Environmental Consultants

SCS ENGINEERS

UNDERGROUND TANK INVESTIGATION

SUMMARY REPORT
WESTLAKE AVENUE
CITY OF SEATTLE

PREPARED FOR

SEATTLE DEPARTMENT OF ADMINISTRATIVE SERVICES

PREPARED BY

SCS ENGINEERS

JUNE 1990

CITY OF SEATTLE
UNDERGROUND TANK INVESTIGATION
WESTLAKE AVENUE UST SITE
SITE INVESTIGATION AND TANK REMOVAL
SUMMARY REPORT

Prepared for:

City of Seattle
Department of Administrative Services
618 2nd Avenue, 14th Floor
Seattle, Washington 98104

Prepared by:

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June 18, 1990
48921

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SCS ENGINEERS

June 18, 1990
File No. 48921

Mr. Paul Berry
Seattle Dept. of Administrative Services
618 2nd Avenue, 14th Floor
Seattle, Washington 98104

Subject: Westlake Avenue Tank Removal Report

Dear Mr. Berry:

Enclosed are three copies of our Tank Removal Summary Report for the Westlake Avenue UST Site. The report provides documentation for the removal of five underground fuel storage tanks and an environmental assessment of site conditions at 630 Westlake Avenue in Seattle, Washington.

The enclosed report was prepared jointly by SCS Engineers and Centrac. For this investigation, SCS provided project oversight, data evaluation, and field support. Centrac provided on-site documentation of tank removal and subsurface conditions, conducted extensive sampling, and completed an historical review of the site.

A total of five underground storage tanks, ranging in size from 500-gallons to 5,000-gallons, were excavated from the site. The 500-gallon tank was used to store expended motor oil and the four other tanks, which were abandoned, previously stored leaded gasoline. No obvious signs of leaks or damage to the tanks and fuel lines were identified during this investigation.

However, high levels of petroleum hydrocarbon contamination were detected in the soil and groundwater at the site. Analytical laboratory testing indicated petroleum hydrocarbon contamination was well above the recommended Washington Department of Ecology (WDOE) cleanup levels.

Approximately 800 cubic yards of contaminated soil was removed from the site and temporarily stockpiled at Seattle's Engineering Department Operations Division Yard at 6th and Harrison. An undetermined volume of contaminated soil still remains at the site below two existing buildings and possibly beyond the property boundaries. The depth of soil contamination near the property boundaries was not defined during the excavation of the tanks, but soil contamination is not expected to be much deeper than about 15 feet, because this is the level at which groundwater and clay were encountered.

Two groundwater monitoring wells were installed in the tank excavations, prior to backfilling and asphalting the site. These wells can be used for future groundwater monitoring and water level information after they are properly developed.

Based on the results of this investigation, off-site migration of hydrocarbon contamination is suspected. Although this investigation did not specifically identify a source of contamination, previous on-site fuel systems and potential upgradient sources are likely to have impacted the property.

To determine the extent and levels of contamination, we recommend constructing several borings and monitoring wells along the property boundary and possibly off-site. The enclosed report provides additional details regarding these recommendations.

We also recommend notifying WDOE that the tanks were removed from the site and that additional work is necessary to determine the magnitude of contamination. After this additional investigation is conducted, alternatives can be evaluated for site remediation.

If you have any questions regarding the enclosed report, please do not hesitate to contact either of the undersigned.

Respectfully yours,

Richard C. Alvord, C.P.G.
Project Manager
SCS ENGINEERS

Terrill J. Chang, P.E.
Project Director
SCS ENGINEERS

48921/westlake

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SECTION 1

INTRODUCTION

SCS Engineers and Centrac jointly conducted an underground storage tank investigation for the City of Seattle during January to April 1990 at 630 Westlake Avenue in Seattle, Washington. The site is owned by the City of Seattle and is currently occupied by an auto custom detailing shop. The location of the site is illustrated in Figure 1.

The purpose of this report is to provide documentation of tank removal activities and an environmental assessment of site conditions. The investigation consisted of removing five abandoned underground tanks, testing subsurface soils and groundwater for petroleum hydrocarbon contamination, and excavating approximately 800 cubic yards of contaminated soil.

Significant levels of petroleum hydrocarbon contamination were detected at the site. The contamination appears to be widespread in extent and is probably present beyond the property boundaries. The depth and extent of contamination at the site was not determined during this investigation. Although the source of contamination was not specifically identified during this investigation, previous on-site fuel systems and possibly activities that occurred upgradient of the site in the past could have impacted the property.

This investigation was completed in two Phases as described below.

- Phase I - Site Characterization
- Phase II - Tank Removal and Soil Excavation

Phase I consisted of a soil vapor survey and an historical review of the site. The soil vapor survey was conducted prior to excavating the underground tanks. The results of the soil vapor survey indicated that contaminated soil would most likely be encountered during the excavation of the tanks. Historical records indicate that fueling stations have occupied the site since the early 1900's and a brewery, lumber mill, and other fuel service stations occupied adjacent properties in the past. A Union 76 Service Station south of the site was the source of a major underground gasoline spill approximately 10 years ago. The impact of this spill on the Westlake site is unknown at this time.

During Phase II of this investigation, a total of five underground storage tanks (T-1 through T-5) were removed from the site. These tanks included one 500-gallon waste oil tank (T-1), and four gasoline tanks (T-2 through T-5) ranging in size from 2,000 to 5,000-gallons.

Soil contaminated with up to 13,000 ppm total petroleum hydrocarbons (TPH) was detected at the Westlake site. Benzene, toluene, ethylbenzene, and xylene (BTEX) were detected in the soil up to 47 ppm, 160 ppm, 93 ppm, and

440 ppm, respectively. Approximately 800 cubic yards of contaminated soil was excavated and temporarily stockpiled at Seattle's Engineering Department Operations Division Yard at 6th and Harrison. Remediation plans for treatment of this soil are currently in progress. Plans for additional investigatory work are also being developed to further characterize sub-surface contamination at the site.

The following sections of this report include a site historical review, documentation of soil vapor testing, sampling and analytical test results, documentation of tank removal activities, and an evaluation of data.

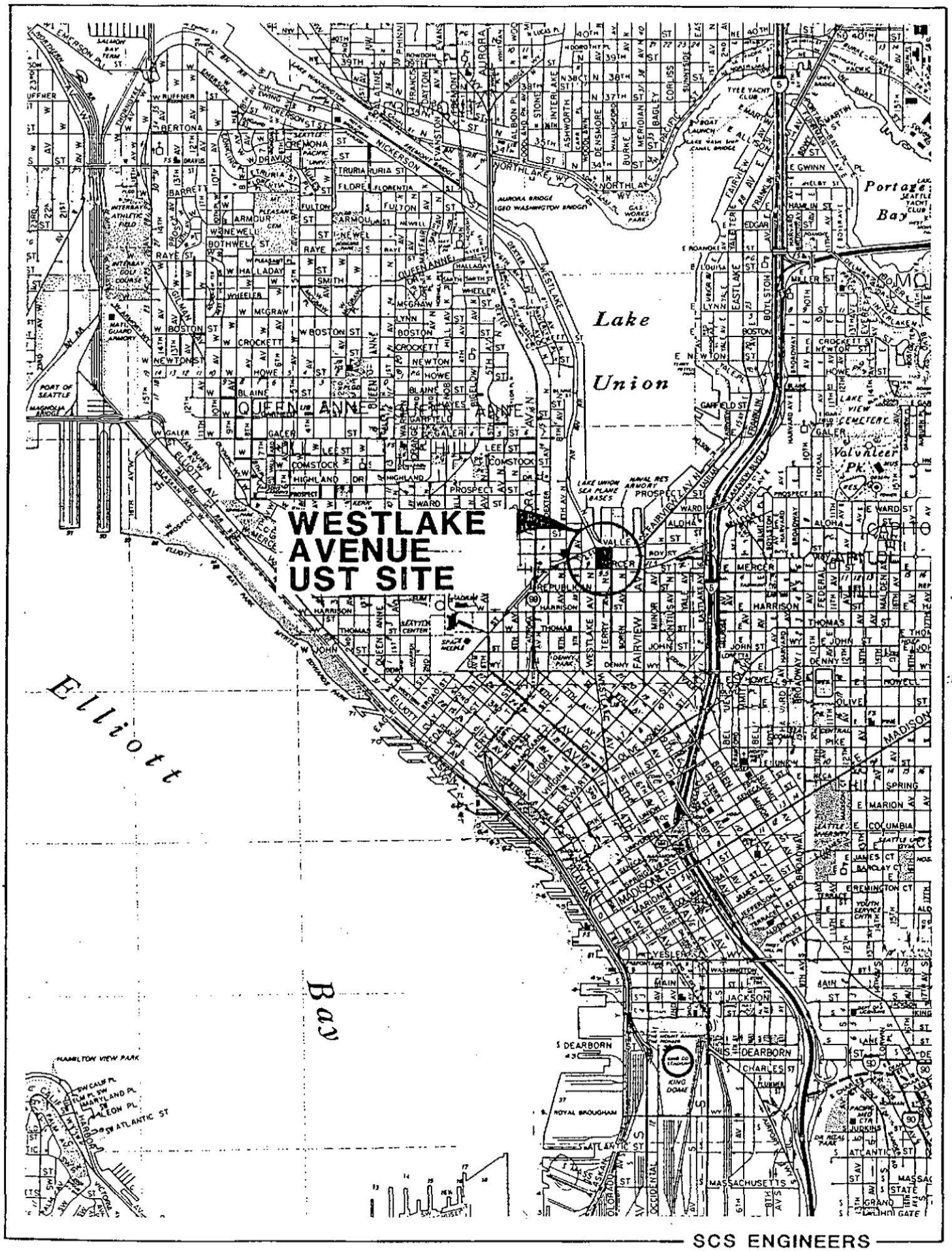

FIGURE 1 WESTLAKE AVENUE UST SITE

SECTION 2

SITE HISTORY

Available historical information, records, and documents for the site were obtained for review from the following sources:

- Washington State Archives
- Sanborn Fire Insurance Maps
- Seattle Engineering Office
- Walker and Associates Aerial Photography
- University of Washington Maps and Documents
- King County Assessor's Office
- Seattle Engineering Office
- City of Seattle Property Files

King County tax records indicate that the Westlake site occupies the west part of Lot 1 of Block 77, Denny's 1st Addition and Lake Union Shorelands Addition. Figure 2 illustrates the approximate location of the Westlake site and Block 77.

Historical records indicate that Block 77 was owned by the Brace and Hergert Mill Company in the early 1900's. J.S. Brace Inc. owned the property from about 1924 to 1972, at which time the property was acquired by the City of Seattle. The property has been primarily the site of lumber mills and gasoline service stations throughout its history. Actual periods of property transition and tenant occupancy are not clear in each case. Based on information available for this investigation, a compilation of historical ownership and tenant occupancy is provided in Table 1.

A copy of the 1904 Sanborn Fire Insurance Map of the site is provided in Figure 3. This map illustrates the presence of a lumber shed, planing mill, and machine shop in the area of this current investigation. Property directly to the south and east of the site (on Block 77) was also owned by the Brace and Hergert Mill Co. and was used for lumber and warehouse storage.

Washington State Archive information indicates that a gasoline station and service garage was built on the property in 1930. At that time the owner of the property was J.S. Brace Inc. and the gas station was known as "McKales". Records indicate that the original gasoline station was demolished in 1948 and later replaced in 1959. A photograph of the gasoline station during the 1930's is provided in Figure 4. In the far right side of the photograph is an automobile service garage that still stands today. Figure 5 is a photograph of this garage and an adjoining "Diamond Tires" building during the 1940's. Finally, Figure 6 shows the site as it was in 1959.

Historical records are unclear as to when underground fuel tanks were installed at the Westlake site. Washington State Archive information indicated that a 2,000-gallon and 3,000-gallon gasoline tank, and a 500-gallon waste oil tank were installed when the service station was constructed in 1930. A Union Oil of California tank construction diagram, obtained from the Washington State Archives, indicates that in 1959, two additional 5,000-gallon gasoline tanks (T-2 and T-3) were installed at the site.

The City of Seattle purchased the site in 1972 and then leased it to the current tenants. The area where the gasoline service station once stood is now occupied by a small one story concrete block office that was constructed in the late 1940's or 1950's. The automobile service garage is currently used for basic vehicle maintenance, oil changes, and auto custom detailing.

All of the underground tanks on the property, except for the 500-gallon waste oil tank, were abandoned and not in use since at least 1972, when the City of Seattle acquired the site. Based on available information, it appears that tanks were abandoned sometime between 1959 and 1972. The former 500-gallon waste oil tank (T-1) was actively used by the current property tenant until its removal in January 1990. Additional details regarding these tanks are provided in Section 4.

ADJACENT SITE HISTORY

Historical property ownership adjacent to the Westlake site includes lumber companies, wood yards, blacksmith and wagon repair shops, a brewing company, warehouses and storage sheds, an auto service station, and a creamery. Currently, adjacent property ownership/occupancy includes railway right-of-ways across Valley Street to the north, a gasoline service station (Union 76 as discussed below) to the south, a restaurant to the southeast, and boat and automobile dealerships to the east and west, respectively.

Information obtained from the Washington State Archives indicates that during the 1930's property to the north (across Valley Street) and east (on Block 77) of the Westlake site was occupied by Brace Lumber Company. Horlucks Brewing Company, owned by Frank Hergert, was built in 1933 south (on Block 77) of the site. Sanborn Fire Insurance maps indicate that Horluck Creameries Inc. once occupied the southwest part of Block 77, south of the current Westlake site. A 1960 King County Kroll Platt Map indicated that in approximately 1933 property on the south end of Block 77 was occupied by Sicks Century Brewery. This brewery, which was owned by J.S. Brace and Roy Investment Co., was demolished in 1965.

Property to the west of the Westlake site has been occupied by William O. McKay Automobile Sales and Repair since approximately 1917. Fire Insurance Maps indicate that a gasoline station may have been present in the early 1900's on the north end of W. O. McKay's property, directly west of the Westlake site, across Westlake Avenue.

In 1965, property south of the current Westlake site (part of Lots 4, 5, and 6 of Block 77) was purchased by Union Oil of California in order to construct and operate a gasoline service station. The property is currently occupied by a Union 76 station.

In 1980, a large underground gasoline spill was reported at the Union 76 site. According to the *Seattle Times* and *Post Intelligencer* newspapers, an estimated 75,000 to 82,000 gallons of gasoline leaked from an underground fuel line over about a six month period. The spill affected an area of several city blocks around the Union 76 station. Streets and businesses were closed down for two weeks while groundwater wells and trenches were constructed to recover the gasoline. Explosive vapors were detected in sewer lines along Westlake, Valley, and Mercer Streets. Approximately 15,000 gallons of gasoline was recovered from the wells and trenches during the cleanup.

According to our recent discussions with local regulatory agencies (Seattle Fire Department, U.S. EPA, and the Washington State Department of Ecology), the City of Seattle Fire Department took the lead on the cleanup. The Fire Department reported that they evacuated several nearby businesses due to strong gasoline odors but had no records that documented the spill. Our discussions with U.S. EPA and WDOE indicated that no additional information was on file at either of these agencies. Several newspaper articles that covered this spill event have been reproduced and are provided in Appendix A.

TABLE 1. HISTORICAL INFORMATION REGARDING OWNERSHIP AND OCCUPANCY OF SITE

Date	Owner/Occupant	Source of Information
1900's - 1930's	Brace & Hergert Lumber	Sanborn Fire Ins. Maps
1924	McKales Gas & Cafe	Sanborn Fire Ins. Maps
1930's - 1948	J.S. Brace/McKales Gas	Washington State Archives
1948 - 1959	J.S. Brace/McKales Tires	Seattle Engineering Office
1972 - Present	City of Seattle/Auto Service Company	Washington State Archives City Property Files

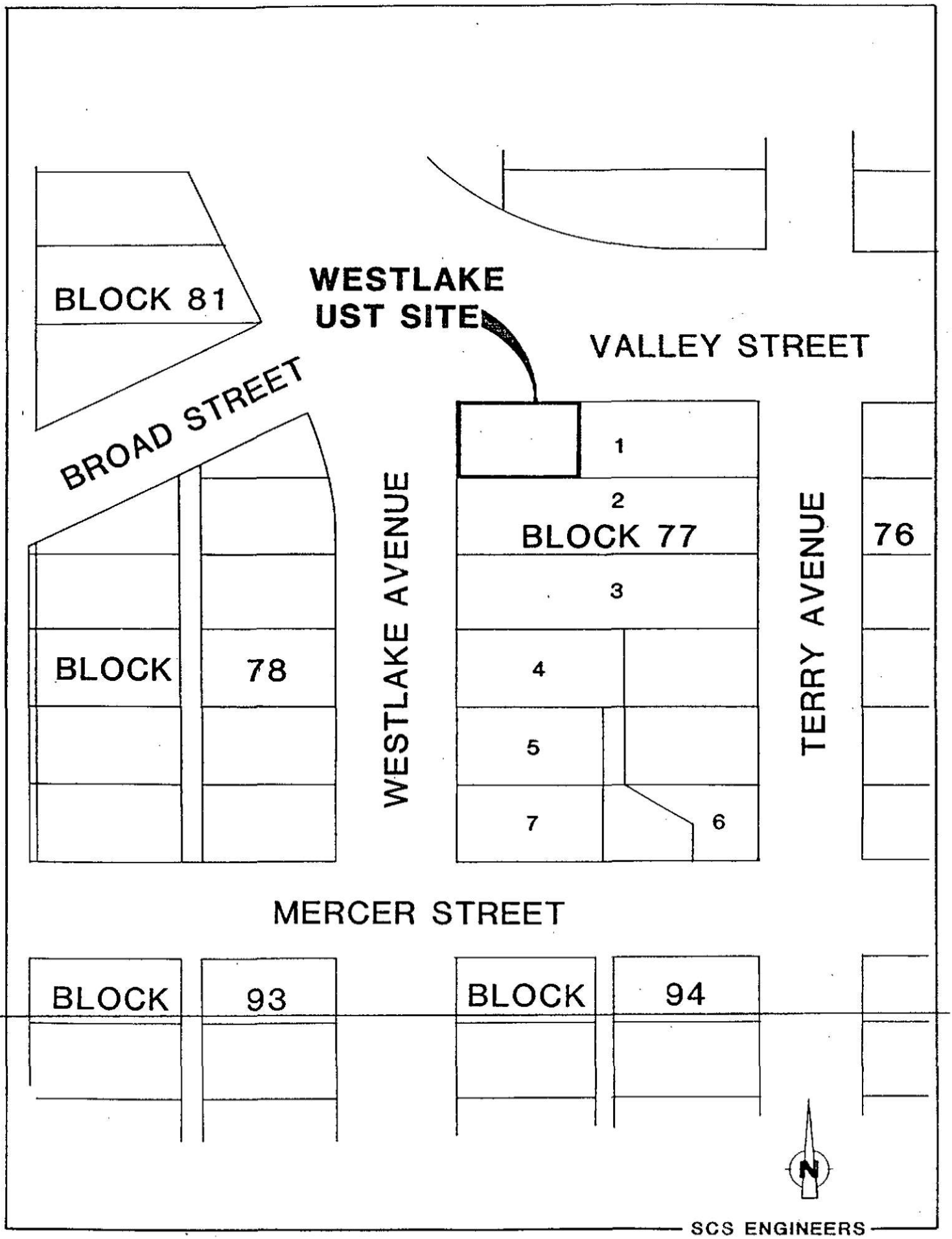

FIGURE 2 LOCATION OF WESTLAKE UST SITE AND BLOCK 77

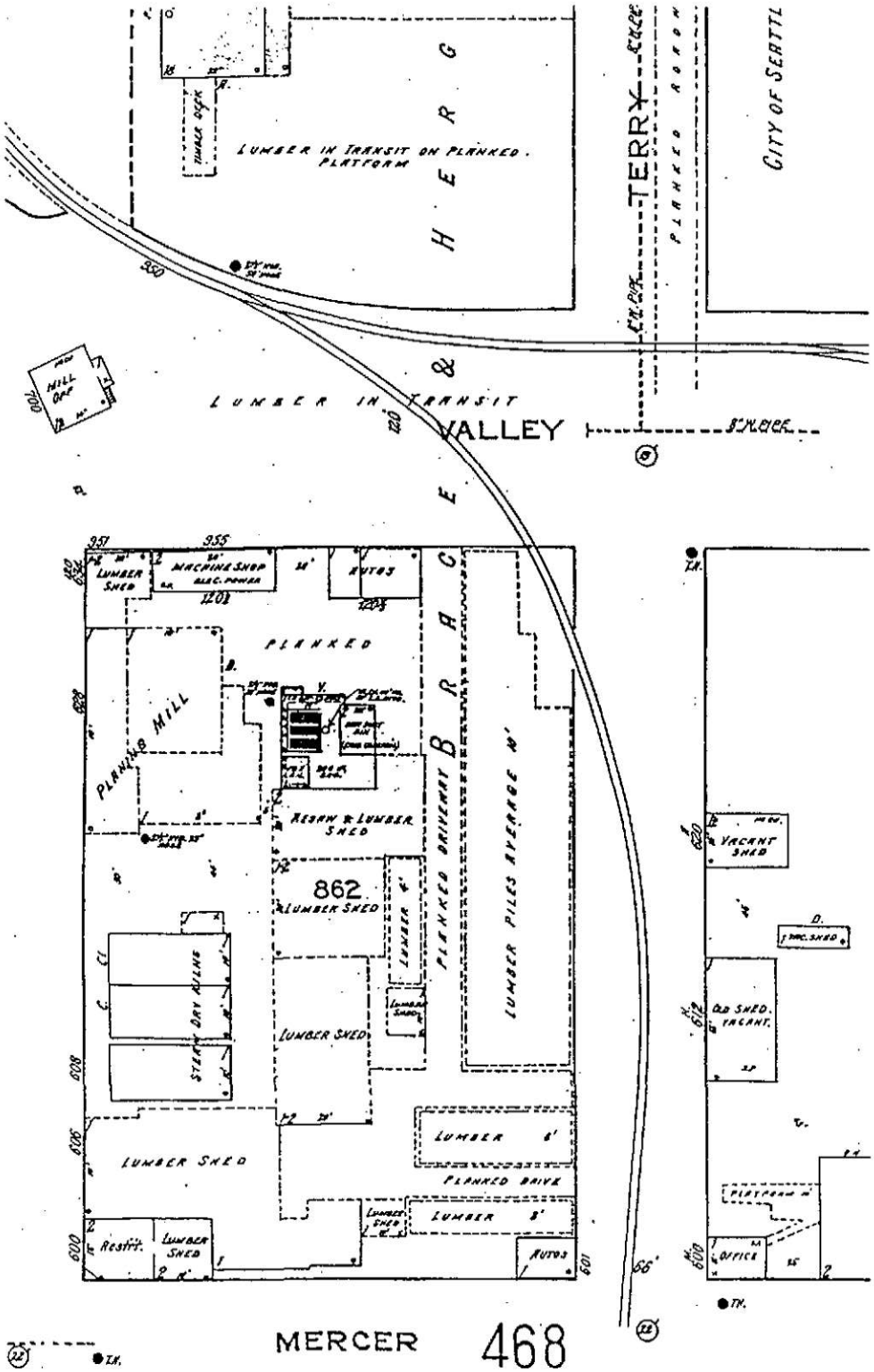

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FIGURE 3 1904 SANBORN FIRE INSURANCE MAP OF THE SITE

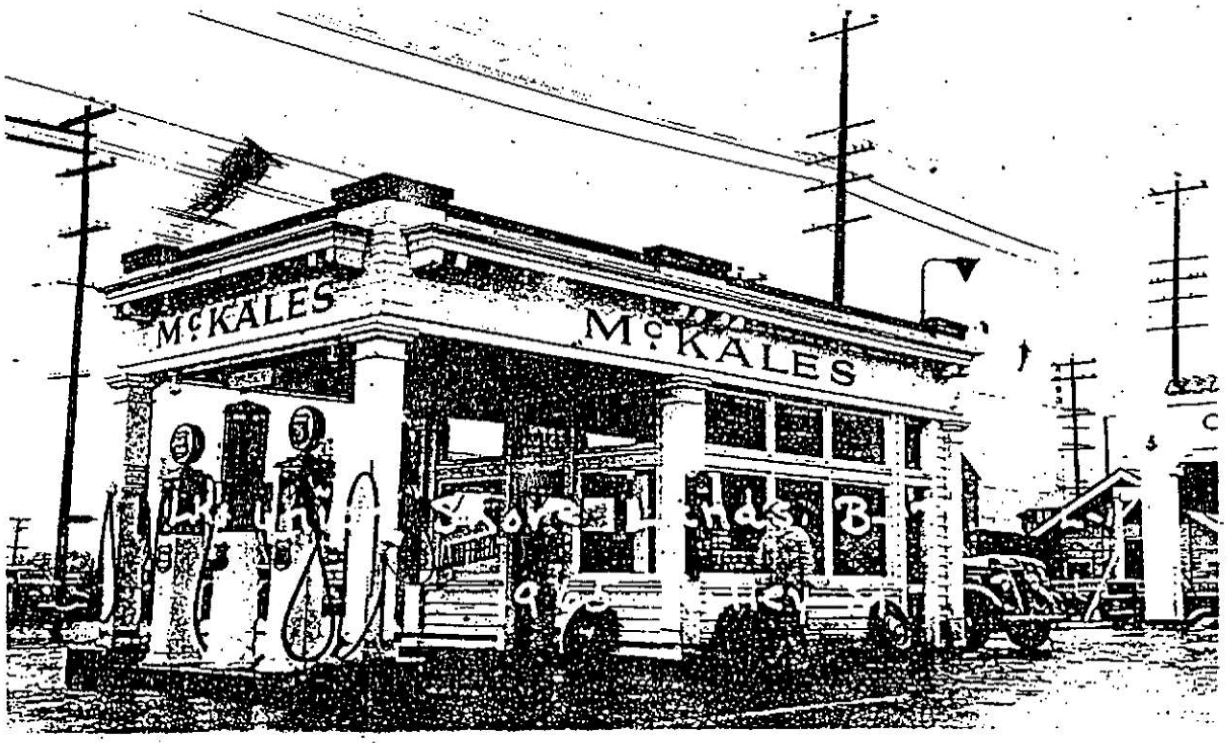

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FIGURE 4 McKALES SERVICE STATION IN THE 1930'S AT THE PRESENT-DAY WESTLAKE UST SITE (Washington State Archives)

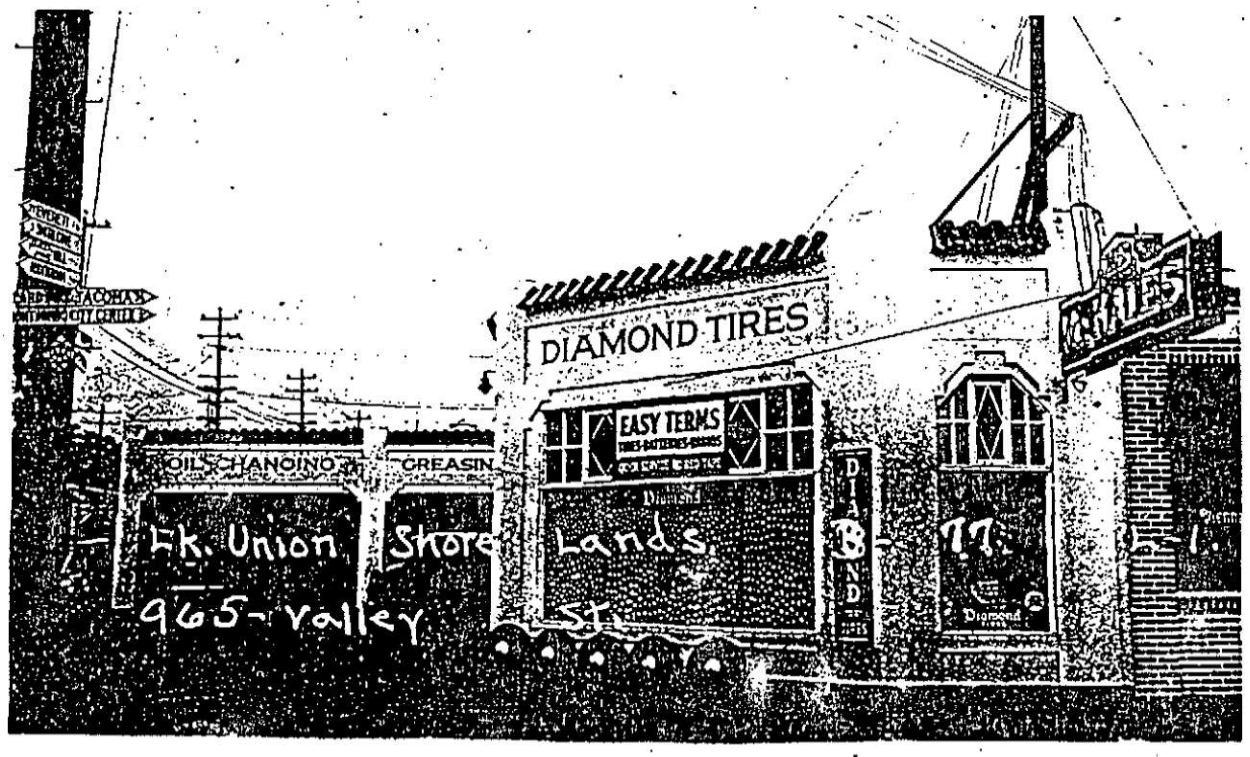

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FIGURE 5 WESTLAKE UST SITE DURING THE 1940'S
(Washington State Archives)

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FIGURE 6 WESTLAKE UST SITE IN 1959
(Washington State Archives)

SECTION 3

PHASE I - SITE CHARACTERIZATION

SCS Engineers conducted a Phase I site investigation at the Westlake site during January 1990. The investigation consisted of the following activities:

- Site walk.
- Record review.
- Verification of tank contents.
- Soil vapor survey.

During Phase I site activities, approximate tank locations were identified, tank contents were verified, available site plans and hydrogeologic information were reviewed, possible contaminant migratory routes were identified, and a soil vapor survey was conducted. A summary of the Phase I findings for the site is provided below.

SITE DESCRIPTION

The Westlake site is located at 630 Westlake Avenue, approximately 300 feet south of Lake Union in Seattle, Washington. The site is bordered on the north by Valley Street, on the south by an old building, a small parking lot, and Union 76 Service Station, on the east by a marine/boat sales and service yard, and on the west by Westlake Avenue.

The site has been owned by the City of Seattle since 1972 and operated primarily by a private auto service business. The current tenant uses the site for vehicle maintenance, including oil changes, brake work, tune-ups, steam cleaning, engine degreasing, etc.

The property is occupied by two permanent one story concrete block buildings as illustrated in Figure 7. The office building now stands where the original gasoline station was constructed. The auto service garage is an "L" shaped structure with four car bays and a small store room. A temporary skid-mount trailer and wash rack for cleaning automobiles is located on the north side of the service garage. A catch basin serving this part of the property is located adjacent to the wash rack on Valley Street. Five abandoned underground tanks were removed from the site in January 1990 during this investigation. One of the tanks (T-1) was used by the current property tenant to store waste motor oil prior to its removal. This tank was formerly located adjacent to the skid-mount trailer.

The property is paved with asphalt in the driveway areas between the two existing buildings, and ramp entries to the service garage are constructed of concrete. City sidewalks, sewer and storm systems, and water lines bound the north and west perimeter of the property.

SITE WALK

A site walk was conducted at the Westlake site during January 1990 by representatives from SCS Engineers and the City of Seattle. Five underground tank locations were estimated based on the locations of tank vents, fill ports, and cracks in overlying asphalt and concrete.

RECORD REVIEW

A Union Oil Company of California site construction diagram, dated June 1959, illustrates the proposed locations for the installation of two 5,000-gallon underground gasoline tanks. The diagram also shows the location of an existing waste oil tank, a 2,000-gallon and 3,000-gallon tank, and a proposed pump island adjacent to Valley Street. A copy of the Union Oil construction diagram is provided in Figure 8.

No public utilities were identified on site by a utility locating service. However, old electrical conduits and water lines were encountered during the excavation of the tanks during this investigation. Water and sewer lines were identified in the street and sidewalk along Valley Street and Westlake Avenue, on the north and west sides of the property, respectively. The location of these utility lines are important because the backfill around these lines could potentially act as a pathway for the migration of fuel product and volatile organic vapors.

No public or private water supply wells or groundwater monitoring wells exist in the vicinity of the site, according to records maintained by the Washington State Department of Ecology's Northwest District in Redmond, Washington. However, according to information collected during our historical review, Union Oil installed several gasoline recovery wells at the Union 76 site in 1980.

The depth to groundwater at the site is approximately 14 feet, as determined during the excavation of the underground tanks. Regional hydrologic and topographic information indicates that shallow groundwater flow and surface drainage in this area discharge into Lake Union, north of the site.

VERIFICATION OF TANK CONTENTS

Phase I of this investigation included locating tank fill ports and measuring the tank contents. Five tanks were identified on the property based on the location of tank fill ports. Approximately two feet of waste motor oil was present in the bottom of tank T-1. The soil around the top of the fill pipe was saturated with waste oil, probably as a result of poor filling practices. The contents of tank T-1 were removed and disposed of by the tenant prior to removing the tanks during this investigation. Tank T-4 was empty and the other tanks (T-2, T-3, and T-5) could not be measured because their fill ports were plugged with concrete. During tank removal activities, it was discovered that tanks T-2, T-3, and T-5 contained water.

Based on available information, it appears that tanks T-2, T-3, and T-5 were abandoned sometime between 1959 and 1972. During the 1960's and 1970's, it was common practice to inactivate a tank by filling it with water and then plugging access ports with concrete.

SOIL VAPOR SURVEY

A soil vapor survey was conducted by SCS Engineers and CENTRAC during January 1990. A total of 17 locations were tested for the presence of volatile organic vapors in the shallow subsurface soil. The locations and results of the survey are illustrated in Figure 9.

At each test location, a one-half-inch diameter hole, approximately one to three feet in depth, was constructed using a hand-driven bar punch rod. A portable photoionization analyzer (HNU meter), which was calibrated to a direct reading for benzene, was used to test for volatile organic vapors in the soil at each test location. The analyzer probe was inserted into each hole and a reading was then recorded.

Soil vapor test results at the site indicated volatile organic vapors were generally less than 50 ppm in the surface soil. The highest reading was 130 ppm near the north end of tank T-3. Except for areas adjacent to the tanks, the highest organic vapors were generally detected along the north and southeast property boundaries.

Based on the results of the soil vapor survey, SCS Engineers and Centrac concluded that the site was most likely contaminated with petroleum fuel product and that there was a likely possibility of off-site migration. Potential sources of volatile organic vapors in the soil at the site include previously leaking underground tanks or fuel lines, surface drainage, old surface spills, or migration of contamination from upgradient sources.

Additional investigatory work is recommended to determine the extent of contamination based on the findings of the soil vapor survey conducted during Phase I and analytical laboratory testing of soil and groundwater samples conducted during Phase II. An evaluation of Phase II analytical test results as well as recommendations for additional work is provided in Sections 5 and 7, respectively.

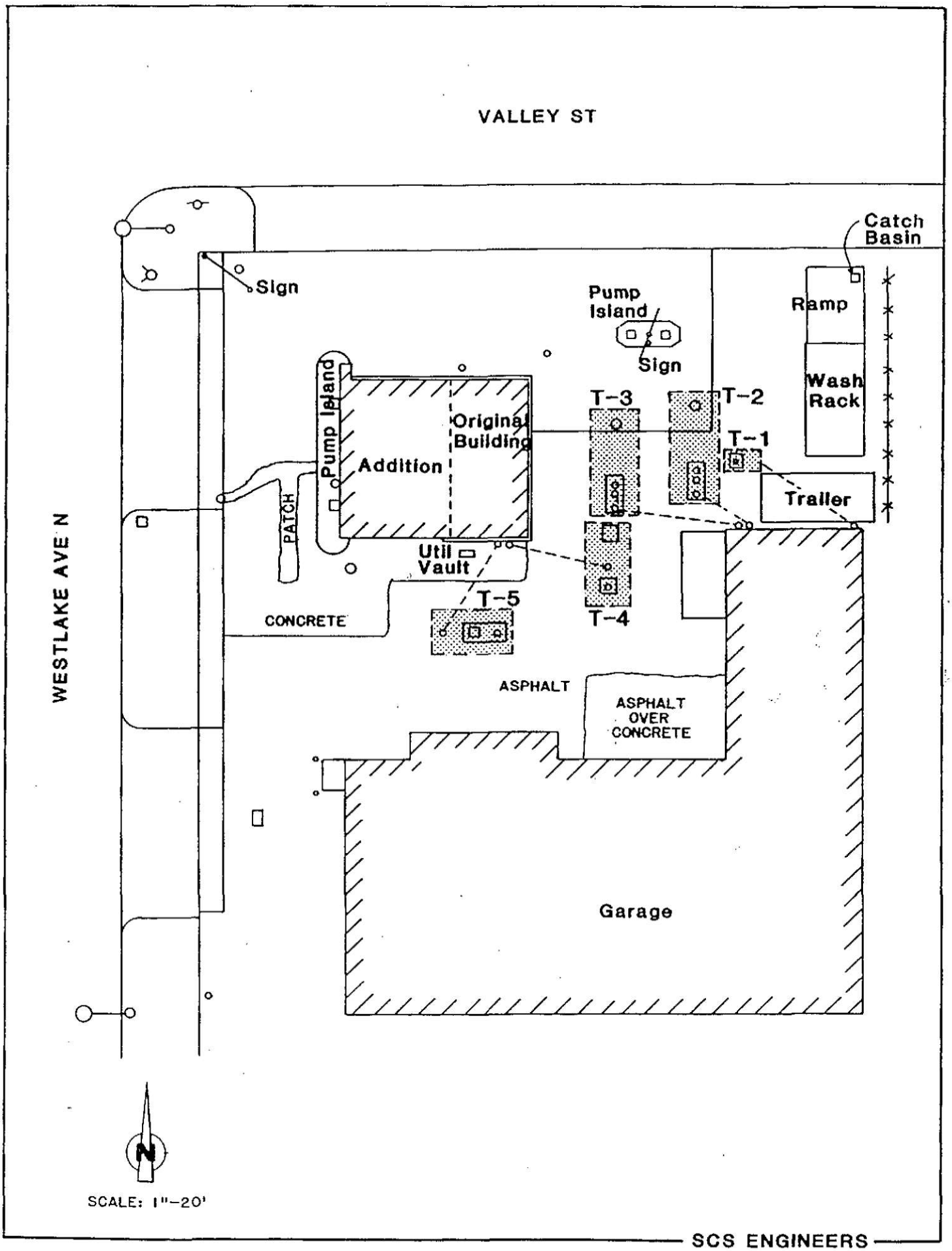

FIGURE 7 WESTLAKE SITE PLAN

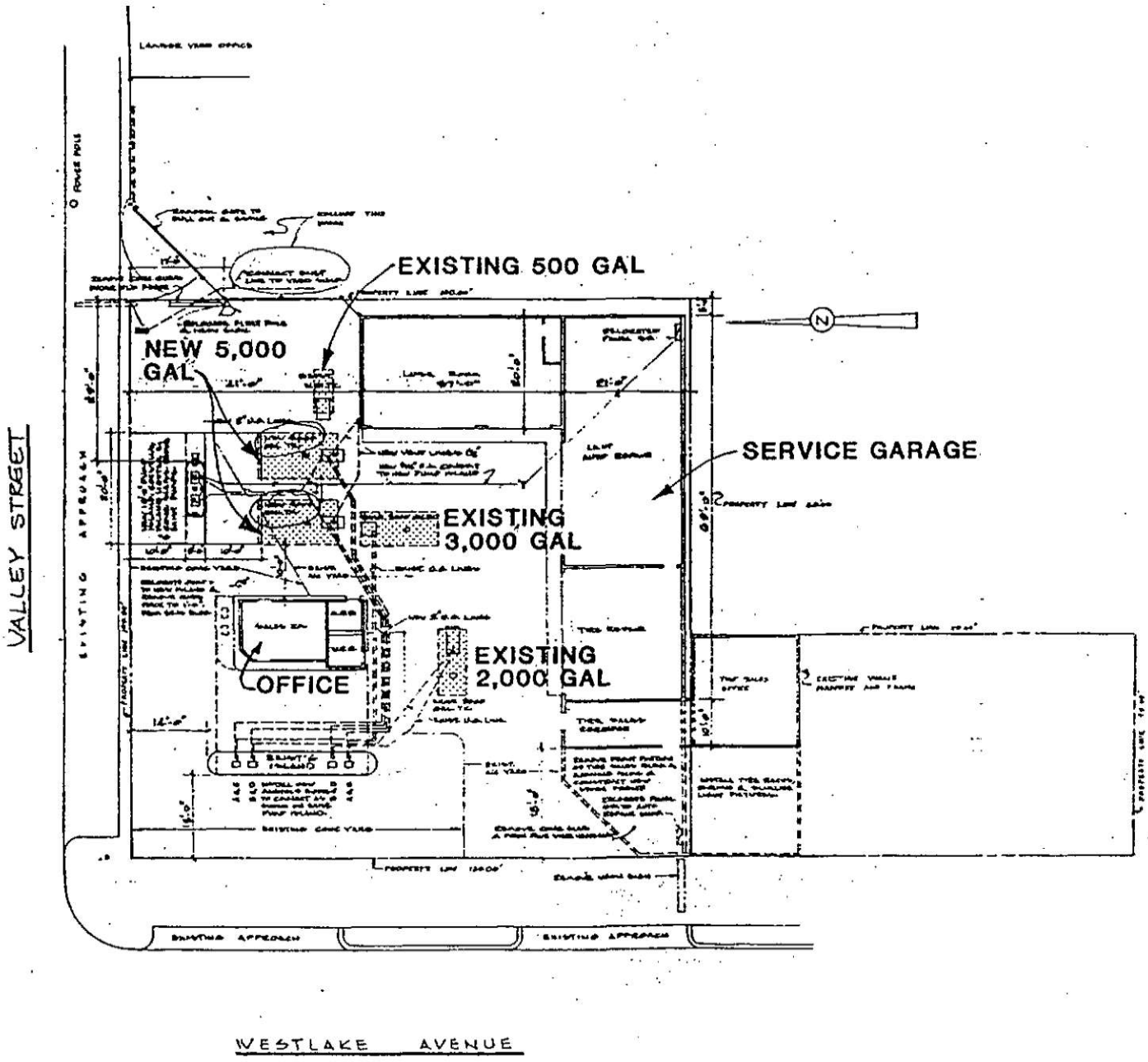

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FIGURE 8 UNION OIL TANK INSTALLATION DIAGRAM, 1959
(MODIFIED BY SCS TO ILLUSTRATE TANK LOCATION)

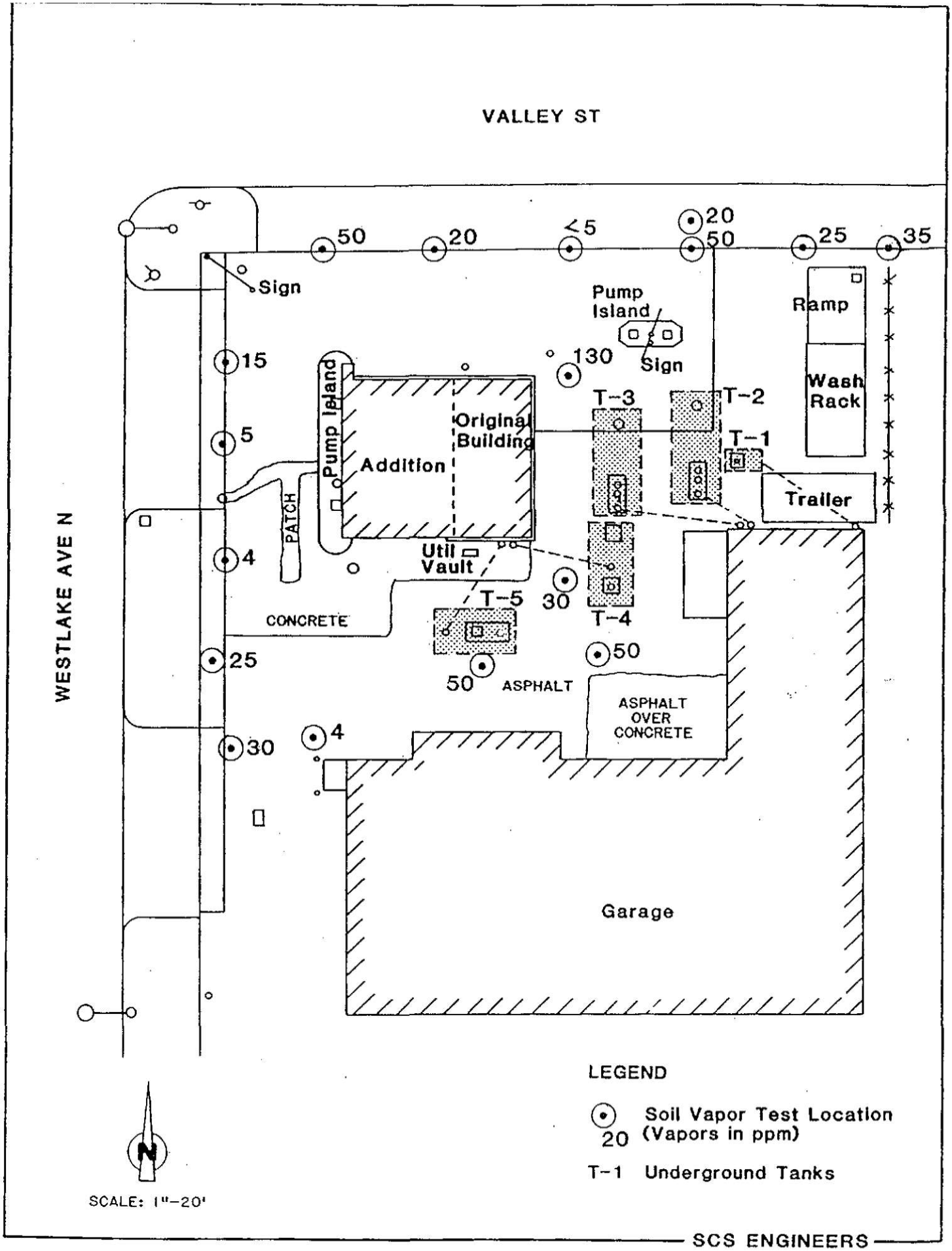

FIGURE 9 SOIL VAPOR TEST RESULTS

SECTION 4

PHASE II - TANK REMOVAL

During February 1990, five underground storage tanks were excavated from the Westlake site. The underground tanks ranged in size from 500-gallons to 5,000-gallons and were previously used to store gasoline (T-2, 3, 4, and 5) and waste motor oil (T-1). These tanks were located approximately as illustrated in Figure 10. A summary of information related to each tank is also provided in Figure 10. Photographic documentation of the tanks and excavation process is provided in Plates 1 to 16.

The primary tasks that were conducted during Phase II of this investigation included:

- Preparations of plans and specifications for tank removal.
- Removal of the tanks.
- Construction oversight.
- Sampling and testing for the presence of contamination.
- Soils remediation.

SCS prepared plans and specifications for the removal of the tanks as requested by the City of Seattle. These plans were approved by the City of Seattle in December 1989. The City retained Gaston Brothers Excavating to excavate the underground tanks and any contaminated soil located adjacent to the tanks at the site.

An SCS representative (CENTRAC) was on site during the entire project in order to provide documentation of activities and to collect soil samples for analysis. The following tank removal and testing procedures were used at the site:

- Expose the fill port and top of tank.
- Removal of tank contents, if any.
- Pump, rinse, and wash tank(s).
- Inertion (with dry ice) of each tank prior to excavation.
- Inspection by the Fire Department.
- Tank removal.
- Inspection for transport by Fire Department.
- Soil vapor monitoring by an on-site geologist.
- Removal of contaminated soils.
- Placement of visquene prior to backfilling operations.
- Backfill excavation with clean sand and gravel.

During this investigation, it was discovered that three of the abandoned tanks (T-2, T-3, and T-5) contained water, and fill pipes for these tanks were plugged with concrete. During the 1960's and 1970's, it was common practice to inactivate a tank by filling it with water and then plugging access ports with concrete. Tank T-4 was determined to be empty, and tank T-1 had about 250 gallons of waste motor oil that was removed prior

to its excavation. The fact that tanks T-2, T-3, and T-5 contained water indicates that they probably were not leaking when they were in use.

During tank removal operations, the tanks and fuel lines were inspected for obvious signs of damage, rust, or leaks. Although each of the tanks showed signs of surface rust, no obvious holes were observed in any of the tanks, except for those which were a result of excavating operations. Any tank punctures that were caused during removal were plugged prior to transport. Tank fill pipes and fuel lines were observed to be in fair condition.

Soil samples from the tank excavations were analyzed for total petroleum hydrocarbons (TPH), and benzene, toluene, ethylbenzene, and xylene (BTEX). The test results indicated that TPH and BTEX contamination were above recommended clean-up levels and that soil remediation was required.

Approximately 800 cubic yards of contaminated soil was removed from two large tank excavations (Excavation No. 1 and 2) at the site. The approximate location of the excavations are shown in Figure 10. The excavations covered nearly the entire driveway area between the two buildings to a depth of about 10 to 14 feet. No additional contaminated soil could be removed from the site without undermining the foundation of the buildings. Remedial alternatives are currently under investigation for the contaminated soil that remains below the buildings at the site.

An area on the west side of the office building was excavated (Excavation No. 3) to a depth of about four feet to investigate for the presence of a tank (see Figure 10). No tank was found at this location; however, an abandoned two-inch fuel line was discovered at a depth of about two feet. The line lies east to west, and using a steel tape measure, was determined to end at a distance of 20 feet from the excavation, under Westlake Avenue. The line contained fuel vapors but no free product. After determining that the line was previously abandoned and did not present a hazard, it was capped and buried. Analytical laboratory testing indicated that the soil in the northeast corner of Excavation No. 3 was contaminated with TPH above cleanup levels.

The soil stockpile at Seattle's Engineering Department Operations Division Yard at 6th and Harrison is currently contained between "ecology blocks" (concrete blocks with dimensions of about 6 ft x 2 ft x 2 ft) and is underlain and covered by visquene, awaiting its final disposition. The City of Seattle is currently investigating remedial options for treating the soil.

After removing the tanks and contaminated soil, filter fabric (stabilization cloth) was placed in the tank excavations to separate clean backfill material from any contaminated soil that remains on site. However, the fabric is permeable to water and will not prevent clean backfill from becoming contaminated where there is contact with contaminated water. In addition, two groundwater monitoring wells were installed in the tank excavations (see Section 5.0 for details) for future monitoring. The excavations were then backfilled with clean sand and gravel to more than 95% compaction. The entire site was then resurfaced with asphalt.

Compaction testing and density records provided by Hong West & Associates are included in Appendix B. Copies of tank removal permits from the Seattle Fire Department and a letter certifying that the tanks were scrapped and disposed of are provided in Appendix C.

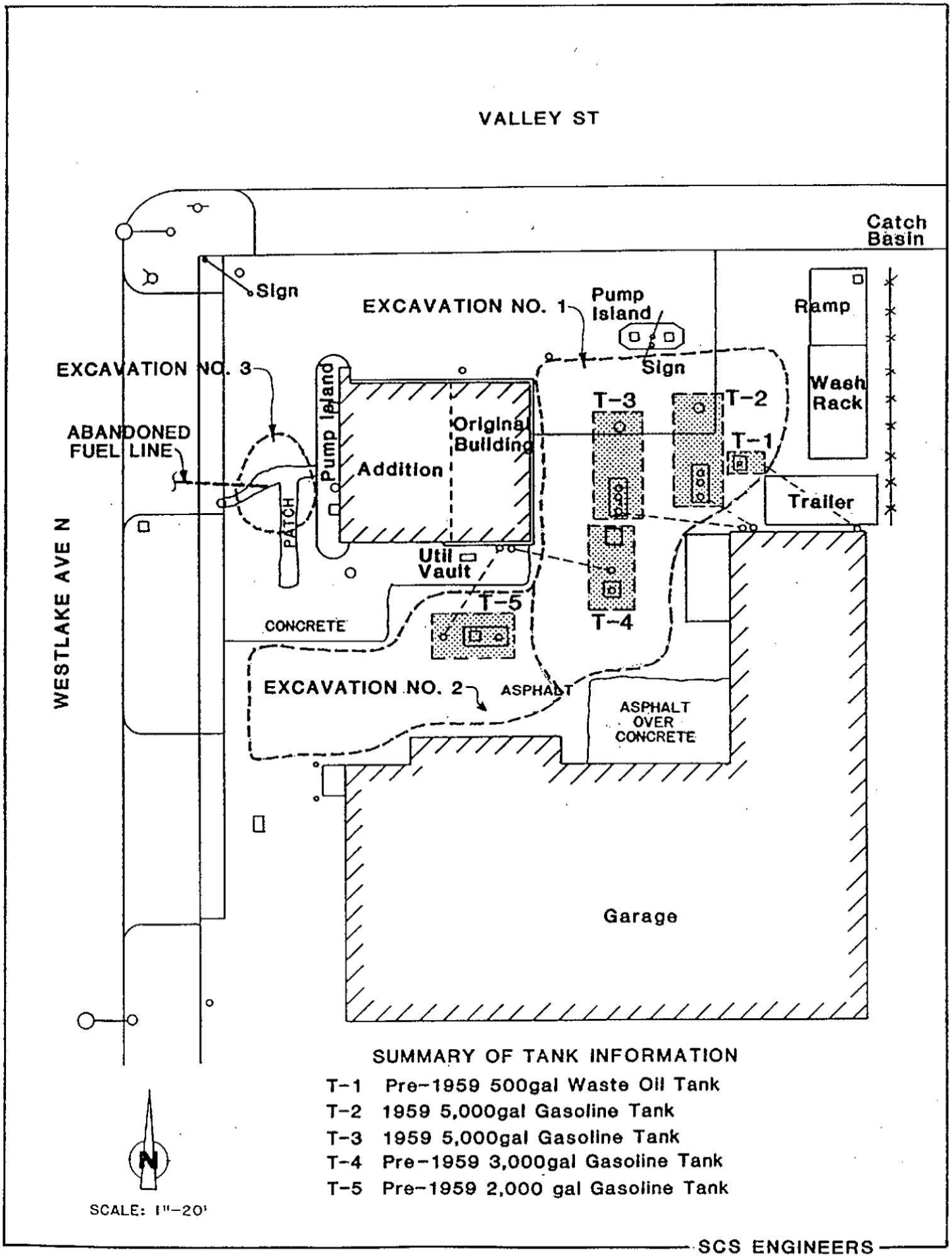

FIGURE 10 LOCATION OF UNDERGROUND TANKS

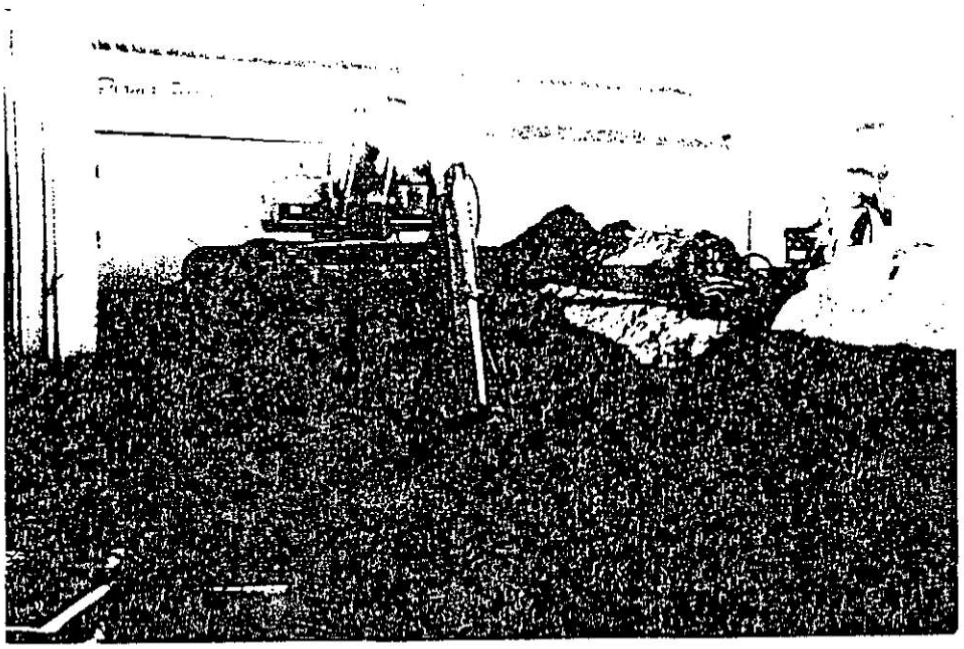

Plate 1. Breaking ground at Westlake Avenue UST site. View to sou

Plate 2. Removal of 500-gallon waste oil tank (T-1).

Plate 3. Exposing two 5,000-gallon gasoline tanks (T-2 and T-3) View to south.

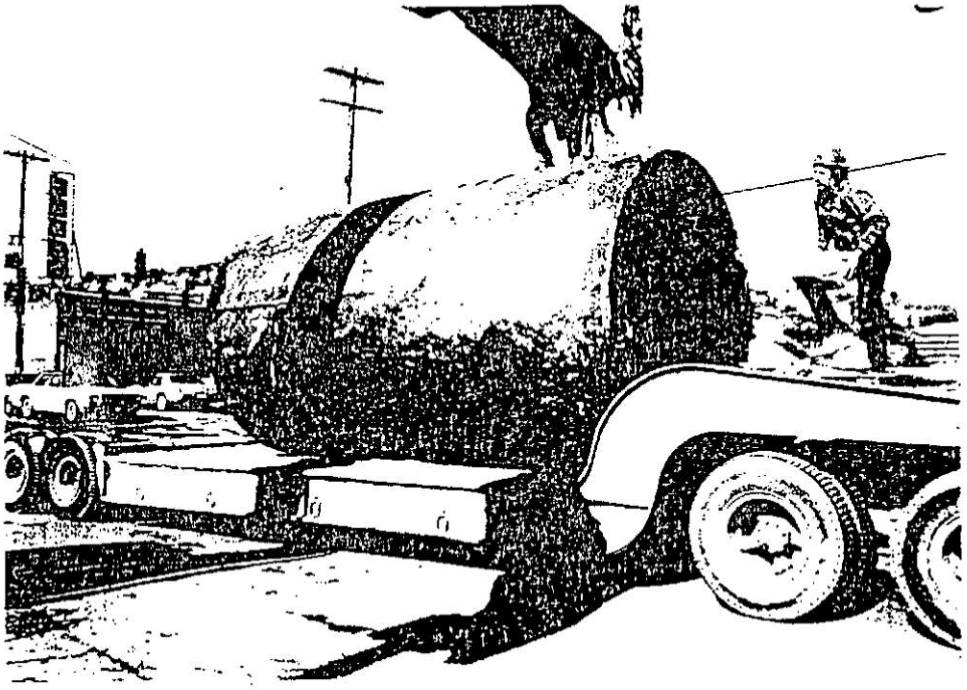

Plate 4. Loading 5,000-gallon tank (T-2) for transport.

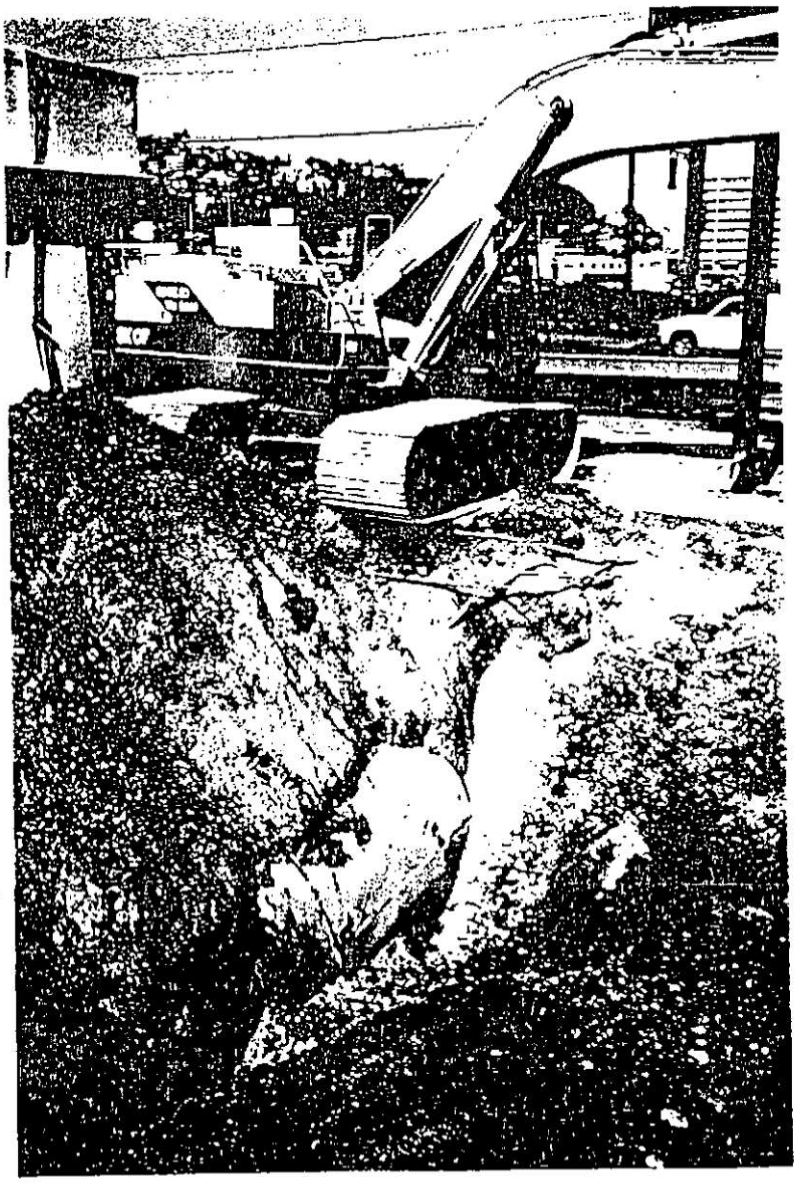

Plate 5. Exposing 5,000-gallon gasoline tank (T-3).

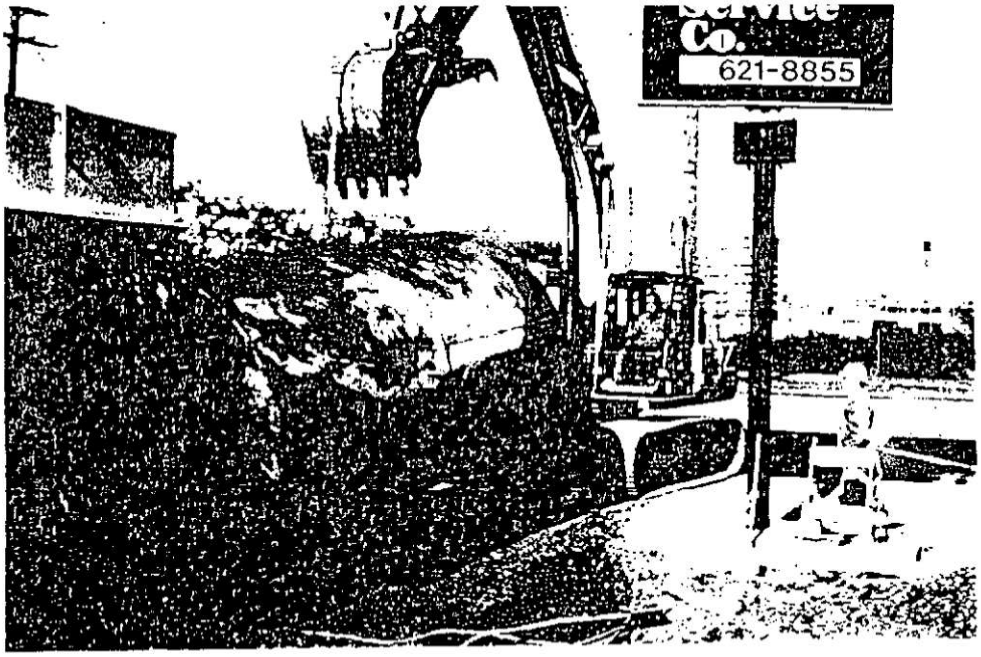

Plate 6. Removal of 5,000-gallon gasoline tank (T-3). View to north.

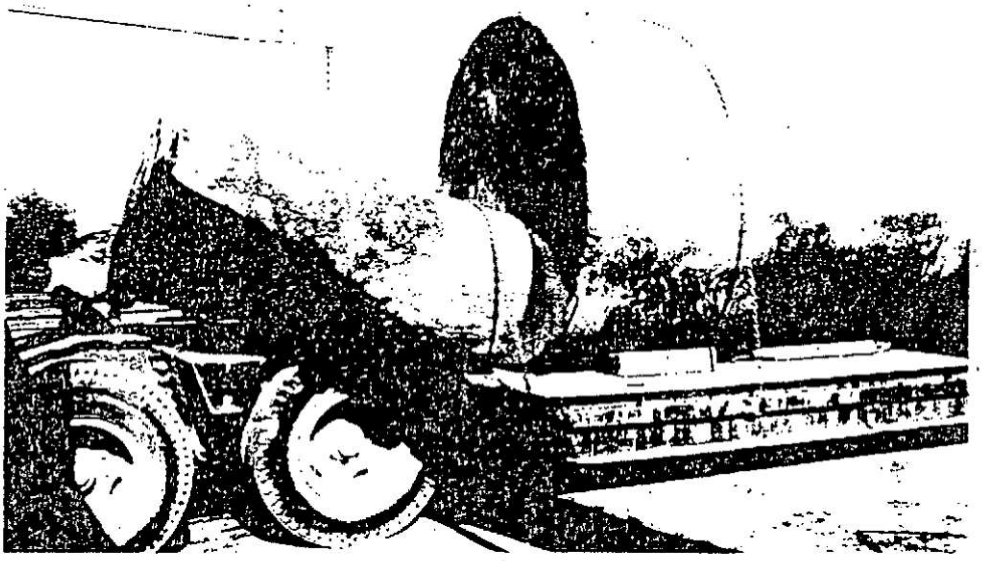

Plate 7. Loading 5,000-gallon tank (T-3) and 500-gallon tank (T-1) for transport.

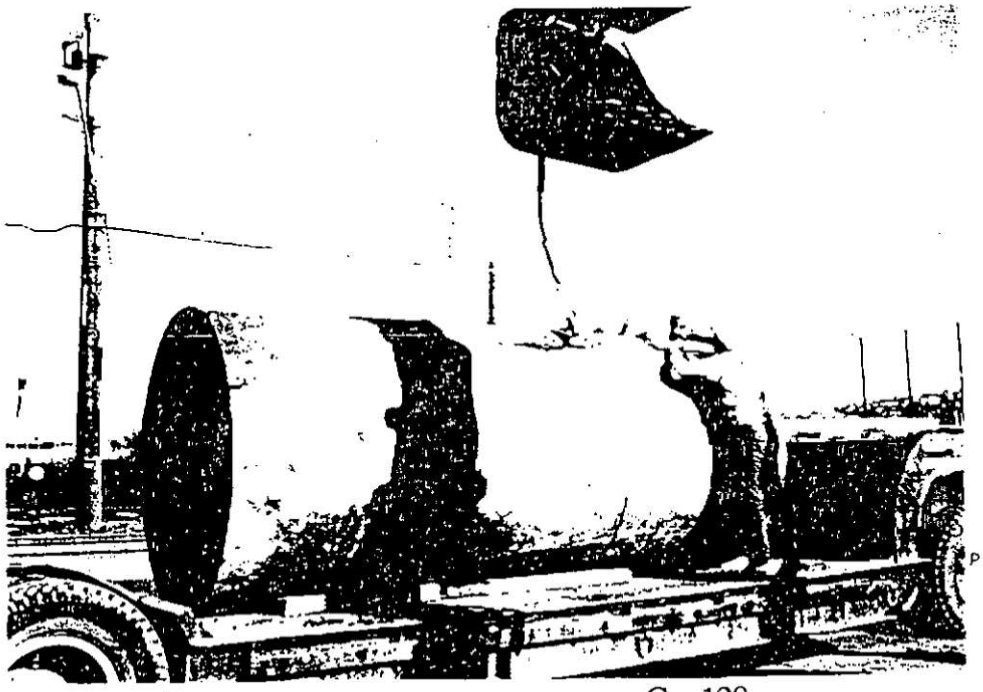

Plate 8. Loading 3,000-gallon gasoline tank (T-4) for transport.

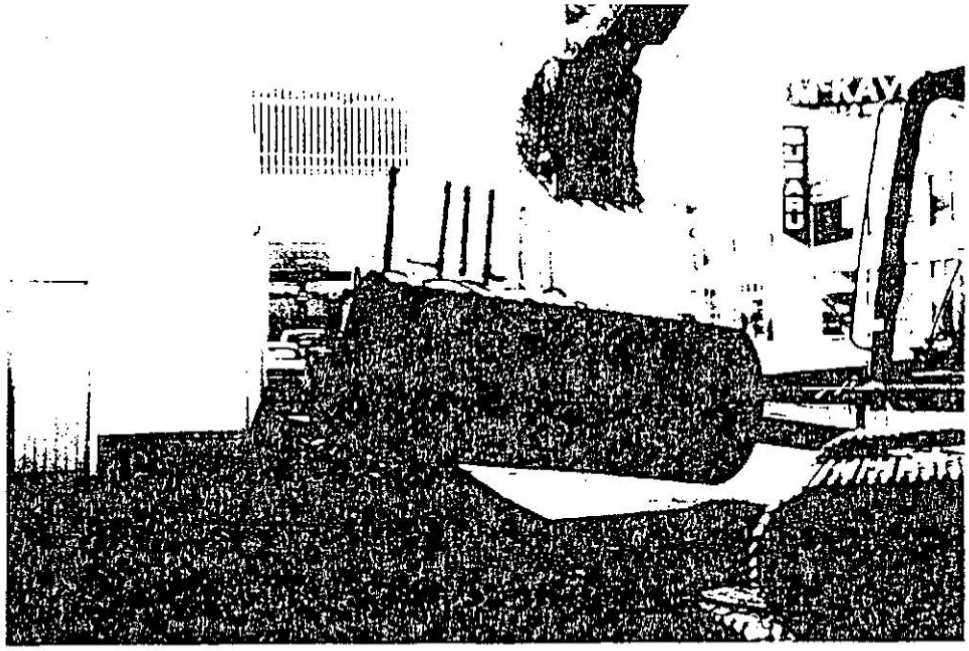

Plate 9. Removal of 2,000-gallon gasoli tank (T-5). View to south.

Plate 10. Contaminated groundwater at southwest corner of site in tank excavation for T-5. Depth is about 14 ft.

Plate 11. Contaminated groundwater at north end of site in tank excavation for T-3. Depth is about 14 ft.

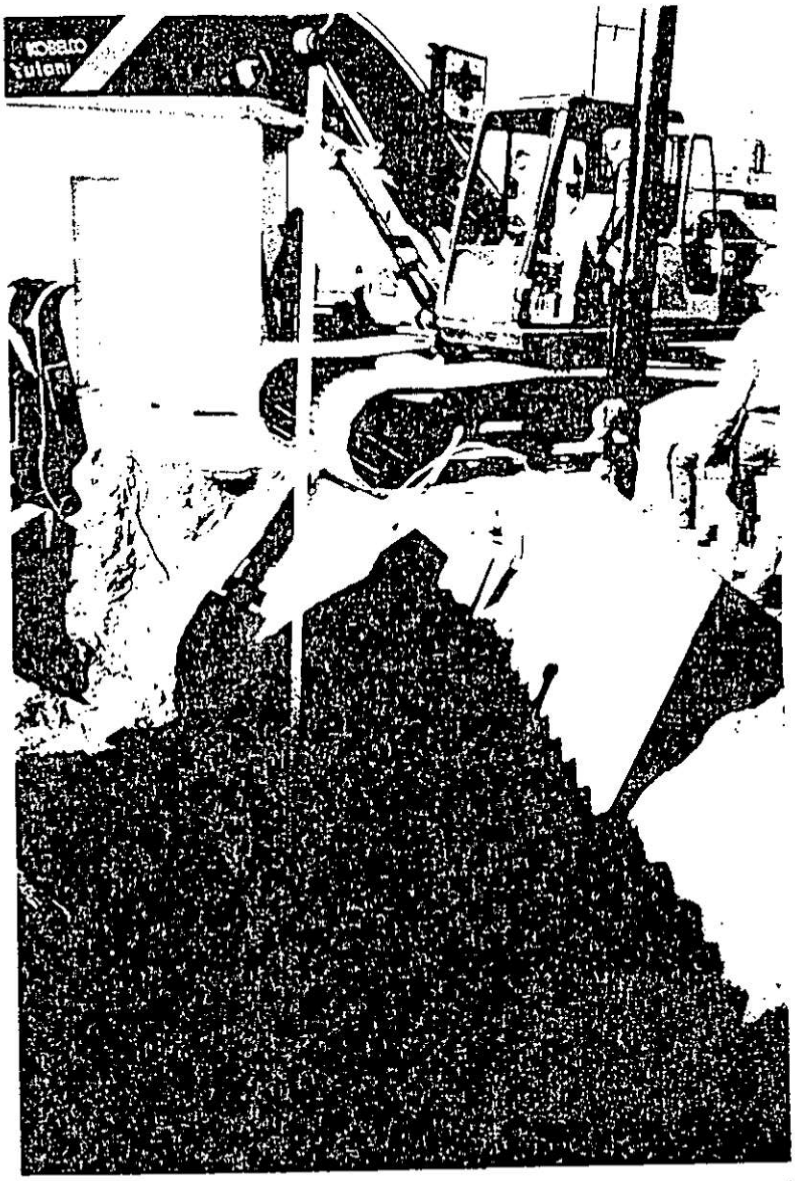

Plate 12. Installation of groundwater monitoring well at north end of site. Note shoring plates in excavation.

Plate 13. Placing filter fabric in excavation.

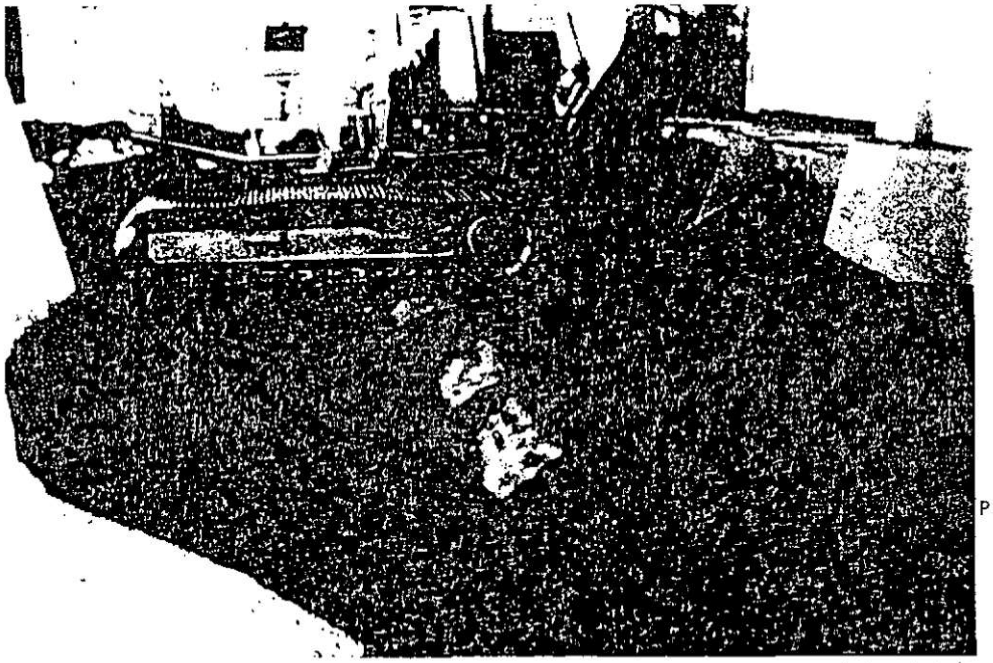

Plate 14. Backfilling tank excavation with clean sand and gravel. Note filter fabric and shor plates on right.

Plate 15. Compacting backfill material in tank excavation.

Plate 16. Exploratory hole adjacent to Westlake Avenue. Discovered an abandoned fuel line, but no tanl

SECTION 5

SITE CONTAMINATION

SOIL

Subsurface soils at the site consist of approximately 15 feet of fill material, underlain by native clay. The fill material includes an assortment of sand, gravel, clay, brick, wood, and concrete. In addition, railroad timbers and pilings covered with creosote were observed at a depth of approximately 10 to 15 feet in the tank excavations. The underlying native clay is gray, massive, plastic, and moist to wet, having similar characteristics to other subsurface deposits in the area.

Subsurface fill material on top of the native clay was contaminated with petroleum hydrocarbons over the entire area of the site. Over 800 cubic yards of contaminated soil was removed from the site during the excavation of the tanks. Dark-stained petroleum hydrocarbon contaminated soil was generally observed from about two feet in depth to the bottom of each tank excavation and at the south (upgradient), north (downgradient) and east property boundaries. The Fuel odors were very strong in each tank excavation and in much of the soil at the site.

A total of 42 soil samples and 4 water samples were collected from the tank excavations. Twenty-six of these soil samples and two water samples were selected for testing, and the remaining samples were archived. Analytical tests were conducted by Alden Analytical Laboratories Inc. for total petroleum hydrocarbons (TPH) using EPA Method 418.1, and benzene, toluene, ethylbenzene, and xylene (BTEX) using EPA Method 602/8020. In addition, four soil samples and one water sample were tested by Aquatic Research Inc. for total lead content.

Analytical test results indicated that 14 out of 16 soil samples tested for TPH exceeded WDOE's recommended clean up level of 200 ppm for TPH. The detected level of TPH contamination in soil at the site ranged from 2.9 ppm (Sample No. 3364) to 13,000 ppm (Sample No. 3367). The average level of TPH contamination in soil samples exceeding cleanup levels was about 2,000 ppm and the median level was 920 ppm.

Analytical test results indicated that 4 out of 10 soil samples tested for benzene exceeded WDOE's recommended clean up level of 0.66 ppm for benzene. The maximum level of benzene contamination was detected at 47 ppm (Sample No. 3367) in the soil on the southwest side of the site. Toluene was detected slightly above WDOE's recommended cleanup level of 143 ppm at this same location. Ethylbenzene was detected above its cleanup level of 14 ppm in three soil samples collected from the site. The maximum detected level of ethylbenzene contamination was 93 ppm (Sample No. 3367). The maximum detected level of total xylene was 440 ppm (Sample No. 3367); however, no cleanup levels have been established for xylene at the present time.

Analytical test results for total lead in four soil samples indicated a maximum concentration of 19.1 ppm (Sample No. 3312). Typical background concentration of total lead in soil is 100 to 200 ppm. Therefore, lead contamination in soil at the site appears to be insignificant.

Analytical test results for soil samples exceeding recommended WDOE cleanup levels for TPH and BTEX are summarized in Tables 2 and 3, respectively. Analytical laboratory reports for TPH, BTEX and lead, and chain of custody records are provided in Appendix D.

GROUNDWATER

Groundwater was encountered in the tank excavations at approximately 14 feet in depth, immediately above the native clay. An iridescent hydrocarbon sheen and a black, oily, tar-like substance were observed in the water on the north and south end of the site. The oily, tar-like substance was observed mostly on the south end of the site (upgradient) at approximately the level of the groundwater. As a result of these observations, a groundwater monitoring well was installed in the excavations on the north and southwest ends of the site for future testing. Each well was constructed of 2-inch diameter PVC, with the bottom two to three feet slotted. Gravel was backfilled around the screen at water level to prevent the well from filling with finer-grained sediment.

Two groundwater samples were collected directly from the tank excavations after the tanks were removed from the ground. These samples were tested for levels of TPH, BTEX, and total lead. Although sampling groundwater from the wells would have been more desirable, there was little time available during the tank removal process to allow for proper well development, groundwater stabilization, and sampling. However, these groundwater sample test results provide a rough indication of the levels of contamination that may be expected during future testing of the monitoring wells. Analytical laboratory reports for TPH, BTEX and lead test results, and chain of custody records are provided in Appendix D.

Maximum TPH in the groundwater was detected at 700 ppm (Sample No. 3365). WDOE's recommended cleanup level for TPH contamination in groundwater is 15 ppm. One groundwater sample (Sample No. 3289) was tested for BTEX levels. Benzene and ethylbenzene exceeded WDOE's recommended cleanup level in this sample by 112 and 2 times, respectively. A summary of the analytical test results exceeding recommended WDOE cleanup levels for TPH and BTEX in groundwater is provided in Table 4.

Total lead was detected at 3.1 ppm in one groundwater sample (Sample No. 3368) collected from the site. This level may be compared to a National Drinking Water Standard of 0.05 ppm for lead. Although groundwater at the site is not used for any drinking water supply, it probably flows to the north and eventually discharges into Lake Union. Therefore, contamination detected at the site is an obvious concern to the environment.

The source of total lead in groundwater at the site is unclear. The test results for lead in groundwater significantly contrast with levels of lead detected in soil at the site. For example, lead concentrations in soil are

expected to be much greater than 19 ppm (maximum detected level of lead at the site) for the same area in which lead in groundwater was detected at 3.1 ppm. Since the water sample was not filtered prior to testing, the results may reflect lead adsorbed on to suspended soil particles, instead of lead dissolved in the groundwater sample. Therefore, these test results may be indicative of background levels of lead detected in soil at the site rather than dissolved lead in the groundwater.

In order to provide a more thorough assessment of the quality and conditions of contamination in groundwater at the site and its potential impact on Lake Union, a number of wells must be properly installed, developed, and tested. Recommendations for providing this assessment are discussed in Section 7.

TABLE 2. SUMMARY OF ANALYTICAL TEST RESULTS
THAT EXCEEDED SOIL CLEANUP LEVELS FOR TPH AT WESTLAKE UST SITE

SAMPLE NO.	TANK LOCATION	DATE OF COLLECTION	TEST PARAMETER[1]	SOIL (ppm)	CLEANUP LEVEL[2] (ppm)
3279	T-1 (bottom)	02/28/90	TPH	3,800	200
3281	T-2 (bottom)	02/28/90	TPH	870	200
3283	T-3 (bottom)	02/28/90	TPH	820	200
3285	T-4 (bottom)	02/28/90	TPH	2,100	200
3287	T-5 (bottom)	02/28/90	TPH	1,700	200
3290	Exc. 1- N wall	02/28/90	TPH	1,400	200
3291	Exc. 1- NE wall	02/28/90	TPH	220	200
3293	Exc. 1- S wall	02/28/90	TPH	1,100	200
3294	Exc. 2- S wall	02/28/90	TPH	580	200
3295	Exc. 1- W wall	02/28/90	TPH	340	200
3362	Exc. 2- N wall	03/02/90	TPH	660	200
3363	Exc. 3- NE wall	03/02/90	TPH	970	200
3366	Exc. 2- W wall	03/02/90	TPH	220	200
3367	Exc. 2- S wall	03/02/90	TPH	13,000	200

Notes: [1] TPH is Total Petroleum Hydrocarbons.

[2] WDOE draft cleanup guidelines, August 1, 1988.

TABLE 3. SUMMARY OF ANALYTICAL TEST RESULTS
THAT EXCEEDED SOIL CLEANUP LEVELS FOR BTEX AT WESTLAKE UST SITE

SAMPLE NO.	TANK LOCATION	DATE OF COLLECTION	TEST PARAMETER[1]	SOIL (ppm)	CLEANUP LEVEL[2] (ppm)
3282	T-2 (bottom)	02/28/90	Benzene	3.1	0.66
			Ethyl-B	55	14
3284	T-3 (bottom)	02/28/90	Benzene	2.9	0.66
			Ethyl-B	35	14
3286	T-4 (bottom)	02/28/90	Ethyl-B	20	14
3288	T-5 (bottom)	02/28/90	Benzene	0.97	0.66
3367	Exc. 2- S wall	03/02/90	Benzene	47.0	0.66
			Toluene	160	143
			Ethyls-B	93	14

Notes: [1] Test parameter for BTEX includes benzene, toluene, ethylbenzene, and xylene.

[2] WDOE draft cleanup guidelines, August 1, 1988.

TABLE 4. SUMMARY OF ANALYTICAL TEST RESULTS FOR GROUNDWATER SAMPLES AT WESTLAKE UST SITE

SAMPLE NO.	LOCATION	DATE OF COLLECTION	TEST PARAMETER[1]	TEST RESULTS (ppm)	CLEANUP LEVEL[2] (ppm)
3289	Exc. 1	02/28/90	Benzene	7.4	.066
			Ethyl-B	2.5	1.4
3365	Exc. 2	03/02/90	TPH	700	15
3368	Exc. 2	03/02/90	Total Lead	3.1	.05[3]

Notes:

[1] Test parameter for BTEX includes benzene, toluene, ethylbenzene, and xylene. TPH is total petroleum hydrocarbons.

[2] WDOE draft cleanup guidelines, August 1, 1988.

[3] National Primary Drinking Water Standard, August 1987

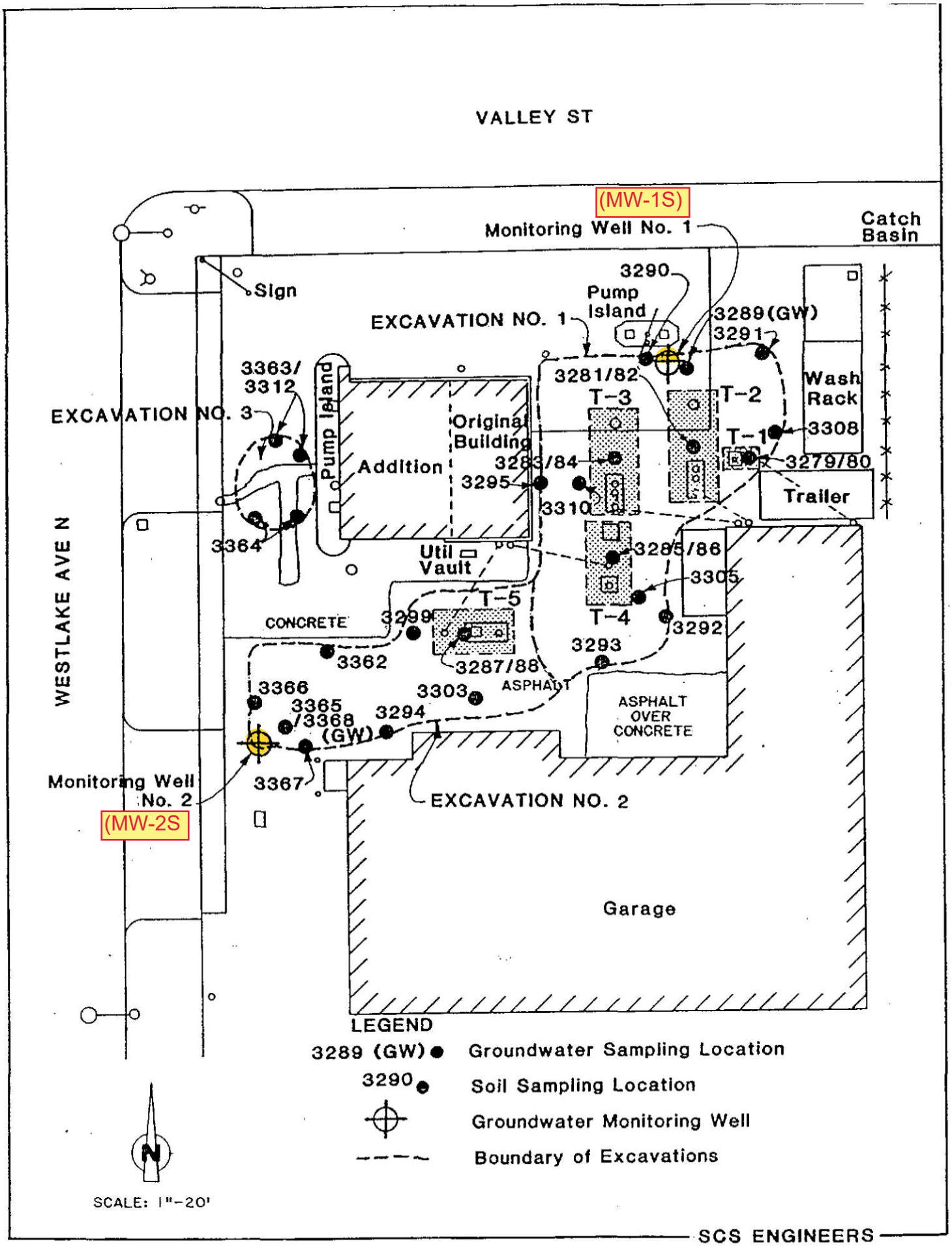

FIGURE 11 SOIL AND GROUNDWATER SAMPLING LOCATIONS

SECTION 6

CONCLUSIONS

Five underground storage tanks were removed from the Westlake site. No holes or obvious signs of leaks were observed in any of the tanks or fuel lines. The tanks appeared to be in fair condition, having only some areas of surface rust; however, the fill pipes and fuel lines generally exhibited a greater degree of surface rust and more extensive pitting.

During this investigation, it was discovered that three of the abandoned tanks (T-2, T-3, and T-5) contained water, and fill pipes for these tanks were plugged with concrete. During the 1960's and 1970's, it was common practice to inactivate a tank by filling it with water and then plugging access ports with concrete. The fact that these tanks contained water indicates that they probably were not leaking when they were in use.

High levels of petroleum hydrocarbon contamination (TPH and BTEX) were detected at the site. Although the source of this contamination was not specifically identified during this investigation, the contamination could be a result of previously leaking underground tanks, fuel lines, old spills, or migration of contamination from upgradient sources.

Approximately 800 cubic yards of petroleum hydrocarbon contaminated soil was removed from the site for treatment. An undetermined amount of contaminated soil remains at the site, primarily under the existing buildings and possibly beyond the property boundaries. Preliminary testing indicates that groundwater at the site is also contaminated with excessive levels of petroleum hydrocarbons and possibly lead.

Based on the location and detected levels of contamination at the site, there is a likely possibility of off-site migration of contamination. The predominant direction of contaminant migration would probably be to the north, because the regional topography and groundwater gradients both slope to the north. Migration of contamination to the Westlake site from upgradient sources (from properties south of the Westlake site) also appears to be a possibility, based on detected and observed contamination in the tank excavations on the south end (upgradient) of the site.

The fact that contaminated soil was observed to be extensive throughout the site including at the upgradient property boundary, indicates that contamination at the Westlake site potentially may have originated from an upgradient source. Based on our historical review, the underground gasoline spill that occurred south of the site 10 years ago is one suspected source of contamination. However, additional investigation is needed to substantiate this. Additional investigation is also needed to determine if the Westlake site is currently being impacted by contamination from other properties, by the transport of contaminated groundwater or volatile vapors.

Based on the findings of this investigation, additional work is needed to characterize the site before effective remedial alternatives for site cleanup can be considered. This will primarily involve determining the extent and level of contamination in the soil and groundwater, and possibly the direction and rate of plume migration in the groundwater. Recommendations for additional site work are provided in Section 7.

SECTION 7

RECOMMENDATIONS

Based on the results of this investigation, we recommend the following:

- Contact WDOE to satisfy notification requirements that the tanks have been removed from the site, and that plans for determining the extent of contamination are currently being developed. A completed WDOE tank closure form for this site will be forwarded to WDOE upon your request. A copy of this documentation is provided in Appendix E.

- Investigate levels of petroleum hydrocarbon contamination along the perimeter of the property, especially at the north end (downgradient) and south end (upgradient) of the site. This may assist in determining if on-site and off-site migration of contamination has occurred.

- Construct approximately 6 to 8 soil borings to a depth of approximately 20 feet in areas that are easily accessible by a drill rig, such as on the southwest, west, and north boundaries of the site. Based on analytical testing of soil samples collected from these borings, additional off-site borings may be necessary. Collect representative soil samples near the surface, middle, and bottom of each boring for testing.

- Convert two upgradient (on south property boundary) and two downgradient borings (on north property boundary) to groundwater monitoring wells after collecting soil samples from the borings. Determine the level of contamination in the groundwater, groundwater gradients, and direction of flow. In addition, install an upgradient background well to determine background levels of contamination. This upgradient well should be located south of the Union 76 Service Station, outside of areas previously impacted by the gasoline spill in 1980. Based on the analytical test results, it may be necessary to install additional monitoring wells to determine the downgradient extent of contamination. Strategic downgradient locations for these additional wells will be estimated after groundwater level gradients and contaminant levels are determined; however, based on existing data, the wells should be installed directly downgradient of the site, north of Valley Street. The approximate location of proposed monitoring wells and soil borings is illustrated in Figure 12.

- Develop the two existing groundwater monitoring wells that were installed at the site during this investigation. Once these wells are properly developed, they can be used to collect groundwater level and water quality information at the site. Well development procedures should consist of surge and bail techniques to remove all sediment from inside each well and provide an effective packing around the outside of the well screens.

- Test soil and groundwater samples for the presence of TPH (EPA Method 418.1) and BTEX (EPA Method 8020/602). In addition, we recommend testing for organic lead in upgradient and downgradient soil and groundwater samples to possibly assist in determining the source of contamination. Since the waste oil tank was recently in use and may have contained engine degreasing solvents, we recommend testing downgradient groundwater samples for the presence of halogenated volatile organics (EPA Method 8010).

- After completing this additional work to further characterize the site, evaluate remedial alternatives to clean up the site. Review alternatives with WDOE for approval and selection of the most feasible approach.

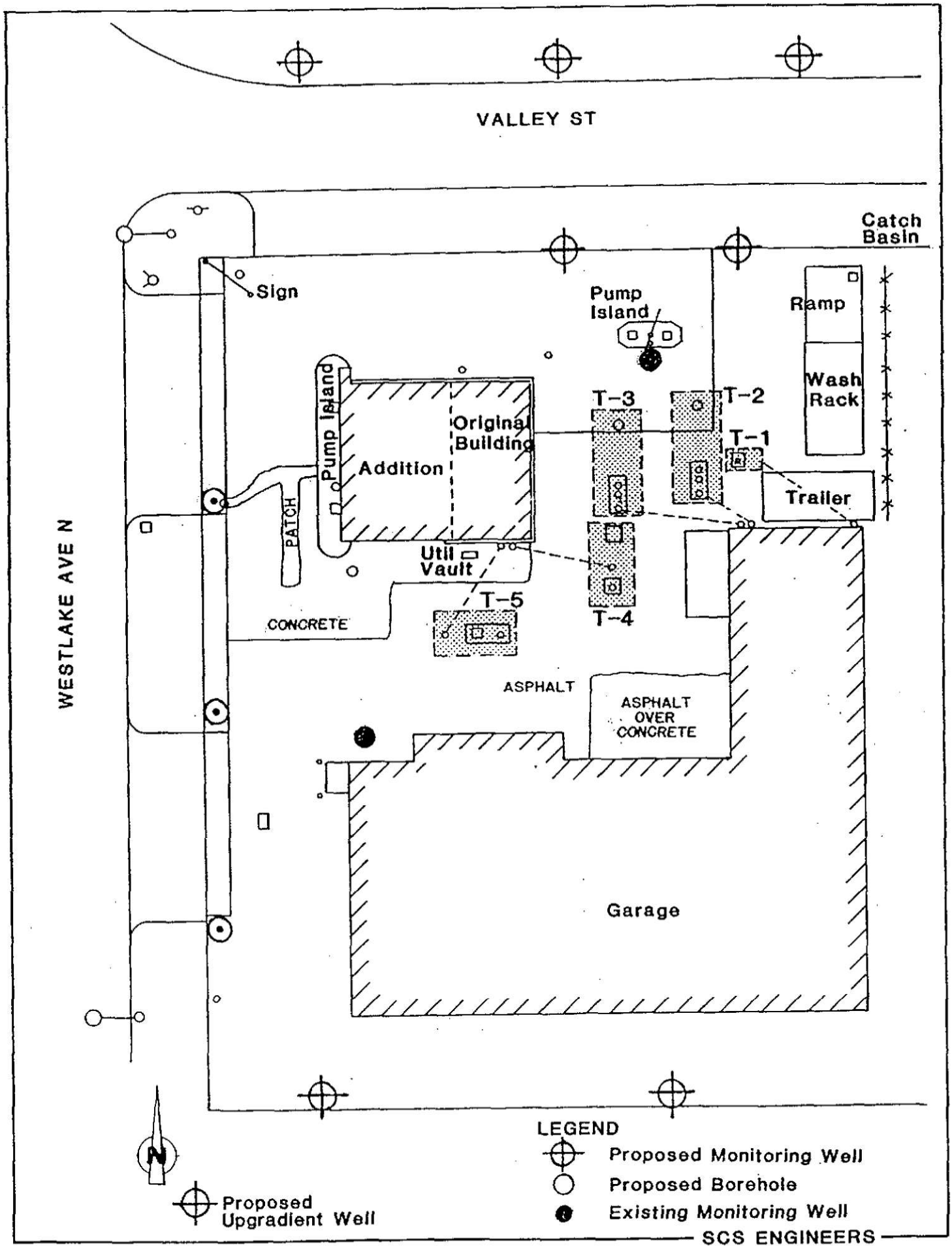

FIGURE 12 LOCATION OF PROPOSED MONITORING WELLS AND SOIL BORINGS

APPENDIX A

NEWSPAPER ARTICLES REGARDING GASOLINE SPILL AT UNION 76 STATION, SEATTLE, WASHINGTON

Gas leak blocks wider Westlake-Mercer area

by Herb Belanger and
Steve Johnston
Times staff reporters

More blocks were sealed off today around a Union 76 service station at Westlake Avenue North and Mercer Street where as many as 75,000 gallons of gasoline have leaked from an underground tank in the past six months.

Fire Department officials ordered closure of the area from Boren to Ninth Avenues North between Valley and Harrison Streets after finding more dangerous fumes in sewers. The highest readings were from sewers along Westlake.

Exits to Mercer Street from the freeway were closed at noon.

Jafco, William O. McKay and a Denney's restaurant were among businesses ordered closed this morning.

Union Oil crews meanwhile continued pumping gasoline from holes drilled behind the service station.

Battalion Chief P.A. Hargrove, assistant fire marshal, said as much as 75,000 gallons may have leaked over the past six months from a line connecting a 10,000-gallon tank to the station's pumps.

Police cordoned off a four-block area shortly after 3 p.m. yesterday when the Fire Department was notified of the leak.

Battalion Fire Chief R.B. Bower said the department was called when a passerby noticed service-station personnel pumping gasoline from holes behind the station into 55-gallon drums.

Bower said officials were told the leak was discovered Friday by the station crew. After taking readings for explosive fumes in surrounding sewer lines, it was decided to close the streets. Some nearby businesses also were closed.

Andrew Barone, a Union engineer, said employes suspected the tank was leaking and confirmed it when "a couple holes" were drilled in the ground behind the station. Gasoline 4 to 5 feet deep was found in the holes.

Barone said the Fire Department was notified about the leak Friday when it was discovered, but Bower said the department didn't know about it until yesterday afternoon.

Fire Lt. Stan Yantis said the gasoline fumes in the sewer lines could have been ignited by a cigaret or any open flame. Some gasoline was going directly into the Metro sewer system; other pools were drifting around underground.

Fire officials were checking fume readings in the sewers throughout the area.

Jeff Benoit, construction engineer for the company's Western division, said the pumping had continued for about 18 hours by midmorning.

Benoit said the recovered fuel probably would be unusable except for use with road-surfacing material.

Gasoline leak keeps intersection closed

by Herb Belanger
Times staff reporter

Additional steps aimed at opening Westlake Avenue North and Mercer Street to traffic were taken yesterday at a Union 76 service station where about 75,000 gallons of gasoline leaked underground.

Since June 9, when the leak was disclosed, traffic in the vicinity has been disrupted while crews work around the clock, seven days a week, to recover the gasoline and eliminate dangerous vapors.

The area surrounding the leaky station remained blocked off today.

Deputy Fire Chief William Landers last night said the area surrounding the leaky station probably will remain blocked off today.

Work crews dug another deep trench at the southwest corner of the station and installed a steel casing to be used for pumping out gasoline. Two trenches were dug last week.

Two six-inch sewers also were connected from the station to the main sewer in the center of Westlake. High levels of gasoline fumes have been recorded in manholes opposite the service station.

Area businessmen, meanwhile, have not been happy with the situation.

John Nerney, president of the William O. McKay Subaru dealership at 609 Westlake Ave. N., directly opposite the station, said he feels "this is all a horrible dream, and I'll wake up and find it isn't true."

"I can't understand how a company as big as Union Oil can have a leak over a long period of time and not know about it."

Nerney said he did not plan legal action, but asked the oil company to pay his expenses while Westlake was closed. The company refused to pay.

The Denny's Restaurant at the corner of Mercer Street and Terry Avenue North had a 45 per cent drop in sales last week, according to Mike Corbell, manager. After closing one day, the restaurant was allowed to reopen. But Corbell has hired watchmen round the clock to keep customers from smoking outside the restaurant.

He said he is keeping a record of average sales at this time of year and the actual sales while traffic is rerouted. In addition, he is logging the wages employes lose when they are sent home because of lack of business.

He said any negotiations for compensation from Union Oil will be on the corporate level.

The Jafco store on Westlake Avenue North was closed one day last week. The store reopened with limited access along Westlake and Mercer to its parking areas.

Bernard Gordon, Jafco's general manager, said business was pretty low at first, but it has been improving steadily. He has talked with Union Oil's insurance representatives, and said Jafco's lawyers will be handling the matter.

At the Pacific Lincoln-Mercury dealership, 601 Westlake Ave. N., Mike O'Brien said, "The results have been disastrous. I've never experienced anything like this in 25 years. There's been a complete stoppage of business since Tuesday of last week."

Crews still reclaiming gasoline at leak site

by Peter Lewis
and Herb Belanger
Times staff reporters

Lessening danger may permit reopening of the area around Westlake Avenue North and Mercer Street, where about 75,000 gallons of gasoline was lost through an underground leak, Fire Marshal Robert Hansen said today.

Mercer Street was to be opened, for rush-hour traffic only, this afternoon if flushing of sewers reduced the explosive potential of fuel in the sewers.

Hansen expected Westlake and Mercer would be open to normal traffic over the weekend.

The Union Oil Co. said it would replace all the underground fuel lines at the station, which will remain closed for about two weeks.

A 60-foot-long ditch was partly completed last night alongside the station in a project to drain gasoline from fuel-saturated soil. Another ditch will be dug tonight on the north side of the station.

The "French drains," 4 feet wide and 15 feet deep, will have "scavenger pumps" to draw gasoline into hoses for pumping into tank trucks. The pumps will have a capacity of 15,000 gallons a day.

As digging proceeded last night, dump trucks were lined up to haul the excavated material, under plastic sheets, to the Union Oil plant at Edmonds. Trucks were driven to Edmonds in convoy, escorted by Seattle police.

The area was sealed off Monday when the Fire Department learned of the leak. Businesses in the area have been reopening as the danger subsides. The Jafco discount store reopened today.

Storm sewers are being capped on the northwest and southwest corners of the station to stop the migration of gasoline vapors into underground utility lines.

Ken Mauermann, district inspector for the state Department of Ecology, said it is hoped that much of the gasoline is contained along the basement floor and wall of an old building foundation under the service station.

Hansen said last evening that test readings were showing reduced levels of vapors in manholes and nearby building basements. "It's not an atomic bomb sitting in the street," he said.

Mauermann said he doesn't expect any of the leaked gasoline to work its way into Lake Union. He said he would wait until the recovery is finished before beginning to assess damage and possible liability.

Union Oil representatives estimated that about 6,000 gallons of gasoline had been pumped from two holes drilled at the station, Mauermann said. Most of what was drawn yesterday from two "wells" drilled earlier was water, he added.

Gasoline has leaked from a line connecting the station's underground storage to the pumps, possibly over a six-month period.

Oil-company billing procedures apparently permitted the gasoline to leak without discovery.

Mauermann said the cooperation of Union Oil in containing the leak has been "astonishing."

Traffic returns to normal around site of le

by Peter Lewis
and Herb Belanger
Times staff reporters

Traffic along Mercer Street has returned to normal for the first time since Monday after gasoline vapors subsided and a project to recover 75,000 gallons of leaked gas appeared to be doing the trick.

Only Westlake North between Mercer and Valley Streets remained closed this morning. It was to be reopened today if readings of vapor levels in sewers indicated there was no danger.

A trench was completed last night along the north side of the Union 76 service station, scene of the gasoline leak. A trench had been dug the previous night along Westlake Avenue North.

Crews last night loaded plastic-lined trucks with tons of gasoline-soaked soil. The soil was being taken to the Union 76 plant at Edmonds where it will be aerated.

Daytime traffic snarls caused by detours around a four-square-block area surrounding the station should be over.

Battalion Chief Merl Weatherhogg said all businesses in the area reopened yesterday except for one millwork building owned by the Brace Lumber Co., 965 Valley St.

But two automobile dealerships along the closed portion of Westlake Avenue North, William O. McKay Subaru and Pacific Lincoln-Mercury, reported extremely slow business because of the limited access.

"We don't know when the gasoline will all be out," Fire Marshal Robert Hansen said. "It may take several months, but as long as there's no hazard, we don't care how long it takes."

Yesterday, crews completed capping storm sewers running off the Union 76 station, stopping the spread of vapors underground.

Pipes were being laid in the trenches, then were being filled in with gravel and dirt. A storage tank to hold the recovered gasoline will be installed.

An estimated 75,000 gallons of high-octane gasoline leaked, perhaps for as long as six months, because of a rupture in a pipe connecting an underground storage tank with the station pumps.

Company billing procedures for the station allowed the missing gasoline to go unnoticed, Union officials said.

Westlake-Mercer area still closed

Stretches of Westlake Avenue North and Mercer Street remained closed to traffic today because of dangerous readings of gasoline fumes in sewer manholes.

The streets near their intersection have been closed most of the past week because of discovery that about 75,000 gallons of gasoline had leaked underground at a Union 76 service station.

Five test wells were drilled in Westlake last night in search of pools of gasoline, but only fumes were found. More wells were to be drilled today.

"We are concerned that there may be gasoline floating in the sump area (the gravel around the sewer itself)," said Paul Dennis, manager of division services for Union Oil Co. "We want to see if we can draw off the fumes that seem to be plaguing that line."

Two manholes have been the major problem — one at the corner of Mercer and Westlake, and another on Westlake south of Mercer. These and another manhole at the junction of Westlake, Broad and Valley Streets have registered dangerously high fume readings.

Scavenger pumps installed at trenches dug in the station property are drawing off mixed gasoline and water and pumping it into tank trucks to be transported to the Union Oil plant at Edmonds. More than 15,000 gallons already have been recovered.

Gas fumes again close intersection

Dangerous readings of fumes in sewer manholes prompted the Fire Department to order closure again yesterday of Westlake Avenue North and Mercer Street at their intersection.

The streets in the area remained closed at rush hour this morning.

Work has been going on for a week to contain an estimated 75,000 gallons of gasoline which leaked underground at the Union 76 station at the northeast corner of the intersection.

The new readings at the intersection showed a 100 per cent possibility of an explosion if there was a spark or flame.

Trenches have been dug alongside the station to draw off the gasoline water mixture and pump it into tank trucks for transportation to the Union Oil plant at Edmonds.

Through yesterday 15,000 gallons of mixed gas and water had been removed from the station.

Mercer gas-leak detour to end today

by Peter Lewis
[illegible]

Barring some last-minute hitch, motorists should be able to travel along Mercer Street this afternoon to reach Interstate 5, the Seattle Fire Department said yesterday.

With the exception of a day or two in between, it will be the first time since June 9 that the heavily traveled thoroughfare has been open at Westlake Avenue North.

The Union 76 station at that intersection, near the south end of Lake Union, has been the site of a major gas-recovery project since it was discovered that an estimated 75,000 to 82,000 gallons of gasoline leaked from underground tanks.

Crews yesterday were erecting a 6-foot-high chain-link fence down the middle of Westlake Avenue North between Mercer and Valley Streets, and around the station to permit further recovery work to continue. The two west lanes of Westlake Avenue North also were expected to reopen today.

Seattle Fire Chief Robert Swartout yesterday said the fence probably would remain up at least through July 4 as a precautionary measure against fireworks that could ignite any remaining gasoline. About 15,000 gallons had been recovered as of yesterday, the chief estimated.

Meanwhile, Barry Lane, a spokesman for Union Oil in Los Angeles, said yesterday that the company "is not trying to avoid any responsibility because we know it's ours." He set the amount of missing gas at 82,000 gallons, about 7,000 gallons more than generally has been estimated so far.

Lane could not explain how the gas, which apparently leaked over a several-month period due to corrosion of a steel storage tank or pipe leading to the station pumps, went undetected.

"We have no answers yet," he said, adding that the matter was under investigation and that "our attention has been mainly directed toward solving the main problem (of safety and recovery)."

Lane said the station, at 600 Westlake Ave. N., was the company's largest in the Northwest, pumping nearly 250,000 gallons a month. He said the station was among a minority of Union 76 stations that work on a "consignment" basis as opposed to "outright sale."

The operator of the consignment-type station "does not own the gasoline until such time as he pumps it," Lane said. Because of the billing process, a consignment operator would have no way of knowing how much gas was in the storage tanks. "All he knows is what he's pumping," Lane said.

An adjustor hired by the company to compensate area businesses for loss of business suffered as a result of traffic restrictions confirmed that her mission "is to settle, not to investigate."

One thing complicating settlements, however, is uncertainty over whether the area will be closed again, an affected businessman said.

New underground storage tanks going in at site of big gas leak

Heavy-construction equipment was crowded onto the Union 76 service-station site at Westlake Avenue North and Mercer Street yesterday as workmen try to get the station back into operation by July 14.

The station was the site of a massive gasoline leak that closed the two streets to traffic for more than two weeks.

Paul Dennis, manager of division services for the Union Oil Co., said three underground storage tanks, two of 10,000 gallons and one of 8,000, are to be replaced soon.

Four new fiberglass tanks, each holding 10,000 gallons, will be installed, he said. Three will be used to store gasoline for sale, the other will be to store leaked gasoline that is recovered from the ground.

Dennis said work is well along on all the underground installations, including the piping to the pumps from the new tanks and the scavenger pumps used to recover the gasoline from the leak.

The pumps, which skim off gasoline from the top of the water table, are installed in casings sunk about 15 feet into the ground.

An estimated 75,000 to 82,000 gallons of gasoline leaked underground over a period of months. Through last week some 15,000 gallons of gasoline was recovered.

With permanent installation of the scavenger pumps, Dennis said, "If the water table changes, we'll always be able to recover any of the gasoline floating on the surface."

The Seattle Times Thursday, June 26, 1980

Traffic back to normal as Mercer Street reopens after gas leak

by Herb Belanger
Times staff reporter

Traffic returned to normal on Mercer Street yesterday afternoon for the first time, except for one or two days, since June 9 when a major gasoline leak was discovered at a Union 76 service station.

The resumption of traffic came after a 6-foot chain-link fence, backed by a plywood barricade, was erected around the station, and after a ventilation system was installed in the sewer main running under Westlake Avenue North.

Traffic also was flowing on Westlake between Mercer and Valley Streets, but it was restricted by the fence to the two west lanes.

Seattle Fire Marshal Bob Hansen said the resumption of traffic was approved after tests of the sewer mains under the busy intersection indicated no gasoline-fume accumulation following installation of the ventilation system.

Hansen said the sewer line will be ventilated for at least six months.

About 14,500 gallons of gasoline have been pumped out of the ground around the station. Union Oil Co. officials said a break in the station's underground-storage system allowed between 75,000 and 82,000 gallons of gasoline to leak into the ground in the past several months.

Hansen said he expects up to another 10,000 gallons to be pumped from the ground, with the rest remaining to be broken down "by bacterial action." Hansen declined to estimate how long that might take.

All test wells sunk around the service station will be monitored regularly to make sure ... migration of the gasoline or buil- site on a 24-hour basis from the time the leak was discovered, will be returned to their normal duties, probably by the end of the week, Hansen said.

The job of monitoring the test wells and sewer for gasoline fume buildup will be taken over by the oil company, which will report regularly to the Fire Department.

Mercer Area Storeowners Are Cryin

By S.L. Sauger

The Union 76 service station at Westlake and Mercer is back in business but some people in the neighborhood still are burned up over the gasoline leakage incident at the station.

Skip Schermer, owner of The Magic Flute, a nearby stereo and music store, is so incensed that he put up a sign outside his building that says "Public Enemy No. 1, Union Oil; Refuses to Pay Damages for Gas Spill."

Bill Cargill, who sells used cars for Pacific Lincoln Mercury across the street from the gas leak location, says it was "a disaster" for him.

"It was so bad there for a while, my wife almost threw me out. I wasn't bringing any money home."

The station closed June 9 after a strong smell of gasoline was noticed. The fire department later closed off a four-block area to traffic because of the danger of explosion.

The closure lasted until June 25 — two weeks. But local business people say the effects of closing the street, and the resulting publicity about danger, cost them customers for a month to six weeks.

Some 75,000 gallons of gas leaked from a line be-

claims payments have been extensive, but he does not have any numbers.

"We have made final settlements with better than half of the 34 claims. They submit a claim, showing their books of past records compared with sales during the closed period, and we make restitution based on the difference. If somebody says, 'We lost $300,000,' we say, 'Prove it.'"

No lawsuits have been filed yet, Dennis said.

Bernard Gordon, general manager of Jafco, which runs a catalog showroom across the street from the station, said business is returning to normal but that attorneys are working on Jafco's loss claim.

"We were closed down one full day, and otherwise it was extremely difficult to get to our store when the streets were closed," Gordon said.

Denny's, right next door to the 76 station, experienced a business drop of about 50 percent during a four-week period, said manager Mike Corbell.

Corbell was confident that Union would pay as soon as Denny's got its claim together.

Over Spilled Gas

Stan Croff, general manager of William O. McKay Co., a large auto dealer, was one of the hardest hit by the leak incident.

"We are still negotiating with Union. I would say our business was down to 20 percent of normal. Part of the time, there was hardly any access to us unless customers came in through the alley. One day, the fire department ordered us out completely.

"Another problem was that the papers and television were saying how dangerous it was around the station located across Westlake from McKay's, so people were afraid to come here for fear of getting killed.

"We lost our allocation of cars for a month because we did not sell our quota. It was one of the more unpleasant things I've seen in 15 years. It was very costly to us.

APPENDIX B

COMPACTION TESTING AND DENSITY RECORDS

HONG WEST & ASSOCIATES

• Geotechnical Engineering • Hydrogeology • Materials Testing • Construction Inspection •

INSPECTION REPORT

PROJECT: Pennzoil Auto Service Co.
DATE: 3-5-90
LOCATION: Valley ST. and Westlake AVE N. Seattle, WA.
GENERAL CONTRACTOR: SCS
CONTRACTOR'S REP: Richard Alvord
JOB NUMBER: 8995
OUR REPRESENTATIVE: T. Maddock
PERMIT NO:
SUB. CONTRACTOR: Meridian Const.
ARCH:
SUB. REP:
ENGR:

Performed in-place density tests @ Sub Grade. Material tested was imported "Pit Run" (gravelly, Sand). Test equipment was nuclear density/moisture gauge (Troxler model 3411B). Test results were 98%, 98%, 98%, and 100% compaction, w/ 90% specified minimum compaction.

T. Maddock

PAGE 1 OF 1

HWA 101-90

HONG WEST & ASSOCIATES

• Geotechnical Engineering • Hydrogeology • Materials Testing • Construction Inspection •

INSPECTION REPORT

PROJECT: Pennzoil Auto Service Co. DATE: 3-2-90

LOCATION: Valley ST. and Westlake AVE. N. Seattle, WA. GENERAL CONTRACTOR: SCS

CONTRACTOR'S REP: Richard Alwood

JOB NUMBER: 8995 OUR REPRESENTATIVE: T. Mostbook

PERMIT NO: SUB. CONTRACTOR: Meridian Const.

ARCH: SUB. REP:

ENGR:

Performed random in-place, during backfilling activities, 1 @ S., E., and W. of office. Test results were 97%, 97%, 98%, 100%, 100%, 100%, and 100% compaction (w/ 90% specified minimum compaction). Material tested, was imported "Pit Run" (gravelly, sand). Tests were taken w/ Campbell Pacific nuclear density/moisture gauge. Crew backfilled to nearly subgrade and are starting to excavate utilities trenches, by end of workday.

T. Mostbook

PAGE 1 OF 1

HWA 101-90

HONG CONSULTING ENGINEERS, INC.

• Geotechnical Engineering • Material Testing • Construction Quality Control Inspection •

FIELD DENSITY REPORT

Project: Pennzoil - Auto Service Co.
Address: Valley ST. and Westlake AVE. D.

Job Number: 8995
Date Tested: 3-2-90 By: T. Maddock
Client: S.C.S.

Attention: Richard Alvord

Test Apparatus: Campbell Pacific Nuclear moisture/density gauge Mach. No. 1
Soil Description: imported "Pit Run" gravelly, Sand
Temperature Air: ..... °C Soil: ..... °C
Specified Compaction: 90 %
Compaction Standard: ASTM D1557
Minimum Dry Density: ..... PCF
Maximum Dry Density: 128.5 PCF
Optimum M.C.: 8.5 %

Test No.	1	2	3	4	5
Location	15'S. 20'E. of SE. corner Pennzoil Office Bldg	15'S. 10'E →	C'S. 12'E of NE. corner →	10'S. 10'E	15'S. 15'E →
Elevation	2' Below Grade	1' BG.	4' BG.	3' BG.	2' BG.
Wet Density — PCF					
Moisture Content — %	4.0	4.0	4.0	4.4	4.5
Dry Density — PCF	125.0	124.3	126.2	128.0	128.5
Compaction — %	97	97	98	100	100

Test No.	6	7			
Location	10'S. 12'E of NE. corner Pennzoil Office	10'S. 22'W NW. corner Bldg →			
Elevation	1' BG.	1' BG.			
Wet Density — PCF					
Moisture Content — %	4.0	4.1			
Dry Density — PCF	128.0	128.3			
Compaction — %	100	100			

SIDE

All tests performed in accordance with ASTM

HONG WEST & ASSOCIATES

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INSPECTION REPORT

PROJECT: Pennzoil Auto Service Co. DATE: 3-1-90

LOCATION: Valley ST. and Westlake AVE. N. Seattle WA. GENERAL CONTRACTOR: SCS.

CONTRACTOR'S REP: Richard Alvord

JOB NUMBER: 8995 OUR REPRESENTATIVE: T. Maddock

PERMIT NO: SUB. CONTRACTOR: Meridian Const.

ARCH: SUB. REP:

ENGR:

Performed in-place density tests @ S. and E. of office. Test results were 99%, 97%, 100%, 99% 96%, 98%, 98%, 99%, and 100% compaction (w/ 90% specified minimum compaction). Crew excavated down to designated depth (10' to 11') and hauled contaminated soils from site. Crew then placed moderate lifts (1') of imported 1" pit run in excavated area and compacted lifts (BOMAG # BW 142 D vibratory steel drum compactor). Stabilization fabric was placed @ base of excavation prior to backfilling. In-place density tests were performed w/ Campbell Pacific Nuclear density / moisture gauge. Backfill activities are scheduled to continue tomorrow.

T. Maddock

PAGE 1 OF 1

HWA 101-90

HONG CONSULTING ENGINEERS, INC.

• Geotechnical Engineering • Material Testing • Construction Quality Control Inspection •

FIELD DENSITY REPORT

Project: Pennyoil - Auto Service Co.
Address: Valley ST. and Westlake AVE. N. Seattle, WA.
Job Number: 8995
Date Tested: 3-1-90 By: T. Maddock
Client: SCS
Attention: Richard Alvord

Test Apparatus: Campbell Pacific nuclear moisture/density gauge Mach. No.: 1"
Soil Description: imported "pit Run" gravelly, Sand
Temperature Air: °C Soil: °C
Specified Compaction: 90 %
Compaction Standard: ASTM D1557
Minimum Dry Density: PCF
Maximum Dry Density: 128.5 PCF
Optimum M.C.: 8.5 %

Test No.	1	2	3	4	5
Location	15'S, 20'E. of SE. corner Pennyoil Office Bldg	10'S, 20'W.	12'S, 10'W.	12'S. 15'W	12'S. 8'W. S.W. corner
Elevation	3' Below Grade	8'BG.	5'BG.	4'BG.	6'BG.
Wet Density — PCF					
Moisture Content — %	4.0	3.8	4.0	4.0	4.0
Dry Density — PCF	127.2	124.3	129.0	127.5	124.0
Compaction — %	99	97	100+	99	96

Test No.	6	7	8	9	
Location	10'S of SW. corner Pennyoil Office Bldg	12'S, 4'W	12'S, 6'W	15'S 5'W	
Elevation					
Wet Density — PCF					
Moisture Content — %	4.3	4.0	4.0	4.4	
Dry Density — PCF	125.7	124.5	127.3	128.6	
Compaction — %	98	98	99	100	

SITE

All tests performed in accordance with ASTM

HONG WEST & ASSOCIATES

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COMPACTION TEST RESULTS

Project: City of Seattle

Address: S. end Lake Union

Job Number: 8995

Date Tested: 2-29-90 By: S.Y.

Client: SCS

Attention:

Sample Number:

Sample Location: Imported from general Constr Pit

Sample Description: Gravelly SAND (medium to coarse)

Minimum Dry Density: PCF

Maximum Dry Density: 128.5 PCF

Optimum Moisture Content: 8.5 %

Natural Moisture Content: 5.3 %

Compaction Standard: ASTM D-1557

Hammer Weight: 10 lbs.

Hammer Drop: 18 ins.

No. of layers: 5

Number of blows/layer: 25

Diameter of mold: 4 ins.

Height of mold: 4 ins.

Volume of mold: 1/30 cu.ft.

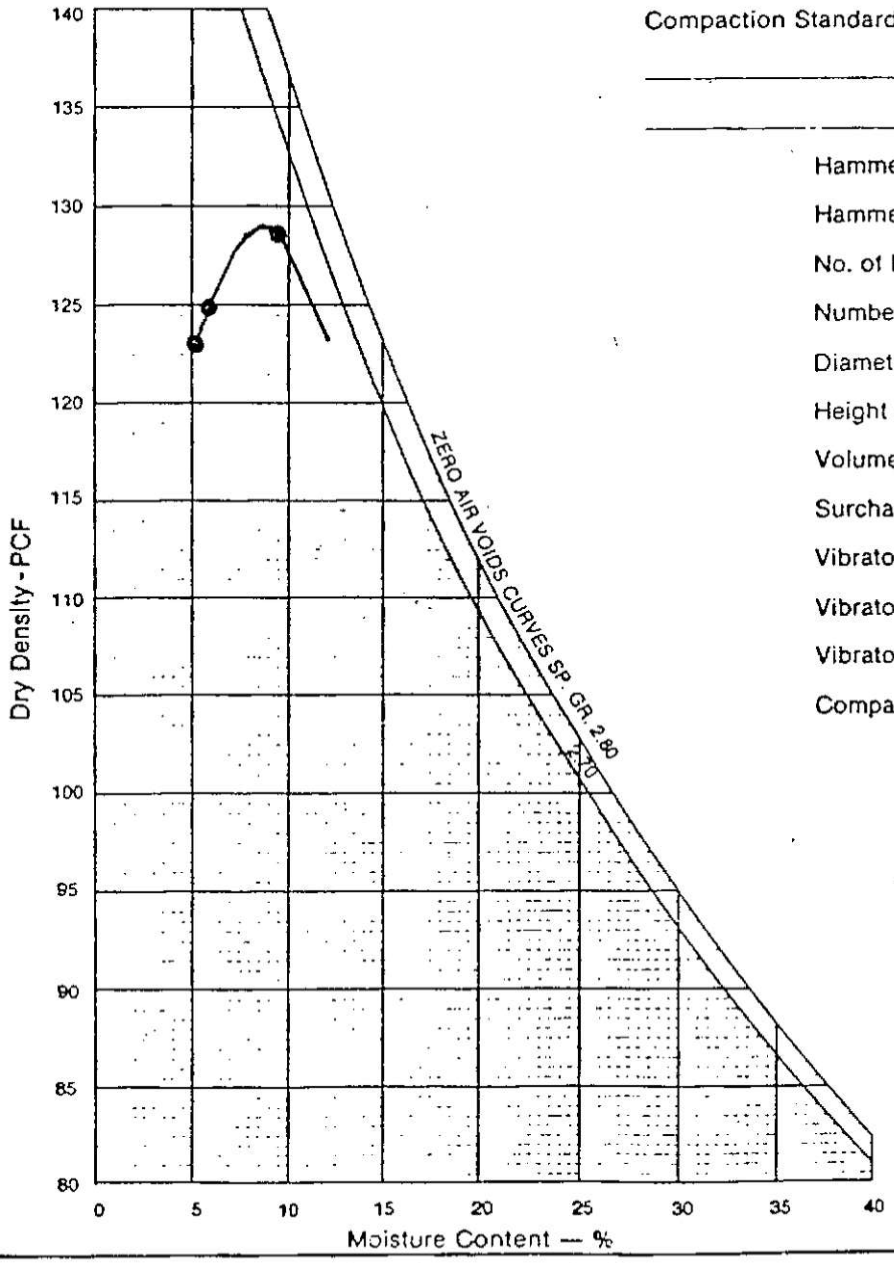
Surcharge Weight: lbs.

Vibratory Amplitude: ins.

Vibratory Frequency: vib./min.

Vibratory Time: min.

Compactive Effort: ft.lbs./cu.ft.



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MAR 7 1990
S.C.S. ENGINEERS

All tests performed in accordance with ASTM

HONG WEST & ASSOCIATES

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INSPECTION REPORT

PROJECT: Pennzoil: Auto Service Co. DATE: 2-28-90

LOCATION: Valley ST. and Westlake AVE. N. Seattle Wa. GENERAL CONTRACTOR: S.C.S.

CONTRACTOR'S REP: Richard Alvord

JOB NUMBER: 8995 OUR REPRESENTATIVE: T. Matlock

PERMIT NO: SUB. CONTRACTOR: Meridian Const.

ARCH: SUB. REP:

ENGR:

Monitored backfill activities @ S. and E. of Office. Performed in-place density tests, during backfill activities. Crew excavated down to designated depth (approx 10' to 11') and hauled contaminated soils & debris from site. Crew placed stabilization fabric @ base of excavation and proceeded to backfill. Observed moderate lifts (1') of imported "Pit Run" placed in excavated area and compacted (BOMAG BW142D vibratory steel drum compactor and pole-pack attachment on CASE 580C (backhoe). Random in-place density tests results were 100%, 99%, 100%, 100%, 99%, 100%, 96%, and 99% compaction (w/ 90% specified minimum compaction ASTM D1557). Obtained representative sample of imported "Pit Run" (backfill material) and delivered to laboratory for testing (Proctor ASTM D1557). Backfill activities are scheduled to continue tomorrow. In-place density tests were taken w/ Campbell Pacific nuclear density/moisture gauge.

T. Matlock

PAGE 1 OF 1

HWA 101-90

HONG CONSULTING ENGINEERS, INC.

• Geotechnical Engineering • Material Testing • Construction Quality Control Inspection •

FIELD DENSITY REPORT

Project: Pennyoil-Auto Service Co.
Address: 2 Valley ST. and Westlake AVE. N. Seattle, WA.
Job Number: 8995
Date Tested: 2-28-90 By: T. Maddock
Client: S.C.S.

Attention: Richard Alrord

Test Apparatus: Campbell Pacific Nuclear moisture/density gauge Mach No.: 1
Soil Description: imported "Pit Run" gravelly, Sand
Temperature Air: °C Soil: °C
Specified Compaction: 90% %
Compaction Standard: ASTM D1557
Minimum Dry Density: PCF
Maximum Dry Density: 128.5 PCF
Optimum M.C.: 8.5 %

Test No.	1	2	3	4	5
Location	10'N., 20'E. of S.E. corner Pennyoil Office Bldg	15'S., 15'E.	10'S., 10'E.	15'S. 20'E.	15'S., 15'E
Elevation	7' Below Grade	7'B.G.	6'B.G.	6'B.G.	5'B.G.
Wet Density — PCF					
Moisture Content — %	3.5	3.1	4.4	4.2	4.0
Dry Density — PCF	128.5	127.5	128.4	128.8	127.2
Compaction — %	100%	99	100	100+	99

Test No.	6	7	8		
Location	15'S., 22'E. of S.E. corner Pennyoil Office Bldg	15'S, 8'W.	10'S.		
Elevation	4'B.G.	8'B.G.	6'B.G.		
Wet Density — PCF					
Moisture Content — %	4.1	4.0	3.9		
Dry Density — PCF	128.3	124.0	127.4		
Compaction — %	100	96	99		

SHE

All tests performed in accordance with ASTM

APPENDIX C

TANK REMOVAL PERMIT AND CERTIFICATION OF TANK DISPOSAL

APPENDIX D

ANALYTICAL LABORATORY REPORT AND CHAIN OF CUSTODY RECORDS

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers
Client Sample Number: See below
Date of Sample Receipt: 2/28/90
Date of Sample Extraction: 3/5/90
Date of Sample Analysis: 3/5/90

Alden Job Number: 9002023/1
Alden Sample Number: See below
Analysis Method: 418.1
Matrix: Soil
Reporting Units: mg/kg

Client Sample ID	Alden Sample Number	Total Petroleum Hydrocarbons
C1	3273	10
C3	3275	21
C5	3277	6.8
T1-B1 WESTLAKE AVENUE UST SITE	3279	3800
T2-B1	3281	870
T3-B1	3283	820
T4-B1	3285	2100
T5-B1	3287	1700
W-6	3290	1400
W-7	3291	220
W-8	3292	190
W-9	3293	1100
W-10	3294	580
W-12	3295	340
N/A	Blank	< 4.0

Note: Results are reported to two significant figures.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers
Client Sample Number: See below
Date of Sample Receipt: 3/2/90
Date of Sample Extraction: 3/8/90
Date of Sample Analysis: 3/8/90

Alden Job Number: 9003004/1
Alden Sample Number: See below
Analysis Method: 418.1
Matrix: Soil
Reporting Units: mg/kg

Client Sample ID	Alden Sample Number	Total Petroleum Hydrocarbons
W-11	3362	660
W-13	3363	970
W-14	3364	2.9
W-17	3366	220
X-1	3367	13000
N/A	Blank	< 5.0

Note: Results are reported to two significant figures.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9003004/1
Client Sample Number: See below	Alden Sample Number: See below
Date of Sample Receipt: 3/2/90	Analysis Method: 418.1
Date of Sample Extraction: 3/8/90	Matrix: Water
Date of Sample Analysis: 3/8/90	Reporting Units: mg/L

Client Sample ID	Alden Sample Number	Total Petroleum Hydrocarbons
H20-16	3365	700
N/A	Blank	< 0.02

Note: Results are reported to two significant figures.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9003004/1
Client Sample Number: W-13	Alden Sample Number: 3363
Date of Sample Receipt: 3/2/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/8/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	5.0	26	
Toluene	5.0	10	
Ethylbenzene	5.0	200	
m,p-Xylene**	5.0	250	
o-Xylene	5.0	52	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9003004/1
Client Sample Number: X-1	Alden Sample Number: 3367
Date of Sample Receipt: 3/2/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/8/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	2500	47000	
Toluene	2500	160000	
Ethylbenzene	2500	93000	
m,p-Xylene**	2500	320000	
o-Xylene	2500	120000	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T1-B2	Alden Sample Number: 3280
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/7/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	2.0	110	
Toluene	2.0	120	
Ethylbenzene	2.0	50	
m,p-Xylene**	2.0	130	
o-Xylene	2.0	38	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T2-E2	Alden Sample Number: 3282
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/6/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	1000	3100	
Toluene	1000	54000	
Ethylbenzene	1000	55000	
m,p-Xylene**	1000	210000	
o-Xylene	1000	80000	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T3-B2	Alden Sample Number: 3284
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/6/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	1000	2900	
Toluene	1000	34000	
Ethylbenzene	1000	35000	
m,p-Xylene**	1000	130000	
o-Xylene	1000	47000	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T4-B2	Alden Sample Number: 3286
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/6/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	1000	< 1000	
Toluene	1000	4200	
Ethylbenzene	1000	20000	
m,p-Xylene**	1000	76000	
o-Xylene	1000	27000	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T5-B2	Alden Sample Number: 3288
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/6/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	100	970	
Toluene	100	350	
Ethylbenzene	100	1400	
m,p-Xylene**	100	3000	
o-Xylene	100	870	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: H2O-15	Alden Sample Number: 3289
Date of Sample Receipt: 2/28/90	Analysis Method: 624
Date of Sample Extraction: N/A	Matrix: Water
Date of Sample Analysis: 3/7/90	Reporting Units: ug/L

Compound Name	Detection Limit	Result	Qualifier
Benzene	100	7400	
Toluene	100	3800	
Ethylbenzene	100	2500	
m,p-Xylene**	100	7700	
o-Xylene	100	2500	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T4-C1	Alden Sample Number: 3305
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/7/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	3.0	28	
Toluene	3.0	17	
Ethylbenzene	3.0	60	
m,p-Xylene**	3.0	160	
o-Xylene	3.0	50	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T1-C2	Alden Sample Number: 3308
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/7/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	2.0	7.0	
Toluene	2.0	17	
Ethylbenzene	2.0	6.4	
m,p-Xylene**	2.0	50	
o-Xylene	2.0	28	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: SCS Engineers	Alden Job Number: 9002023/1
Client Sample Number: T3-C2	Alden Sample Number: 3310
Date of Sample Receipt: 2/28/90	Analysis Method: 8240
Date of Sample Extraction: N/A	Matrix: Soil
Date of Sample Analysis: 3/7/90	Reporting Units: ug/kg

Compound Name	Detection Limit	Result	Qualifier
Benzene	200	360	
Toluene	200	250	
Ethylbenzene	200	7900	
m,p-Xylene**	200	25000	
o-Xylene	200	5500	

** m-Xylene and p-xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical Laboratories, Inc.

SAMPLE LOG-IN & CHAIN-OF-CUSTODY FORM

Client Sample I.D.	Matrix	Sample Container	Alden Sample I.D.	Haiocarbons by GC Method 601/8010	Aromatics by GC Method 602/8020	Pesticides, PCBs by GC Method 608/8080	PAHs by GC Method 610/8100	Herbicides by GC Method 615/8150	VOA Organics by GC/MS Method 624/8240	A/BN Extractables by GC/MS Method 625/8270	TOC by IR Method 415.2	TPH by IR Method 418.1	Other (Specify) BTEX	Other (Specify)	Other (Specify)
T1-B1	Soil											X			
T1-B2	"	(VOA)											X		
T2-B1	"											X			
T2-B2	"	(VOA)											X		
T3-B1	"											X			
T3-B2	"	(VOA)											X		
T4-B1	"											X			
T4-B2	"	(VOA)											X		

C - 180

Client Information:

Firm/Agency Name: SCS / CENTRAC

Address: 2950 Northup Way

City, State ZIP: Bellevue, WA

Project No./PO No.:

Contact Name, Title: Rick Alvord / Donna

Phone: 822-5880 Fax: 889-2267

Relinquished by:

Firm/Agency: CENTRAC

Name (Print): Donna Hewitt

Signature: Donna Hewitt Date: 2-28-90

Received by:

Firm/Agency: ALDEN ANALYTICAL LABS Inc.

Name (Print): BRYAN S GRAHAM

Signature: Bryan S Graham Date: 2-28-90

Alden Analytical
Laboratories, Inc.

SAMPLE LOG-IN &
CHAIN-OF-CUSTODY FORM

Client Sample I.D.	Matrix	Sample Container	Alden Sample I.D.	Halocarbons by GC Method 601/8010	Aromatics by GC Method 602/8020	Pesticides, PCBs by GC Method 608/8080	PAHs by GC Method 610/8100	Herbicides by GC Method 615/8150	VOA Organics by GC/MS Method 624/8240	A/BN Extractables by GC/MS Method 625/8270	TOC by IR Method 415.2	TPH by IR Method 418.1	Other (Specify) BTEX	Other (Specify)	Other (Specify)
TS - B1	Soil	8oz										X			
TS - B2	"											X			
H2O - 15	H_2O	VOA											X		
W - 6	Soil											X			
W - 7	"											X			
W - 8	"											X			
W - 9	"											X			
W - 10	"											X			

C - 181

Client Information:

Firm/Agency Name: SCS / CONTRAC

Address: 2950 NORTHUP WAY

City, State ZIP: Bellevue, WA

Project No./PO No.:

Contact Name, Title: Rick Alvord / Donna

Phone: 822-5800 Fax: 889-2267

Relinquished by:

Firm/Agency: CONTRAC

Name (Print): Donna Hewitt

Signature: [signature] Date: 7-28-90

Received by:

Firm/Agency: Alden Analytical Laboratories Inc

Name (Print): Bryan S. Graham

Signature: [signature] Date: 7-28-90

Alden Analytical
Laboratories, Inc.

SAMPLE LOG-IN &
CHAIN-OF-CUSTODY FORM

Req for ses

Client Sample I.D.	Matrix	Sample Container	Alden Sample I.D.	Halocarbons by GC Method 601/8010	Aromatics by GC Method 602/8020	Pesticides, PCBs by GC Method 608/8080	PAHs by GC Method 610/8100	Herbicides by GC Method 615/8150	VOA Organics by GC/MS Method 624/8240	A/BN Extractables by GC/MS Method 625/8270	TOC by IR Method 415.2	TPH by IR Method 418.1	Other (Specify)	Other (Specify)	Other (Specify)
W-12	Soil											X			

C - 182

Client Information:

Firm/Agency Name: SCS/CENTRAC

Address: 2950 Northup Way

City, State ZIP: Bellevue

Project No./PO No.:

Contact Name, Title: Rick Alvord

Phone: 822-5800 Fax:

Relinquished by:

Firm/Agency: Centrac

Name (Print): Donna Hewitt

Signature: Date: 2-28-90

Received by:

Firm/Agency: Alden Analytical Laboratories Inc

Name (Print): Bryan S Graham

Signature: Date: 2-28-90

AQUATIC RESEARCH INCORPORATED
1100 E. UNION // SEATTLE , WA 98122 // (206) 322-3572

CASE FILE NUMBER: AL030-01
DATE: 04/12/90
RECEIVED: 04/06/90
FINAL REPORT, LABORATORY ANALYSIS OF TOTAL LEAD ON SOIL AND WATER SAMPLE FROM ALDEN ANALYTICAL (CLIENT PROJECT NO. 9004005/1)

C A S E N A R R A T I V E

Four soil samples and one water samples were submitted to the laboratory and were received in good condition. The samples were digested for total metals using EPA CLP procedures and then analyzed for lead only. No difficulties were encountered during the digestion or analysis of these samples. Sample data follows, while QA/QC data is contained on the next page.

S A M P L E D A T A

SOIL SAMPLES

METHOD SAMPLE ID	Concentration (mg/kg; dry weight) GFAA LEAD	PERCENT SOLIDS
A8 (3303)	4.72	86.53%
T2-C-1 COMP (3312)	19.1	80.32%
A4 (3299)	12.9	81.14%
T2B1 (3281)	5.69	87.14%

DIGEST RESULTS OF SOIL SAMPLES AND OF ONE WATER SAMPLE

SAMPLE ID	(mg/l) LEAD	MATRIX
A8 (3303)	0.0254	Soil
T2-C-1 COMP (3312)	0.0899	Soil
A4 (3299)	0.0563	Soil
T2B1 (3281)	0.0277	Soil
A10 (3368)	3.103	Water

Alden Analytical
Laboratories, Inc.

SAMPLE LOG-IN &
CHAIN-OF-CUSTODY FORM

Client Sample I.D.	Matrix	Sample Container	Alden Sample I.D.	Halocarbons by GC Method 601/8010	Aromatics by GC Method 602/8020	Pesticides, PCBs by GC Method 608/8080	PAHs by GC Method 610/8100	Herbicides by GC Method 615/8150	VOA Organics by GC/MS Method 624/8240	A/BN Extractables by GC/MS Method 625/8270	TOC by IR Method 415.2	TPH by IR Method 418.1	Other (Specify) Archive	Other (Specify)	Other (Specify)
A-10	H_2O												X		
A-11	H_2O												X		
A12	Soil												X		

C - 184

Client Information:

Firm/Agency Name: SCS/CONTRAC

Address: 2950 NORTHUP WAY

City, State ZIP: Bellevue, WA 98004

Project No./PO No.:

Contact Name, Title: Rick Alvord / Donna Hewitt

Phone: 822-5800 Fax: 889-2267

Relinquished by:

Firm/Agency: CENTRAC

Name (Print): DONNA HEWITT

Signature: Donna Hewitt Date: 3-2-90

Received by:

Firm/Agency: ALDEN ANALYTICAL LABS INC.

Name (Print): STEPHEN KOURI

Signature: Stephen Kouri Date: 3/2/90

Alden Analytical Laboratories, Inc.

ARCHIVE

SAMPLE LOG-IN & CHAIN-OF-CUSTODY FORM

Client Sample I.D.	Matrix	Sample Container	Alden Sample I.D.	Halocarbons by GC Method 601/8010	Aromatics by GC Method 602/8020	Pesticides, PCBs by GC Method 608/8080	PAHs by GC Method 610/8100	Herbicides by GC Method 615/8150	VOA Organics by GC/MS Method 624/8240	A/BN Extractables by GC/MS Method 625/8270	TOC by IR Method 415.2	TPH by IR Method 418.1	Other BTEX (Specify)	Other (Specify)	Other (Specify)
A9	Soil														
T4C1	↓												X		
T5C1															
T5C2															
T1C2													X		
T1C1															
T3C2													X		
T3C1	↓														

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Client Information:

Firm/Agency Name: SCS / Centroc

Address: 2950 Northup Way

City, State ZIP: Bellevue WA 98004

Project No./PO No.:

Contact Name, Title: Rick Alvord / Donna Hewett

Phone: 822-5800 Fax: 889-2267

Relinquished by:

Firm/Agency:

Name (Print):

Signature: Date:

Received by:

Firm/Agency:

Name (Print):

Signature: Date:

AQUATIC RESEARCH INCORPORATED
1100 E. UNION // SEATTLE , WA 98122 // (206) 322-3572

CASE FILE NUMBER: AL030-01
DATE: 04/12/90
RECEIVED: 04/06/90
FINAL REPORT, LABORATORY ANALYSIS OF TOTAL LEAD ON SOIL AND WATER SAMPLE FROM ALDEN ANALYTICAL (CLIENT PROJECT NO. 9004005/1)

Q A / Q C D A T A

QC PARAMETER	LEAD (mg/l)	PERCENT SOLIDS
DATE ANALYZED	4/11/90	4/10/90
DETECTION LIMIT	0.0008	NA
DUPLICATE ANALYSIS		
Sample ID->	3565	3312
Original	<0.0008	80.32%
Duplicate	<0.0008	80.88%
RPD	NC	0.69%
QC CHECK		
Found	0.0482	
True	0.0490	
Percent Recovery	98.37%	NA
BLANK ANALYSIS	<0.0008	NA

RPD = Relative Percent Difference.
NC = Not Calculable due to one or more values being below the detection limit.
NA = Not Available.

AQUATIC RESEARCH INCORPORATED

William J. Bruton Jr.
Quality Assurance Manager

APPENDIX E

WDOE TANK CLOSURE RECORD

NOTICE OF PERMANENT CLOSURE OF UNDERGROUND STORAGE TANK(S)

Site Owner/Operator: City of Seattle/Paul Berry
Site Address: 630 Westlake Avenue, Seattle, Washington
Telephone: (206) 684-0422

Site Notification Number (If known; this is assigned by Ecology): _____
Tank has been registered with Ecology (__); tank was not registered (X).

Local closure permit (if any) obtained from: City of Seattle Fire Dept.
(Always contact local authorities regarding permit requirements.)

Tank closure performed by:
Company/Individual: SCS Engineers/Richard Alvord
Telephone: (206) 822-5800 Date of Tank Closure: February 1990
Method of Closure: (X) Removal (__) In-Place Closure
If closed in place, type of fill material used: _____

If removed, how will the tank(s) be disposed of? (X) Scrap (__) Landfill
(__) Other method (please specify): _____
Disposal Location: _____

	Tank(s) Closed		
Tank ID Number	Age	Size	Last Material Stored
T-1	Pre-1959	500	Waste motor oil
T-2	1959	5,000	Gasoline
T-3	1959	5,000	Gasoline
T-4	Pre-1959	3,000	Gasoline
T-5	Pre-1959	2,000	Gasoline

Will the tanks be replaced by new underground tanks? (__) Yes (X) No
(NOTE: If YES, you need to submit a notification form for the new tanks.)

Was a site assessment completed? (X) Yes (__) No If so, was contamination found? (X) Yes (__) No

(NOTE: The appropriate regional office of the Washington Department of Ecology should be contacted for assistance if contamination is found (see attached map). Records of the site closure must also be maintained at the site and must be available upon an inspector's request for at least three years after closure.)

Inspecting Agency: Seattle Fire Dept. Inspector Name: T. Nigretto
(NOTE: This is generally the local fire department or agency enforcing the Uniform Fire Code; in some cases (usually involving contamination) it may be Ecology. In some instances there may be no inspecting agency.)

Signature: Paul Berry Date: 6/12/90
Title: Assistant Project Coord.

Please return the completed form to:

Storage Tank Unit
Department of Ecology
M/S PV-11
Olympia, WA 98504-8711