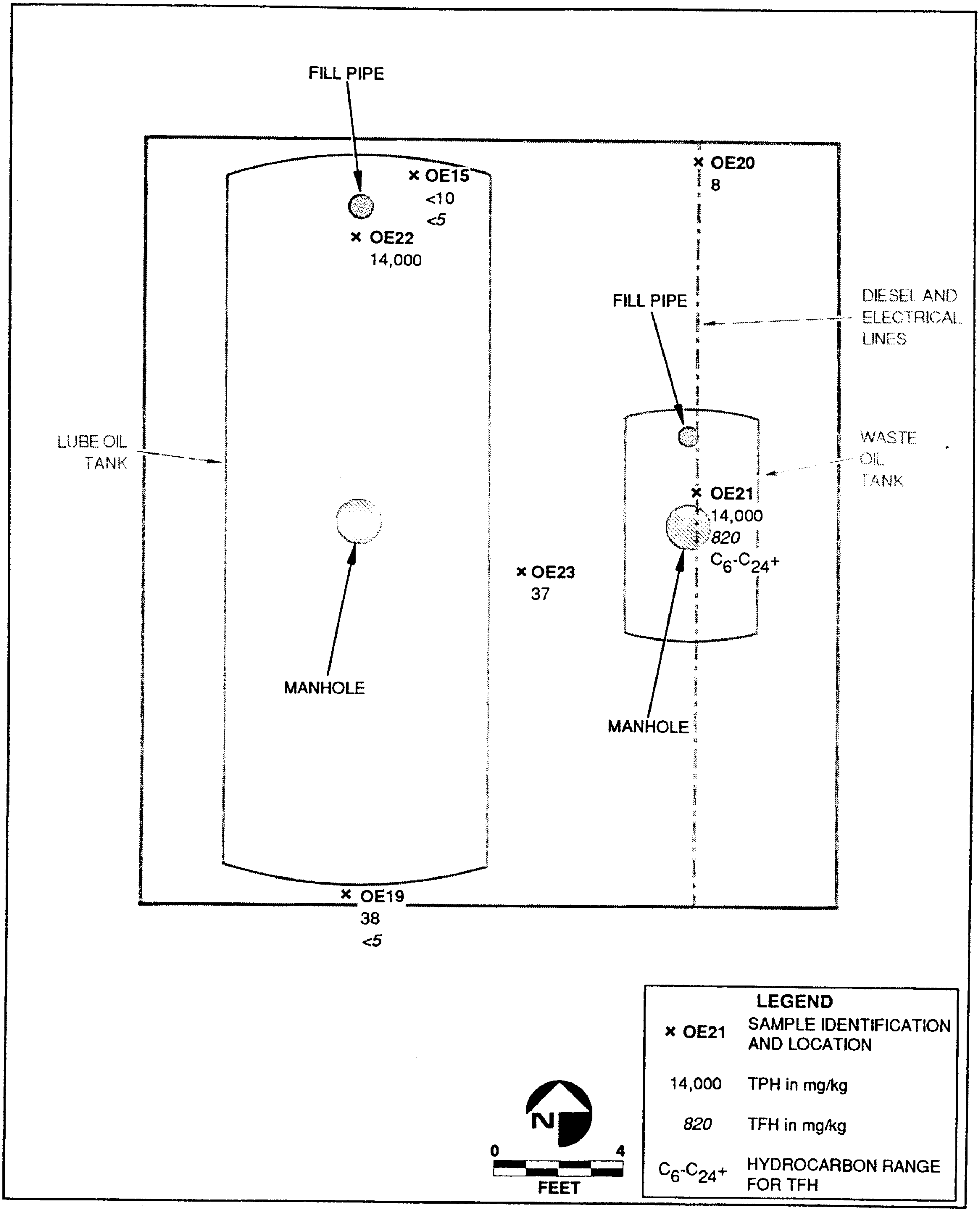
Oil Excavation Soil Sample Locations and Depth

FIGURE 11-2



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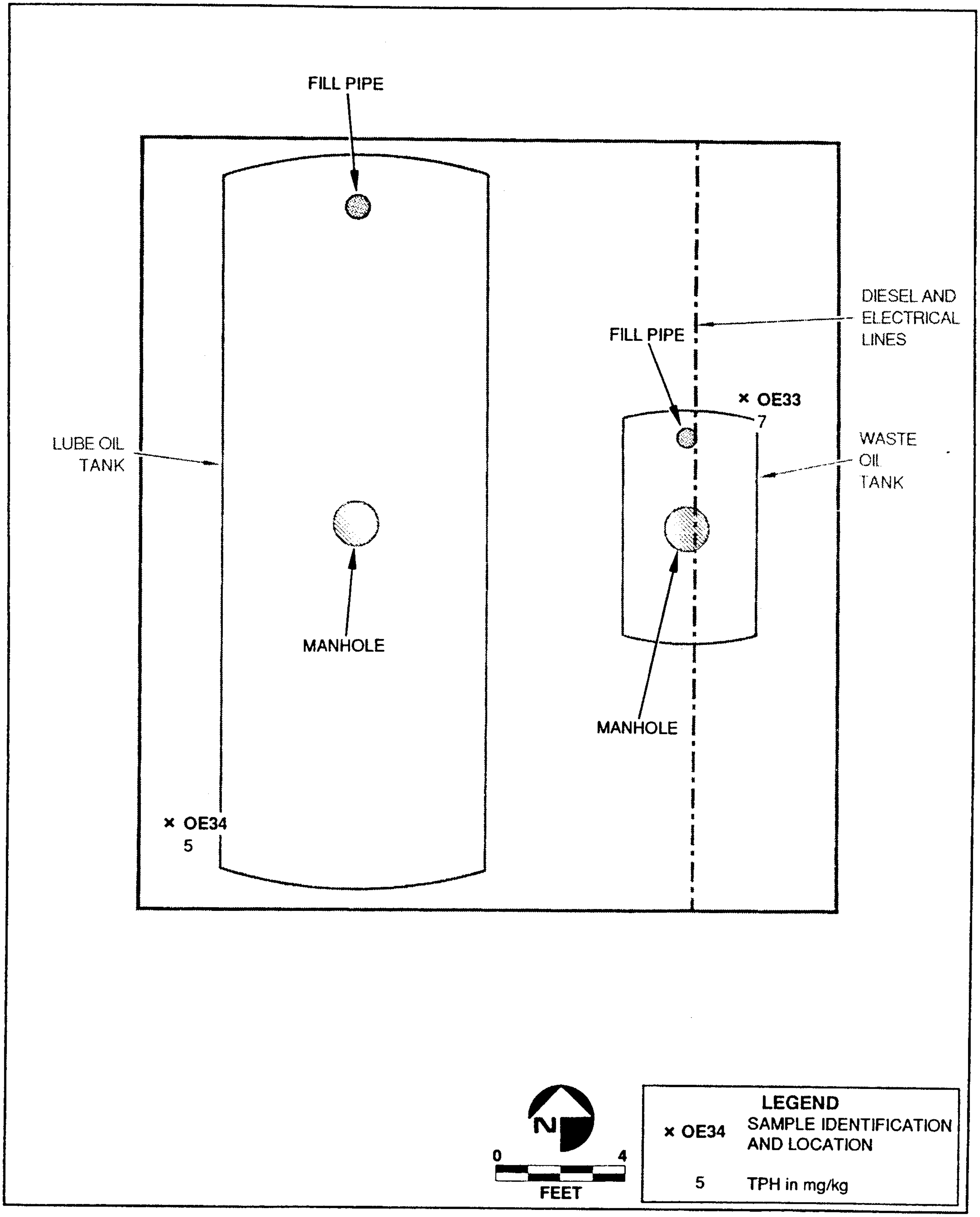
TFH Results in the Soil Samples from the 0-2 Foot Lift in the Lube and Waste Oil Excavation

FIGURE 11-3



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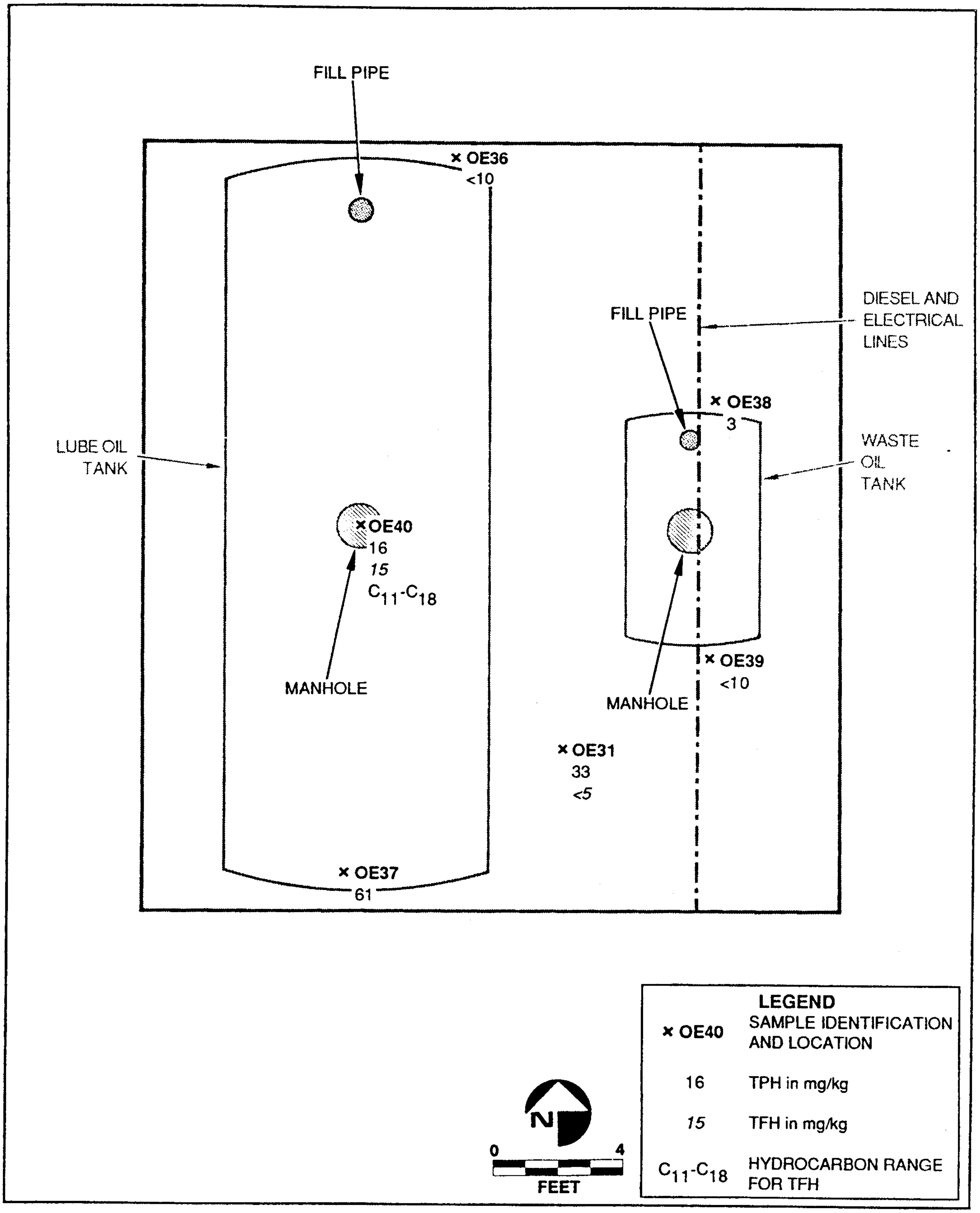
TFH Results in the Soil Samples from the 4-6 Foot Lift
in the Lube and Waste Oil Excavation

FIGURE
11-4



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TFH Results in the Soil Samples from the 9-12 Foot Lift in the Lube and Waste Oil Excavation

FIGURE 11-5

11.2.3 Polynuclear Aromatics

The analyses for PNAs was requested by the RWQCB. Four oil excavation samples were run by this analysis (Table 11-2). Very low levels of fluorene and phenanthrene were detected in OE14, which was collected at the crossover of the lube and waste oil lines. Fluorene was identified in this sample at a level of 0.99 mg/kg and phenanthrene at 2.4 mg/kg. The remaining three samples did not contain any measurable PNAs.

11.3 DISCUSSION

11.3.1 Surface to 2-Foot Samples

Contamination was indicated by the analytical data in the surface soils underlying the concrete cover at the northern fillpipe of the lube oil tank and below the diesel service line where it crosses over the manhole of the waste oil tank. The chromatogram for this sample indicates a hydrocarbon chain range broader than that would be expected for diesel contamination. As discussed in Section 8, the fuel and petroleum hydrocarbon contamination detected in this sample is probably explained by both a sewage and diesel #2-D source. There were no other areas of stained soil which indicated contamination in this lift of soil. All remaining samples ranged from undetectable to 38 mg/kg.

11.3.2 4- to 6-Foot Samples

Due to the low levels of contamination noted in the soils above this lift, only two samples were analyzed at this depth. OE23, in the northeast portion of the excavation, and OE34 in the southwest area. Neither sample had significant TPH levels, with a maximum value of 7 mg/kg. These very low levels of hydrocarbon support the inspection observations that no significant amount of soil contamination was present in the lube oil tank excavation.

11.3.3 9- to 12-Foot Samples

Several soil samples were taken at this depth as directed by the DOHS inspector on site. All samples contained low to non- detectable levels of hydrocarbon contamination. Selected samples were analyzed by Method 418.1 and Method 8015 to suggest what types of hydrocarbon species were present. Contamination levels were sufficiently low as to defy good analytic identification of compounds with these methodologies. For a further discussion of how analytical results may be compared, see Section 5, Analytical Approach.

No contamination of concern was contained in any of the DOHS samples.

11.3.4 General Analytical Conclusion for the Lube Oil and Waste Oil Tanks Excavation

Soil contamination existed only in shallow soils at the northern fillpipe of the lube oil tank and below the diesel service line over the waste oil tank manhole. The tanks and lines appeared in good condition during inspection as did the surrounding soils. Analytic data supports the observation that no leakage from the underground storage tank systems had occurred.

Table 11-2

SOIL ANALYTICAL RESULTS FROM THE OIL EXCAVATION
EPA METHOD 8310 POLYNUCLEAR AROMATICS

Sample Number	Date	Location	Fluorene mg/kg	Acenaphthene mg/kg	Acenaphthylene mg/kg	Napththalene mg/kg	Phenanthrene mg/kg
OE11	9/12/89	Joint of Oil Pipeline	<0.17	<0.83	<0.83	<0.83	<0.17
OE14	9/13/89	Joint of Oil Pipeline	0.99	<0.83	<0.83	<0.83	2.4
OE39	9/14/89	Waste Oil Excavation	<0.17	<0.83	<0.83	<0.83	<0.17
OE40	9/14/89	Lube Oil Excavation	<0.17	<0.83	<0.83	<0.83	<0.17

SECTION 12
REMOVAL OF LUBE OIL AND WASTE OIL PIPELINE

12.1 INSPECTION

Inspection of the lube and waste oil lines followed the methods outlined in Appendix D. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented in Section 12.2. Sampling methodologies are provided in Appendix F.

Each oil tank onsite had its own service lines. The waste oil tank was filled by means of a steel, gravity service line, and vented with an underground line leading to a standpipe. The lube oil tank had two fiberglass lines leaving it; one suction line to the service bay, and one to the underground extension of the vent standpipe.

12.1.1 Waste Oil Lines

On 9/11/89, a portion of the waste oil gravity line was exposed along the northern edge of the service building. The line was exposed manually with shovels to insure its integrity. The length of the exposure was studied visually and screened with the OVA for signs of contamination.

As noted above, the gravity line was constructed of steel. There was not any apparent protective coating on the line, but corrosion appeared to be surficial only. The line demonstrated good rigidity when removed from the excavation, and had metallic resonance when struck with a hammer. There were no obvious breaches in the walls of the waste oil line.

OVA analyses did not indicate contamination being present within the line excavation. Readings were all below 5 ppm, with most readings falling below detectability. It should be noted, however, that waste oil is not very conducive to OVA detection due to low volatility. Soils underlying the line were dry and exhibited no staining which might be indicative of waste oil contamination.

On 9/13/89, during the oil tank excavation, more of the waste oil line was uncovered. The line was traced for its full extent from the eastern end of the service bay to its western termination at the waste oil tank. For the whole length of the exposure, the waste oil line appeared to be in good condition, with no severe corrosion or structural degradation noted.

Soil underlying the waste oil line appeared to be stained in an area at the west end of the building. There was also a sewage odor to the backfill material in the trench. In this area, the waste oil line crossed over and turned away from the lube oil line. The apparent contamination appeared to be associated with the virgin oil line rather than waste oil due to relatively light colored soil staining. There was, however, a coupling for the waste oil line in the vicinity of the contaminated soil.

The termination of the gravity line at the tank was in good condition. Couplings and elbows in the tank area were removed by cutting. This revealed a good cross section of the metal of the pipes. It was shiny and intact, showing no signs of significant corrosion or degradation.

12.1.2 Lube Oil Line

On 9/13/89, the lube oil line was uncovered during excavation work on the waste and lube oil tanks. The service line entered the west end of the building where it was accessed inside. The vent line of the lube oil system was constructed of fiberglass from the tank, and then was coupled to the steel vent line as it led to the standpipe running up the building.

The lube oil lines were short in length, running approximately 25 feet from the building to the tank. The lines were in good condition with no cracking, splintering, or sponginess noted. There did appear to be a leak associated with a coupled area, just outside the building wall (Photo, Figure 12-1). The area was stained gray and had a fairly strong sewage odor. As noted above, the waste oil line also crossed the area of contamination and was likewise coupled in the vicinity. The soil contamination is thought to be associated with the lube oil line due to the fairly light coloration of the soil staining.

The termination of the lube oil service lines at the tank were in a good state with no obvious leaks or stained soil in the vicinity. The couplings at the tank also showed no signs of leakage.

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Area of Lube Oil Pipeline Coupling

FIGURE 12-1

To remediate the soil contamination noted above, the contractor excavated beneath the cross-over of the two oil lines (Figure 12-2). Soil was visually inspected with each lift. The sewage odor was not detected after the first two foot lift. OVA analyses of the soil beneath the junction indicated contamination had been removed at 5 feet below ground surface.

12.2 ANALYTICAL RESULTS

Sixteen soil samples were taken along the waste oil gravity line (Table 12-1, Figure 12-3). OE1 through OE13 were taken beneath the line along the building and OE24 to OE26 came from the line near the connection with the waste oil tank. Only two samples indicated highly elevated levels of TPH contamination, OE10 and OE11. These samples contained 8,200 and 1,400 mg/kg respectively. They were collected in the area where the lube oil service line and the waste oil gravity line cross near the corner of the building (Figure 12-2). Due to the high concentrations detected, further excavation was undertaken to remove the contamination. Table 12-2 presents the results of the seven samples taken in the area below the union of the two lines.

OE27 and OE28 were taken along the lube oil service line (Figure 12-3 and Table 12-1). Both samples had TPH concentrations less than 50 mg/kg.

12.3 DISCUSSION

Of the eighteen soil samples collected along the oil lines only three exceeded 1,000 TPH. In the area of the crossover of the lube oil service line and the waste oil gravity line, two adjacent samples contained 1,400 and 8,200 mg/kg TPH. This area was further excavated to remove the contaminated soils. The three confirmatory samples collected from two walls and the floor of this area contained TPH levels ranging from 110 to 531 mg/kg. On site soils may remain when fuel contamination is below 1000 mg/kg, therefore no more soil was removed from this location.

The lines in this location appeared to have a high degree of integrity. The soils were not stained nor was a oily residue observed in this area. However, a strong sewage odor was noted. The lack of visible contamination coupled with the sewage odor suggests that the

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Area of Lube Oil Service Line and
Waste Oil Gravity Line Crossover

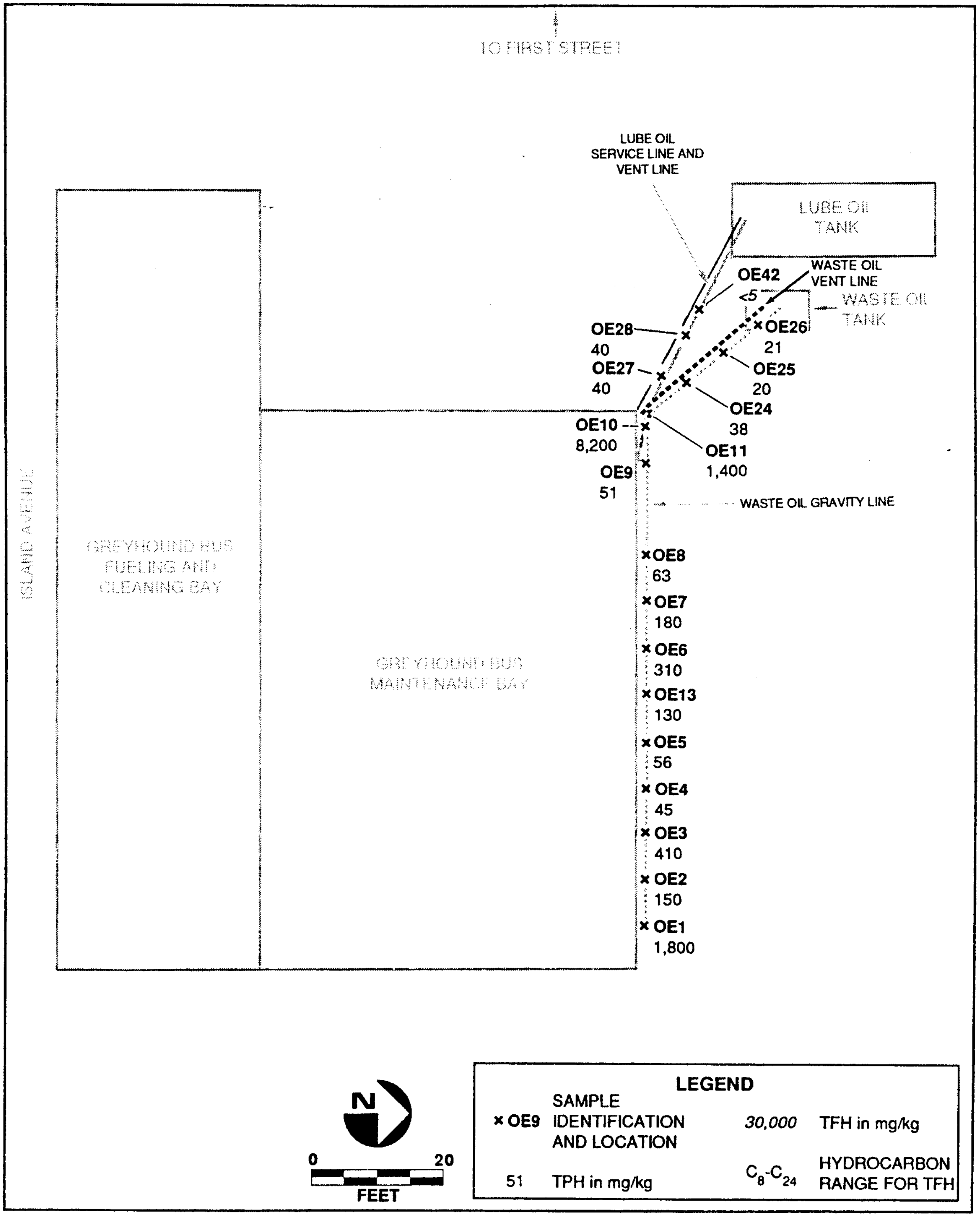
FIGURE
12-2

Table 12-1

SOIL ANALYTICAL RESULTS
FROM THE OIL LINE TRENCHES
EPA METHODS 418.1 AND 8015 (CDOHS MODIFIED)

Sample Number	Date	Methods 418.1 mg/kg	8015 mg/kg	Hydrocarbon Range	Quantified with
OE1	9/11/89	1,800	NA	NA	NA
OE2	9/11/89	150	NA	NA	NA
OE3	9/11/89	410	NA	NA	NA
OE4	9/11/89	45	NA	NA	NA
OE5	9/11/89	56	NA	NA	NA
OE6	9/11/89	310	NA	NA	NA
OE7	9/11/89	180	NA	NA	NA
OE8	9/11/89	63	NA	NA	NA
OE9	9/12/89	51	NA	NA	NA
OE10	9/12/89	8,200	NA	NA	NA
OE11	9/12/89	1,400	NA	NA	NA
OE13	9/13/89	130	NA	NA	NA
OE14	9/13/89	11,000	NA	NA	NA
OE24	9/13/89	38	NA	NA	NA
OE25	9/13/89	20	NA	NA	NA
OE26	9/13/89	21	NA	NA	NA
OE27	9/13/89	40	NA	NA	NA
OE28	9/13/89	40	NA	NA	NA
OE41	9/15/89	30,000	NA	NA	NA
OE47	9/25/89	32,000	9,600	C_6-C_{24}	Diesel

NA - NOT ANALYZED BY THIS METHOD



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TPH and TFH Results in Oil Pipeline Soil Samples

FIGURE 12-3

Table 12-2

SOIL ANALYTICAL RESULTS EPA METHOD 418.1 FROM BENEATH THE WASTE OIL LINE AND LUBE OIL LINE CROSSOVER

Sample Number	Date	Sample Depth	418.1 mg/kg
OE10	9/12/89	1.0	8,200
OE11	9/12/89	1.0	1,400
OE14	9/13/89	2.0	11,000
OE41	9/15/89	3.0	30,000
OE47	9/25/89	3.0	32,000
OE57	10/2/89	3.5	531
OE58	10/2/89	3.5	110
OE59	10/2/89	3.5	460

elevated TPH results may be in part due to the fact that the analyses was potentially quantifying hydrocarbons associated with the sewage.

Sample OE21, collected outside the northeast corner of the Greyhound Maintenance Building where the waste oil line emerged from the building wall, contained 1,800 mg/kg TPH. The line removed from this area appeared to be in good condition. The soil here was not stained or odorous. In addition, the OVA reading and headspace analyses on this sample did not exceed 5 ppm. Possibly the hydrocarbons quantified by the TPH analyses are also associated with sewage.

SECTION 13
ABANDONED FUEL OIL TANK

13.1 INSPECTION

Inspection of the fuel oil tank followed the methods outlined in Appendix E. Soil samples were acquired during the inspection according to DOHS regulations and scientific judgement. When possible, sample locations were determined by a DOHS inspector. Sampling locations and results are presented in Section 13.2. Sampling methodologies are provided in Appendix F.

On 8/16/89, Angus Asphalt Company discovered an undocumented underground storage tank while excavating for the new underground fuel system. The old tank had apparently been utilized for storage of heating oil by a lumber yard which existed at the site prior to occupancy by GLI. The location of the abandoned underground structure is depicted in Figure 13-1.

The tank was situated in the southeast corner of the excavation for the new tank. The northern end of the tank had been exposed by the backhoe, revealing a riveted metal structure surrounded by boards. The northwest corner of the tank appeared to be leaking a black, viscous, oil-like substance that was staining soils immediately below. This seepage appeared to have occurred as a result of the recent excavation and no other significant staining was observed either below or adjacent to the tank.

On 8/21/89, a more detailed inspection of the tank was conducted by ERCE. The soils surrounding the tank appeared to be native materials with no observable backfill materials present, suggesting that the tank was an isolated structure. In addition, observations through a small hole in the tank revealed that it was filled with concrete and apparently had been vented prior to abandonment.

On 8/18/89, a decision was made to remove the underground structure. The tank was inerted with cement and dirt apparently at the time it was abandoned. The structure was therefore not considered to be an underground tank and no permit for removal was required from the DOHS. Active seepage from the tank necessitated removal in an expeditious fashion.

Table 13-2

SOIL SAMPLE RESULTS
HISTORIC FUEL OIL TANK EXCAVATION
EPA METHOD 8020

Sample Number	Date	Benzene mg/kg	Toluene mg/kg	Ethyl-Benzene mg/kg	Meta-Xylene mg/kg	Ortho- and Para-Xylene mg/kg
GLM-3	8/18/89	4.3	5.8	1.7	16	16
E6	8/22/89	<0.50	<0.50	6.3	.075	19
E7	8/24/89	<0.025	<0.025	<0.025	<0.025	<0.025

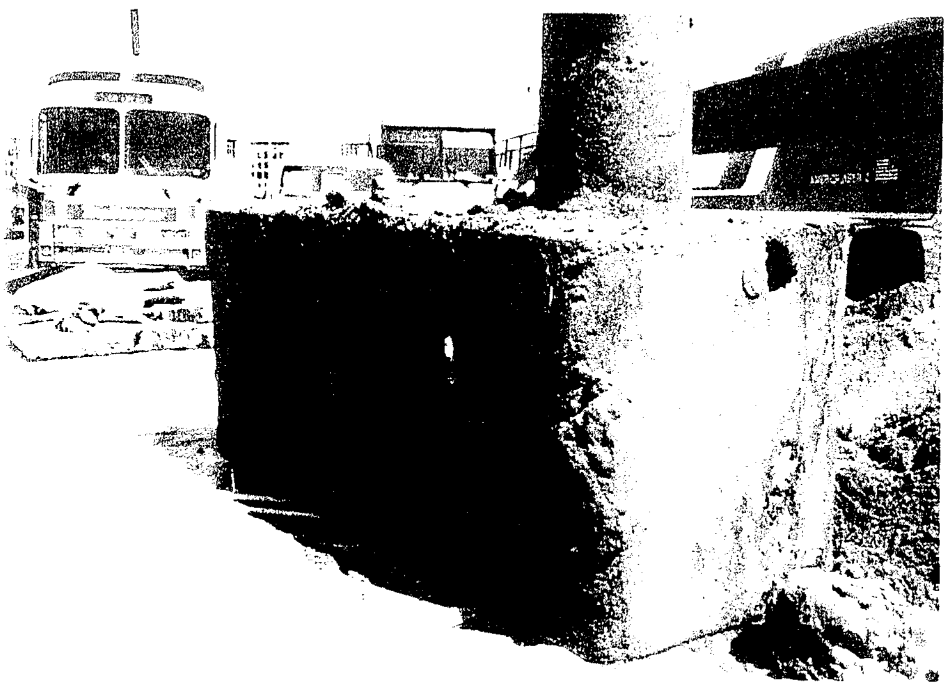
The tank was constructed of riveted metal, probably steel, with a large access port on the north end of the tank. The standpipe port had a diameter of approximately 18 inches and extended about 2 1/2 feet above the top of the tank. The stand pipe was filled with rubble and soil which could not be easily removed to gain access to the interior of the tank. The tank was surrounded by treated redwood planks which were in varied states of integrity. Corrosion holes were visible in the north end of the tank where the redwood was in the most decomposed state. The tank was visually inspected through these holes and seemed to be filled with concrete from the top of the large port. The approximate location and dimensions of the old tank are depicted in Figure 13-1, with photographs shown in Figure 13-2.

The tank was covered by approximately 3 feet of soil and was encased in treated redwood planks. After the removal of the the topsoil and redwood covering, the tank was inspected for integrity and contents. There was corrosion noted in many areas of the tank, but it seemed to have structural integrity. The soils surrounding and below the tank did not appear to be impacted with the exception of the area of seepage noted previously. OVA readings were generally 100 to 300 ppm where soils were unstained. Readings were very high inside the tank and around the stained soils.

Since the tank had been inerted, it was necessary to remove it prior to any cleansing activities. The tank was pushed to one side by the backhoe in an effort to loosen its position and facilitate removal. Upon movement, a leak of approximately 20 gallons of black, oily material occurred from the same area of the tank where the previous seepage had been noted. The amount of liquid was unexpected since concrete and rubble had been observed to fill a significant portion of the tank. During removal, additional leakage of the black oily material was noted. In all, approximately 30 gallons of the material had spilled into the excavation.

The contractor removed all visually stained soil from the area of the abandoned tank and spill. The contaminated soils were placed upon, and covered by visquene.

Verification samples were obtained from below the tank and from beneath the areas where leakage from the tank had impacted soils. On 8/22/89, Vera Industrial Cleaning undertook the decontamination of the tank. The tank was triple rinsed with an approved surfactant and steam-cleaned. The rinse solution was captured and pumped into the industrial cleanup



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Historic Fuel Oil Tank

FIGURE 13-2

tanker on site. As an additional precaution, decontamination of the tank took place in a bermed, plastic covered area within the contaminated soil stockpile. In this way any rinse solution which potentially could have escaped capture, would have been absorbed by the underlying contaminated soil. After the tank was decontaminated, it was cut into more manageable sections and transported to a recycler.

On 8/31/89 all remaining contaminated materials on site were manifested and transported by a licensed hazardous waste hauler to Casmalia Landfill. The landfill is permitted as a Class I, Hazardous Waste Landfill by the EPA.

13.2 Soil Sampling and Analytical Results

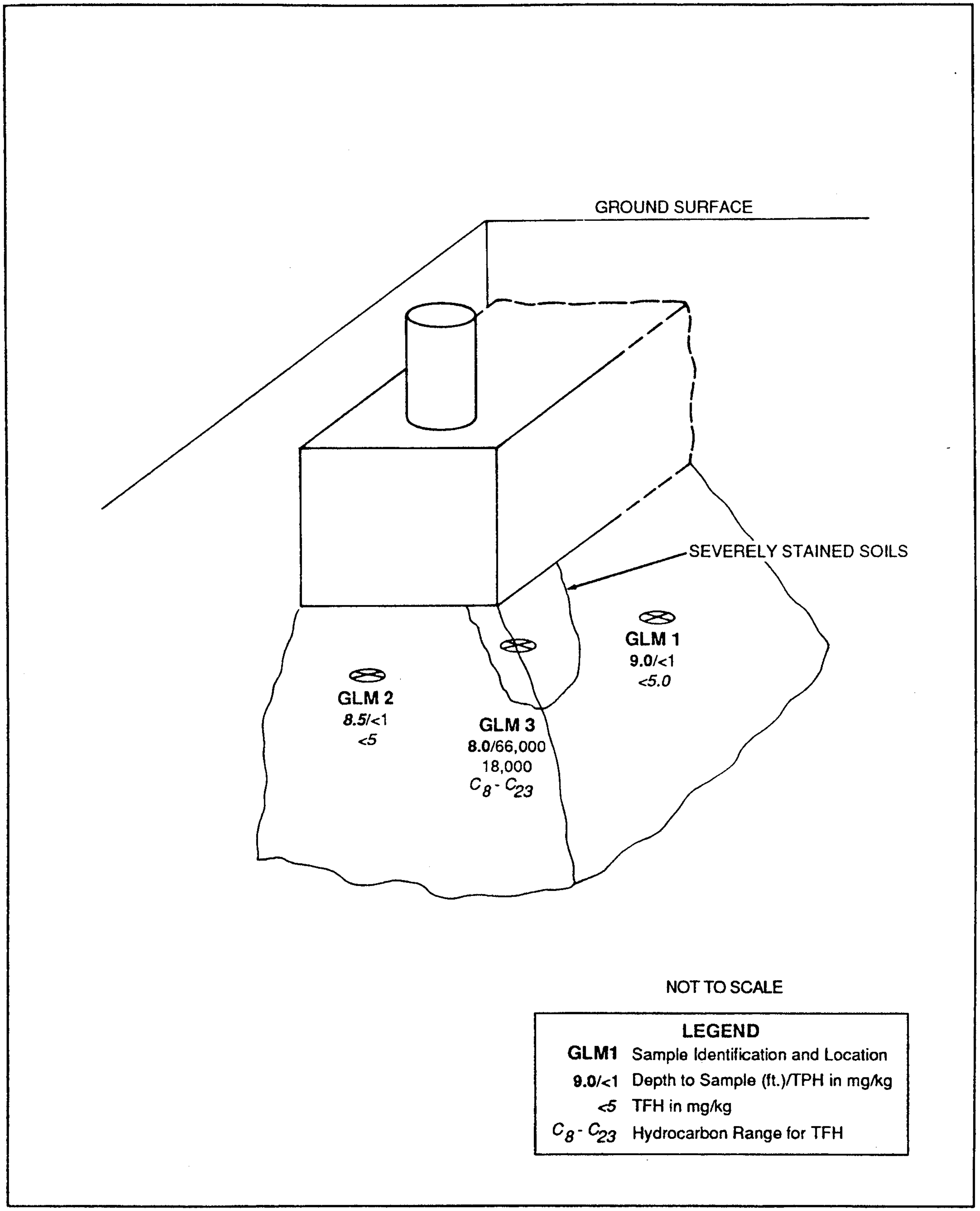
13.2.1 Soil Sampling, August 18, 1989

On August 18, three soil samples (GLM-1 - GLM-3) were taken from the area beneath the abandoned tank as shown in Figure 13-3. These samples were acquired to assess if significant downward migration of hydrocarbon contamination was associated with the abandoned tank. Soils were screened with the OVA to indicate areas of potentially high contamination.

As shown in Table 13-1, GLM-3 contained a TPH concentration of 66,000 mg/kg and a TFH concentration of 18,000 mg/kg. The high levels of contamination were expected for GLM-3 since it was acquired just beneath the abandoned tank in a small area stained by the material which had leaked out of the tank. Samples GLM-1 and GLM-2 did not contain hydrocarbon levels above the detection limits of the analyses performed.

13.2.2 Soil Sampling, August 21, 1989

On August 21, four soil samples (E1,E3 - E5) were acquired from within the excavation in the area of the abandoned tank and spill (Table 13-1). These samples were taken during removal of the old tank to confirm that potential contamination from the abandoned tank had been contained. These soil samples were acquired with a backhoe because observed



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TPH and TFH Results in Soil Samples Beneath Fuel Oil Tank

FIGURE 13-3

Table 13-1

SOIL ANALYTICAL RESULTS
HISTORIC FUEL OIL TANK
EPA METHODS 418.1 AND 8011

Sample Number	Date	Total Petroleum Hydrocarbons* mg/kg	Total Fuel Hydrocarbons+ mg/kg	Hydrocarbon** Range	Quantified Using
GLM-1	8/18/89	<1	<5.0	---	---
GLM-2	8/18/89	<1	<5.0	---	---
GLM-3	8/18/89	66000	18000	C8-C23	Diesel
E1	8/21/89	15000	15000	C6-C21	Diesel
E3	8/21/89	26	<5.0	---	---
E4	8/21/89	70	11	C12-C17	Diesel
E5	8/21/89	270	140	C10-C17	Diesel
E6	8/22/89	1000	7000	C6-C18	Diesel
E7	8/22/89	1	N/A	N/A	N/A

*ANALYZED USING EPA METHOD 418.1 (CDOHS MODIFIED)

+ANALYZED USING EPA METHOD 8015 (CDOHS MODIFIED)

**HYDROCARBON RANGE APPLIES TO HYDROCARBON CHAIN LENGTH FOR 8015 (MOD)

NA - NOT ANALYZED

slumping within the excavation made entry dangerous. The soil samples were taken from different regions within the vicinity of the former tank after the removal of visually stained materials. Sample locations are depicted in Figure 13-4.

Samples were composited from different regions within the backhoe bucket to obtain good statistical sampling of the excavated soils. All other sampling methodologies were similar to those described in Appendix C.

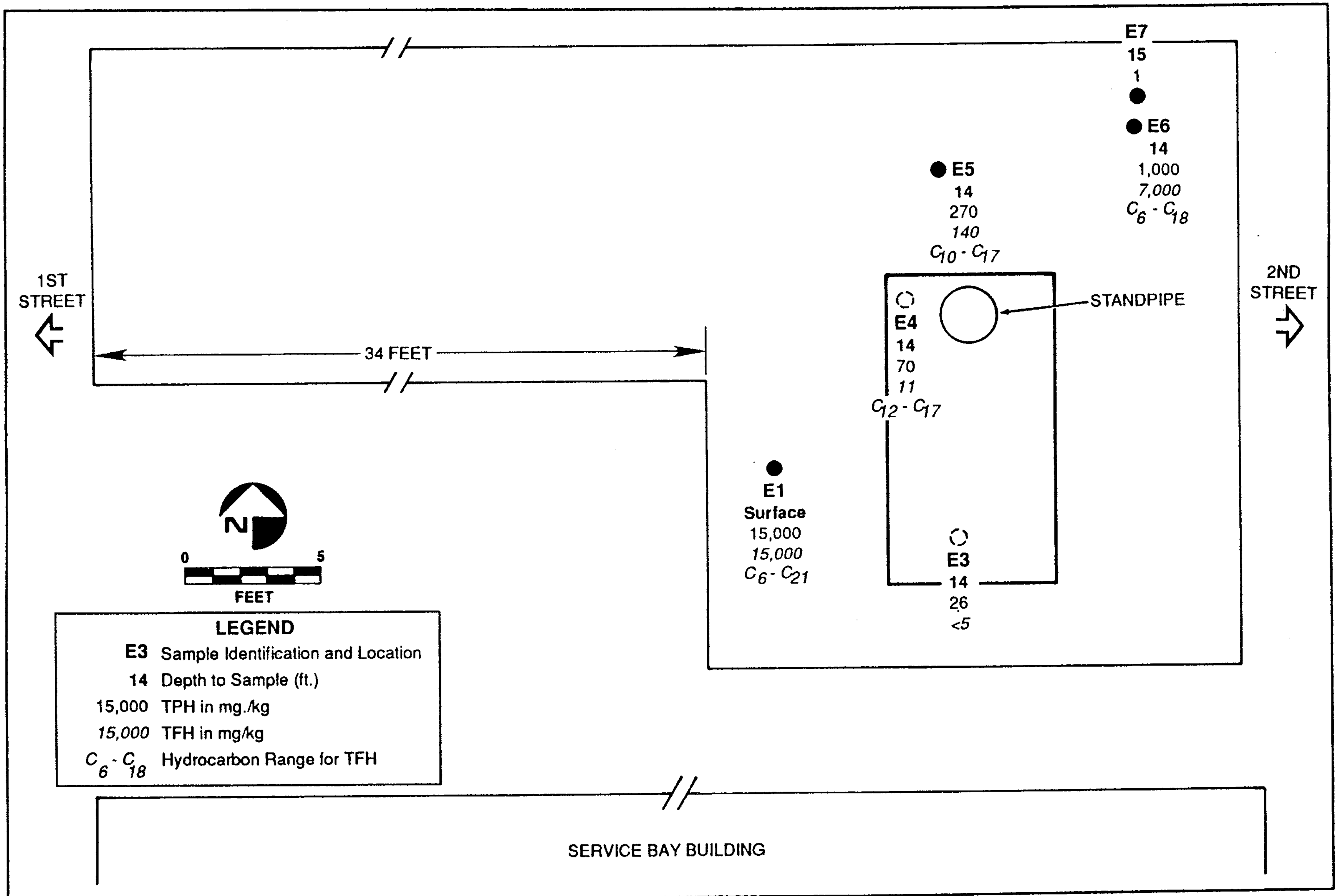
Sample E1 contained TPH and TFH levels of 15,000 mg/kg. This high level of contamination was expected from the stained appearance of the sample. E1 was obtained from immediately beneath the concrete slab which was removed to facilitate the excavation of the inerted tank. As discussed in Section 3, the soil beneath the slab appeared to be surficially stained from migration of surface hydrocarbons through cracks in the concrete. Sample E3, E4, and E5 contained low levels of hydrocarbon which fall below generally accepted cleanup levels.

13.2.3 Soil Sampling, August 22, 1989 and August 25, 1989

On August 22, one soil sample (E6) was retrieved with the backhoe after it was noted that a small patch of stained soil remained within the excavation. It is thought that this soil was the result of "slop" from the backhoe during the original removal activities and not from deeper migration of the contaminant. The visually stained material was removed and placed within the contaminated soil stockpile.

The analytical results on E6 showed moderate levels of hydrocarbon contamination with TPH yielding 1000 mg/kg and TFH yielding 7000 mg/kg (Table 13-1). These suggested that the soils were contaminated above accepted cleanup levels. The differences in the analytic results may suggest loss of volatiles during the extraction procedure for the 418.1 method. BTXE analysis by EPA Method 8020 showed that E6 also contained measurable levels of ethylbenzene and total xylenes (Table 13-2).

On August 25, one last confirmatory sample (E7) was taken from the same vicinity as E6. Sample E7 was acquired in the same manner as the other post-tank removal excavation samples. The purpose of this sampling was to determine if the results of E6 were isolated, or whether a horizon was reached where contamination was prevalent. Soil in the vicinity of E6 was removed and a sample taken from the area.



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TPH and TFH Results in Soil Samples

FIGURE 13-4

The analytic results of E7 indicate hydrocarbon concentrations in the sample were below detection limits of the analyses performed. This suggests that the contamination seen in E6 is not indicative of the conditions existing in the excavation at the time of the last sample.

13.3 DISCUSSION

The soil analytical results show that contamination related to the abandoned, inerted underground tank structure had been removed from the excavation. The data indicate that levels of hydrocarbon contamination within the excavation were elevated only in areas where dark hydrocarbon staining was present. All excavation samples which were taken from unstained locations showed low levels of hydrocarbon contamination with the exception of E6.

It is postulated that the contamination seen in E6 could be related to contaminated soil spillage from the backhoe bucket in the excavation. It is also conceivable that the contamination seen in E6 is related to capillary fringe (soil suction) action on the known hydrocarbon plume beneath the site. The hydrocarbon range exhibited by E6 has a lighter (shorter carbon chain length) component than the other samples. This shorter chain length suggests the possibility of other fuel sources, such as gasoline, in the soil. This lighter component may also explain the differences in the analytical results for this sample.

It is the conclusion of ERCE that all contamination potentially associated with the old tank has been removed from the site.

SECTION 14
SUMMARY OF CONTAMINATION DISCOVERED AND REMEDIAL EFFORTS

14.1 Diesel Tanks Excavation

Shallow soil contamination (0 to 4 feet bgs) in the diesel excavation is suggestive of both diesel #1-D and diesel #2-D. This contamination appears to be due to spillage occurring at the diesel tanks' fill ports and at the pumping station. The spillage migrated through cracks and seams in the concrete. Spillage at the pumping station appears to also account for the deeper soil contamination (7 to 10 feet bgs) in the northern part of the diesel excavation.

All soil contamination in this area has been remediated by means of removal to a depth of 14 feet bgs. At 14 feet bgs all samples contained very low to non-detectable levels of hydrocarbons. Due to the high degree of integrity of both diesel tanks and connecting lines, it is believed that soil contamination from 0 to 12 feet bgs is solely due to surface spills migrating vertically in the backfill material and formational soils. The extent of these contaminated soils was established laterally and vertically and was remediated by removal. The abrupt increase in soil contamination at the 16-foot lift is attributed to capillary fringe contamination caused by the free product plume underlying the site.

14.2 Diesel Lines

Contamination greater than 1000 mg/kg, discovered along the diesel service pipeline, was mostly confined to the areas above the east diesel tank and above the waste oil tank. Soil along the line just south of the east diesel tank was also contaminated. It is likely the source of this contamination was mitigation of spillage at the fill ports of the diesel tanks. All contaminated soil beneath the line and above the tanks was remediated by means of removal during the respective tank excavations. Verification samples were taken beneath the line in both excavations. To delineate and remediate the contaminated soil along the line just south of the east diesel tank, this area was further excavated to a depth of 8 feet bgs. Verification samples confirmed that all contamination had been removed. Wall samples from the excavation were also taken to verify that contamination had been remediated laterally.

14.3 DIESEL DISPENSER

Contamination greater than 1000 mg/kg was discovered in the dispenser area and was remediated by means of removal to 12 feet bgs. The cause of the contamination appears to be seepage from a coupling in the fuel dispenser. Data suggest that soil contamination is still present below the 12-foot level.

Laterally, contamination was delineated and remediated by means of removal to the north and to the east. Verification samples were collected from the north and east walls. Wall samples on the south and west sides of the excavation indicate that contamination still exists in these two directions.

The chromatograms for all the samples collected in the diesel dispenser excavation are similar to each other and bear close resemblance to the chromatogram of the diesel #2-D fuel. This further suggests that the dispenser and connecting service line are likely the sources of soil contamination in this area.

14.4 FORMER DIESEL/GASOLINE LINES

The greatest amount of soil contamination was discovered and removed in this area. An excavation 20-feet wide, 64-feet long and 15.5-feet deep was created and dozens of samples were taken within it. At 15.5 and 17 feet bgs, all samples in the northern half of the excavation were severely contaminated. The increase of TFH levels at these depths is suggestive of capillary action on the free product below. Soil has been remediated by removal to the west, south and east. Remediation to the north was not possible due to existing structures. Soil contamination appeared to persist below 15.5 feet, but has not been remediated below the capillary level.

The chromatograms produced for samples collected in this area resembled diesel #1-D, except for about a third of the samples which contain a combination of diesel #1-D and gasoline. The fuel lines in this area carried both gasoline and diesel #1-D prior to 1974. These lines generally appeared to be heavily corroded during removal and may be the source of the TFH levels in the soil beneath them.

14.5 Northern Waste Oil Tank

Contamination greater than 1000 mg/kg was discovered in samples from 3 to 5 feet bgs in the waste oil tank excavation. Soil was remediated by means of removal laterally and vertically down to a depth of 9 feet bgs. Verification samples were collected at 9 feet bgs.

Waste oil and diesel #1-D contamination were identified in this area. Due to the high degree of integrity observed in the waste oil tank, waste oil contamination is assumed to be caused by surface spills at the fill port which migrated through cracks or seams in the concrete. The diesel #1-D source of contamination is probably a result of leakage from the former fuel lines which carried this fuel and surfaced at the pumping station just north of the waste oil tank.

14.6 Lube oil and Waste oil Tanks

Soil contamination discovered in this area was found only in the shallow soils immediately underlying the concrete. This soil was remediated by means of removal both vertically and laterally. Verification samples were collected.

The contamination observed in the shallow soils can be attributed to spillage at the fill ports of both tanks and possibly to wastewater leakage from the oil/solids separator located near the lube oil and waste oil tanks excavation.

14.7 Lube Oil and Waste Oil Pipelines

Contamination exceeding 1000 mg/kg was observed at the crossover of the lube oil service line and the waste oil gravity line. Further excavation was conducted in this area to delineate soil contamination vertically and laterally. Verification samples were collected from the walls and floor of the excavation. All contaminated soils were remediated by means of removal.

14.8 Abandoned Fuel Oil Tank

Contamination exceeding 1000 mg/kg was discovered immediately beneath the fuel tank. It is likely that most of the contamination was caused during removal efforts. All contaminated soils were remediated by means of removal and verification samples were obtained.

SECTION 15
REFERENCES

Applied GeoSystems, Subsurface Environmental Investigation and Monitor Well Installation at Greyhound Lines, San Diego Garage, 539 First Avenue, San Diego, California, February, 1988.

American Society of Testing Materials, Standard Specification for Automotive Gasoline, 1986.

American Society of Testing Materials, Standard Specification for Diesel Fuel Oils, 1981.

American Society of Testing Materials, Standard Specification for Fuel Oils, 1986.

American Society of Testing Materials, Standard Method for Distillation of Petroleum Products, 1982.

Gastil, G., and R. Highley. 1977. Guide to San Diego Stratigraphy:Department of Geological Sciences, San Diego University, San Diego, California, pp. 37-40.

Kennedy, M.P. 1975. Geology of the Del Mar, La Jolla, and Point Loma Quadrangles, Western San Diego Metropolitan Area, San Diego County, California:California Division of Mines and Geology Bulletin 200A.

Kennedy, M.P. and G.L. Peterson. 1975. Geology of the Del Mar, La Jolla, and Point Loma Quadrangles, Western San Diego Metropolitan Area, San Diego County, California:California Division of Mines and Geology Bulletin 200B.

Kleinfelder, Inc. Report on the Source, Quantity and Migration of Petroleum Constituents in the Soil and Ground Water at and near the Greyhound Maintenance Facility at 539 First Avenue, San Diego, California, December, 1988.

Polk, R.L., Polks San Diego City Directory, Polk and Co. Publishers, Monterey, California, 1974.

Regional Water Quality Control Board. Cleanup and Abatement Order No. 89-49, May, 1989.