PACIFIC TESTING LABORATORIES

EXECUTIVE OFFICES
3257 16th Ave W • Seattle, WA 98119
(206) 282-0666 • FAX (206) 282-0710

EASTSIDE DIVISION
11824 North Creek Parkway N • #101 • Bothell, WA 98011
(206) 485-4244 • 451-8436 • FAX (206) 485-4611

TACOMA DIVISION
2402 Pacific Highway E • Tacoma, WA 98424
(206) 922-9299 • FAX (206) 922-1512

PENINSULA DIVISION
10726 Silverdale Way N W • #105 • Silverdale, WA 98383
(206) 698-6650 • FAX (206) 698-6648

March 15, 1993
Certificate No. 9212-6600.7

Mr. Harry A. Rubin
U.S. BANK - TRUST REAL ESTATE
M/S WWH271
P.O. Box 720
Seattle, Washington 98111-0720

Subject: Site Characterization and Soil Remediation at Sahlberg Equipment, Inc. Property, Seattle, Washington

Dear Mr. Rubin:

Pacific Testing Laboratories is pleased to submit to you the following report detailing site characterization and soil remediation at the former Sahlberg Equipment, Inc. property, located at 5950 Fourth Avenue South, Seattle, Washington.

Copies of this report have been forwarded to the required regulatory agencies.

Thank you for using Pacific Testing Laboratories. If you have any questions, or if we can be of further assistance to you, please contact us at (206) 282-0666.

Reviewed and Technically Approved by: Frank T. Jarnot, P.E., Chief Engineer

Sincerely,

Robert P. Shopbell,
Environmental Scientist

RPS/hlw

Enclosure

cc: Mary O'Herron, Washington State Department of Ecology
NORTHWEST REGIONAL OFFICE
3190 160th Avenue Southeast
Bellevue, WA 98008-5452

FIL

Report Prepared for:

U.S BANK - TRUST REAL ESTATE

P.O. BOX 720

SEATTLE, WASHINGTON 98111-0720

Subject:

SOILS REMEDIATION AT
SAHLBERG EQUIPMENT
5950 FOURTH AVENUE SOUTH
SEATTLE, WASHINGTON

Prepared by:

PACIFIC TESTING LABORATORIES

3257 16TH AVENUE WEST

SEATTLE, WASHINGTON 98119

March 15, 1993
Certificate No. 9212-6600

Prepared by: Robert P. Shopbell

Robert P. Shopbell
Environmental Scientist

Reviewed by: Frank Jarnot

Frank Jarnot P.E., Chief Engineer

SOILS REMEDIATION AT
5950 Fourth Avenue South
Seattle, WASHINGTON

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SOILS REMEDIATION AT
5950 FOURTH AVENUE SOUTH
SEATTLE, WASHINGTON

1.0 EXECUTIVE SUMMARY

The objective of this project was to further establish extent of a petroleum hydrocarbon contamination, verification of ground water contaminant levels and the remediation of petroleum hydrocarbon contaminated soils from a limited area of the subject site. The contamination point source, storage drums located on-site for many years, had been removed when the existing business closed operations and moved to another location.

Sub-surface exploration at other locations on the subject site did not indicate Total Petroleum Hydrocarbons (TPH) concentrations in excess of Washington State Department of Ecology (WDOE) regulatory limits. Ground water near the excavated site indicated continued TPH concentrations above WDOE limits. Ground water samples obtained from monitoring wells surrounding the excavation site did not indicated elevated TPH concentrations. Petroleum hydrocarbon contaminated soils were excavated, and transported to a transfer station for subsequent disposal at a lined landfill.

Petroleum hydrocarbon contaminated soils have been successfully remediated from this portion of the subject site. The presence of soils containing TPH at concentrations in excess of WDOE limits is remote at other portions of the subject site. The presence of TPH concentrations in excess of regulatory limits in ground water suggests ground water remediation may be necessary.

2.0 PREVIOUS REPORTS

U.S. Bank - Trust Real Estate gave Pacific Testing Laboratories two reports to review regarding the subject site in preparation of this report.

> "Level I Environmental Site Assessment, Sahlberg Equipment, Inc., Property." Rittenhouse-Zeman & Associates, April, 1991.
>
> "Environmental Site Assessment, Sahlberg Equipment Facility." RZA AGRA, Inc., June, 1992.

A copy of each report reviewed in the preparation of this report is included in Appendix E.

3.0 SITE BACKGROUND

While performing a Phase I Environmental Assessment at 5950 Fourth Avenue South, Rittenhouse-Zeman & Associates (now known as RZA AGRA, Inc.) discovered indications of petroleum hydrocarbon contamination. They subsequently installed two ground water monitoring wells. During the placement of each well, soils with TPH concentrations in excess of WDOE regulatory limits were encountered. RZA AGRA estimated contaminated soils to be four feet below grade.

Additionally, ground water samples obtained from the monitoring wells indicated TPH concentrations exceeding WDOE limits.

Pacific Testing Laboratories was retained to investigate the possibility that the source of petroleum hydrocarbon contaminated ground water was from off site, as well as establish the potential for petroleum hydrocarbon contaminated ground water to be migrating off site. Secondly, Pacific Testing Laboratories was to establish the potential for soil contaminated with petroleum hydrocarbons to exist at other on-site locations. Finally, Pacific Testing Laboratories was to remediate known petroleum hydrocarbon contaminated soils. Due to expected TPH concentrations in soil, as well as expected contaminated soil volume, landfill disposal at Regional Disposal Company's Roosevelt Regional Landfill was selected as the remediation technique of choice.

4.0 SAMPLING METHODOLOGY

U.S. Bank was interested in obtaining data on the condition of sub-surface soils in the area between the office building and the warehouse. Due to the fact that the elevation of the subject site at this location is approximately five feet below surrounding street elevations, soil samples were obtained at five feet below grade in three locations.

Standard penetration tests were performed at five foot below grade, utilizing a two-inch O.D. splint-spoon sampler. Penetration tests consist of driving the sample tube with a 140 pound hammer having a 30 inch free fall. The number of blows per six-inch increment were recorded on the boring logs. The number of blows required to cause the last 12 inches of penetration was used as an indicator of the relative density of the underlying soils. Samples from the split spoon were classified in the field, then taken to the laboratory for analysis.

Soils encountered in Boring A were dark brown sand in nature. Ground water was encountered at four feet below grade. Boring B contained soils that were gray brown and silty. Ground water was encountered at four feet below grade. Boring C also contained gray brown silty soil. No ground water was encountered in this boring.

4.0 SAMPLING METHODOLOGY, CONTINUED

One soil sample from each of the three borings (A, B, and C) were obtained by the use of Pacific Testing Laboratories' B-65 drill rig, which uses a 140 pound hammerhead to drive a 2 inch diameter split spoon sampler into the soil matrix. To obtain soil samples at the desired level, holes were bored by the use of a 6 inch diameter hollow stem auger. Prior to obtaining soil samples, the split spoon was decontaminated to prevent cross contamination from previous sampling events. Soil samples from each sampling level were transferred from the split spoon to the appropriate pre-labeled glass sampling jars. Soil samples were obtained at 5 feet below grade. These samples were placed in an ice filled cooler for transportation back to the laboratory.

Ground water samples were obtained from the original ground water monitoring wells, MW-1 and MW-2. Ground water level in monitoring well MW-1 was approximately five feet below grade during the sampling event, December 8, 1992 at 3:05 pm. Ground water level in monitoring well MW-2 was approximately four feet below grade the same day, at 3:20 pm. A total of three well volumes was purged with a plastic disposable bailer from each well immediately prior to obtaining each sample. A new bailer was used to obtain the ground water sample. Each sample was placed in the appropriate previously labeled glass sampling jar, placed in an ice filled cooler and transported to the laboratory for analysis.

Two other borings were placed for the purpose of obtaining ground water samples. One boring was placed in South Front Street, the second was placed to the west of the original ground water monitoring wells installed by RZA AGRA.

Six soil samples from each of the two additional borings (MW-A and MW-B) were also obtained by the use of Pacific Testing Laboratories' B-65 drill rig. Holes were bored by the use of a 6 inch diameter hollow stem auger. Prior to obtaining soil samples, the split spoon was decontaminated to prevent cross contamination from previous sampling events. Soil samples from each sampling level were transferred from the split spoon to the appropriate pre-labeled glass sampling jars. Soil samples were obtained at 2.5, 5, 7.5, 10, 12.5 and 15 feet below grade. These samples were placed in an ice filled cooler for transportation back to the laboratory. At the laboratory, equal volumes of soil from sampling levels 2.5 and 5, 7.5 and 10, 12.5 and 15, of each boring were composited for analysis.

To sample ground water, a 2 inch diameter monitoring well was installed in borings MW-A and MW-B and developed. Ground water samples were obtained with a disposable baler, after purging of each well was complete. Each sample was placed in a previously prepared glass liquid sample jar, and transported to the laboratory for analysis.

4.0 SAMPLING METHODOLOGY, CONTINUED

Ground water depth in each monitoring well was approximately 6 feet below grade at the time of sampling. Ground water sample MW-A was obtained at 14:09 and ground water sample MW-B was obtained at 14:50 on December 14, 1992.

Random soil samples were obtained throughout the excavation process. These soil samples were obtained to characterize contaminated soil for disposal purposes. Six soil samples were obtained by random grabs of excavated material. These samples were labeled 1 through 6. Approximately 100 cubic yards of material was excavated and stockpiled on-site. Analytical results indicated that disposal soil samples did not contain TPH concentrations above detection limit. A seventh soil sample, Sample 7, was obtained from composited random grabs of the stockpile. Again, this soil sample did not contain TPH concentrations above detection limits.

Ten random grab composite soil samples were obtained from the excavation to assure over-excavation of petroleum contaminated soils. Each composite sample was obtained via random grabs of five sub-samples from a minimum of six inches below grade. Each sample was composited on-site, and placed in an ice filled cooler for transport back to the laboratory.

Analytical results of composite sample S-2 indicated TPH concentrations exceeding WDOE limitations. After further excavation, an eleventh composite sample, S-3, was obtained to verify over-excavation of the area represented by composite soil sample S-2.

Based upon analytical results of disposal soil samples, it was decided to backfill the excavation with stockpiled materials. Pacific Testing Laboratories utilized a Case 580 front end loader to move the stockpiled materials to the excavation. Each bucket load was monitored with the use of a MicroTip MP-1000 Photoionization Detector (PID). Based upon PID measurements of volatile organic compounds (VOC), each load was placed in the excavation or secondarily stockpiled for disposal.

U.S. Bank - Trust Real Estate requested backfilled soils to be compacted for preparation of asphalt covering. With the exception of the southern portion of the excavation, nuclear densometer values met or exceeded 95% compaction. The southern boundary failed to met 95% compaction due to excessive moisture in the ground. Compaction will be achieved once the soil is able to dry out in the summer heat. The soil technicians field report is included Appendix D.

Complete bore logs are presented in Appendix C.

A site map containing bore hole, monitoring well and over-excavation sample locations is included in Appendix A.

5.0 EXCAVATION ACTIVITIES

Pacific Testing Laboratories utilized a Case 580 backhoe to excavate petroleum hydrocarbon contaminated soils from the southeast corner of the subject site. Based upon review of the RZA AGRA report, contaminated soils were expected to be approximately four feet below grade. Excavation began in the southeast corner of the area of concern. A layer of course gravel appeared to contain the majority of contamination. Migration of petroleum hydrocarbons was inhibited by a band of compact sands, located at 0.5 to 3.0 feet below grade. On-site PID analysis revealed VOC concentrations to be as high as 300 parts per million (ppm) in the gravel layer. Beneath the compact sand layer, PID analysis revealed VOC concentrations to be below 10 ppm. Pacific Testing Laboratories utilizes a VOC concentration action level of 30 ppm for segregation of contaminated and non-contaminated soils.

The compacted sand layer was 3.5 feet below grade throughout the southern boundary of the area of concern. The layer was closer to grade the farther north the excavation continued. VOC concentrations, as measured by on-site PID analysis, were less than 10 ppm along the northern boundary of the area of concern.

Petroleum hydrocarbon contamination was limited to a small concentrated area, and not as widespread as past reports indicated. This limited area impacted field measurements, leading to an excess amount of soil being excavated. Stockpiled soil was then placed in the excavation. Each bucket load was monitored with the PID. If head space measurements indicated VOC concentrations in excess of 30 ppm, this soil was sampled and stockpiled for disposal. Approximately 40 cubic yards of soil were segregated. Soil samples were obtained from each bucket load containing VOC concentrations in excess of 30 ppm. They were labeled 1A through 5A. Each sample was placed in an ice filled cooler for transport back to the laboratory. Due to the limited volume of segregated soil, Pacific Testing Laboratories analyzed only samples 3A and 5A. These soil samples contained VOC concentrations in excess of 90 ppm, as read by the PID.

Material disposed was assigned a tracking number of 93-1115 by Regional Disposal Company. Transportation of contaminated soils to Regional Disposal Company's Seattle transfer station was completed on March 11, 1993, by Blakley Brothers, under Pacific Testing Laboratories guidance. Based upon gate tickets, 71.36 tons of material was disposed. Ultimate disposal of material is the Roosevelt Regional Landfill, in Klickitat County, Washington.

6.0 ANALYTICAL METHODOLOGY

Petroleum hydrocarbon contamination was suspected in the area where soil samples A, B and C were obtained. Each sample was analyzed utilizing WDOE approved Washington Total Petroleum Hydrocarbon (WTPH-HCID) analysis. Each sample contained petroleum hydrocarbons in the diesel range. Further analysis utilizing Washington Total Petroleum Hydrocarbon - Diesel (WTPH-D) quantified concentrations of diesel range hydrocarbons. Analytical results are presented in Table 1.

Petroleum hydrocarbon contamination was also suspected in composite soil samples obtained during the installation of ground water monitoring wells MW-A and MW-B. Each composite sample was analyzed utilizing WTPH-HCID. This analysis revealed each sample contained petroleum hydrocarbons in the diesel range, thus WTPH-D was utilized to quantify diesel concentrations. Analytical results are presented in Table 2.

Ground water samples MW-1 and MW-2 were obtained from monitoring wells installed by RZA AGRA. Previous analysis of ground water samples obtained from both wells indicated elevated concentrations of heavy oil petroleum products, and diesel. Thus ground water samples MW-1 and MW-2 were analyzed utilizing WTPH-418.1, for heavy oils, and WTPH-D, for diesel range petroleum products. Additionally, previous analysis of ground water samples obtained from MW-2 revealed elevated concentrations of Benzene, Toluene, Ethylbenzene, Xylenes (BTEX). Ground water sample MW-2 was additionally analyzed utilizing the United States Environmental Protection Agency (EPA) Method 8020. Analytical results are presented in Table 3.

Ground water samples obtained from newly installed ground water monitoring wells MW-A and MW-B were analyzed utilizing WTPH-418.1, WTPH-D and EPA Method 8020, based upon ground water analysis results presented in the RZA AGRA report. Analytical results are presented in Table 4.

Soil samples obtained for disposal characterization were analyzed utilizing WTPH-HCID, due to unknown carbon chain length of petroleum hydrocarbons suspected. Analytical results are presented in Table 5.

Composite soil samples obtained for verification of over-excavation were analyzed utilizing WTPH-HCID. Analytical results are presented in Table 6.

7.0 ANALYTICAL RESULTS

Soil samples obtained from borings A, B and C did not indicate TPH concentrations in excess of WDOE limits.

Table 1.
TPH Concentrations, in ppm
Dry Weight Basis

Sample	WTPH-D
A	44
B	42
C	46
WDOE Limit	200

Analysis of composite soil samples obtained during the installation of ground water monitoring wells MW-A and MW-B indicated that soils from MW-A contained elevated TPH concentrations, while soils from MW-B did not.

Table 2.
TPH Concentrations, in ppm
Dry Weight Basis

Sample	WTPH-D
Composite MW-A-2.5', MW-A-5'	207
Composite MW-A-7.5', MW-A-10'	321
Composite MW-A-12.5', MW-A-15'	49
Composite MW-B-2.5', MW-B-5'	52
Composite MW-B-7.5', MW-B-10'	39
Composite MW-B-12.5', MW-B-15'	42
WDOE Limit	200

7.0 ANALYTICAL RESULTS, CONTINUED

Analysis of ground water samples obtained from monitoring wells MW-1 and MW-2 revealed continued elevated concentrations of diesel range petroleum hydrocarbons. Ground water sample MW-2 also contained elevated levels of heavy oil range petroleum hydrocarbons.

Table 3.
Concentrations in ppm

Sample	WTPH-418.1	WTPH-D	Benzene	Toluene	Ethyl-Benzene	Xylenes
MW-1	<1.0	1.8	NA	NA	NA	NA
MW-2	1.1	8.3	<0.001	<0.025	<0.010	<0.015
WDOE Limit	1.0	1.0	0.005	0.040	0.030	0.020

< = less than

NA = Not Analyzed

Parameters analyzed in ground water samples obtained from monitoring wells MW-A and MW-B did not indicate contaminated concentrations in excess of WDOE limits.

Table 4
Concentrations in ppm

Sample	WTPH-418.1	WTPH-D	Benzene	Toluene	Ethyl-Benzene	Xylenes
MW-A	<1.0	<1.0	<0.001	<0.025	<0.010	<0.015
MW-B	<1.0	<1.0	<0.001	<0.025	<0.010	<0.020
WDOE Limit	1.0	1.0	0.005	0.040	0.030	0.020

< = less than

7.0 ANALYTICAL RESULTS, CONTINUED

Analysis of soils for disposal characterization did not initially revealed elevated TPH concentrations. Reduction of the initial stockpile revealed petroleum hydrocarbon contaminated "hot spots". These samples, 3A and 5A contained TPH concentrations in excess of WDOE limits.

Table 5.
TPH Concentrations in ppm
Dry Weight Basis

Sample	WTPH-G	WTPH-D	WTPH-418.1
1	<20	<25	<100
2	<20	<25	<100
3	<20	<25	<100
4	<20	<25	<100
5	<20	<25	<100
6	<20	<25	<100
7	<20	<25	<100
3A	<20	<25	321
5A	<20	<25	256
WDOE Limit	100	200	200

< = less than

7.0 ANALYTICAL RESULTS, CONTINUED

Analytical results of over-excavation samples revealed that petroleum hydrocarbon contaminated soils had been successfully excavated from the site.

Table 6.
TPH Concentrations in ppm,
Dry Weight Basis

Sample	WTPH-G	WTPH-D	WTPH-418.1
N-1, North wall, west area	<20	<25	<100
N-2, North wall, east area	<20	<25	<100
E-1, East wall, north area	<20	<25	<100
E-2, East wall, south area	<20	<25	<100
S-1, South wall, east area	<20	<25	<100
S-2, South wall, west area	<20	<25	392
S-3, South wall, west area	<20	<25	<100
W-1, West wall, south area	<20	<25	<100
W-2, West wall, north area	<20	<25	<100
B-1, Base east area	<20	<25	<100
B-2, Base west area	<20	<25	<100
WDOE Limit	100	200	200

< = less than
All laboratory reports are contained in Appendix B.

8.0 LITERATURE REVIEW

Pacific Testing Laboratories reviewed six WDOE files on near-by surrounding sites with known contamination. The purpose of these reviews was to establish a background TPH concentration for the subject sites immediate surroundings. Each site reviewed contained TPH concentrations in excess of WDOE limits for ground water. Five of the six sites reviewed contain gasoline and its components in excess of WDOE limits. One site contained only diesel contamination. Four of the sites had completed ground water remediation, the remaining two sites were performing on-going ground water remediation.

No report reviewed indicated ground water conditions of the entire South Seattle area. Each report addressed ground water conditions on the subject site only.

9.0 CONCLUSIONS

Analytical results of soil samples obtained in borings A, B and C indicate minimal TPH concentrations. These concentrations are significantly below WDOE limits of 200 ppm for diesel in soil. Pacific Testing Laboratories concludes that there is petroleum hydrocarbon contamination in the area sampled, but in concentrations below clean-up levels. This suggests petroleum hydrocarbons, specifically in the diesel range, exist throughout the subject site, but not in concentrations requiring mandated clean-up.

During the placement of ground water monitoring well MW-A, soils were encountered that contained elevated TPH concentrations in the diesel range. The location of MW-A, in South Front Street, means that the City of Seattle is responsible for contaminated soils, and not Sahlberg Equipment. Soils encountered during the installation of MW-B also contained measurable TPH concentrations in the diesel range. These levels were not in excess of WDOE clean-up levels, and were consistent with analytical results obtained from soil samples A, B and C.

Petroleum hydrocarbon contamination encountered in the southeast property corner excavation was in the heavy oil range, not in the diesel range. Therefore, Pacific Testing Laboratories concludes that diesel contamination encountered in South Front Street has negligible impact on the subject site.

Ground water samples from MW-1 and MW-2 still contained elevated levels of petroleum hydrocarbons. Analytical results of MW-2 indicate that BTEX concentrations have diminished over time from previous sampling activities. Pacific Testing Laboratories concludes BTEX contamination appears to have been remediated, but petroleum hydrocarbon contamination still needs to be addressed.

Pet. hyd. in H2O still needs to be addressed

Contam > MTCA in city right-of-way

9.0 CONCLUSIONS, CONTINUED

Analytical results of ground water samples MW-A and MW-B did not indicate TPH or BTEX concentrations in detectable concentrations. Pacific Testing Laboratories concludes that ground water contamination in the excavation area (MW-1 and MW-2) has not impacted ground water in surrounding areas, as evidenced by the ground water condition of MW-B. Pacific Testing Laboratories also concludes that ground water contamination in the excavation area is due to immediate surroundings, and not off-site sources, as evidenced by the ground water condition of MW-A.

Nuclear densometer field measurements indicated that a majority of the excavation site meets or exceeds 95% compaction. Once the southern boundary of the excavation area has had an opportunity to dry out, further densometer measurements are expected to meet 95% compaction.

Based upon analytical results of over-excavation soil and disposal soil samples, Pacific Testing Laboratories concludes that petroleum hydrocarbon contaminated soils have been successfully excavated and removed from the subject site.

Due to the nature of heavy oil petroleum hydrocarbons, aging of contaminants is beyond the scope of analysis performed. Pacific Testing Laboratories cannot further any conclusions regarding the age of contaminants.

Literature review of similar projects located near the subject property did not indicate elevated TPH concentrations throughout the South Seattle area. These projects have remediated, or are undergoing remediation of their ground water contamination. Based upon other factors of the South Seattle area, Pacific Testing Laboratories concludes that although ground water remediation may be necessary, WDOE may accept contaminant levels at concentrations above established drinking water levels. WDOE has the ultimate decision authority for accepting contaminate concentrations.

10.0 RECOMMENDATIONS

Ground water samples obtained and analyzed from ground water monitoring wells MW-A and MW-B did not contain detectable concentrations of TPH or BTEX. No further sampling is recommended. Pacific Testing Laboratories recommends carrying out monitoring well abandonment of monitoring wells MW-A and MW-B. Pacific Testing Laboratories will be happy to provide you with a detailed scope of work and cost estimate to abandon these wells, at your request.

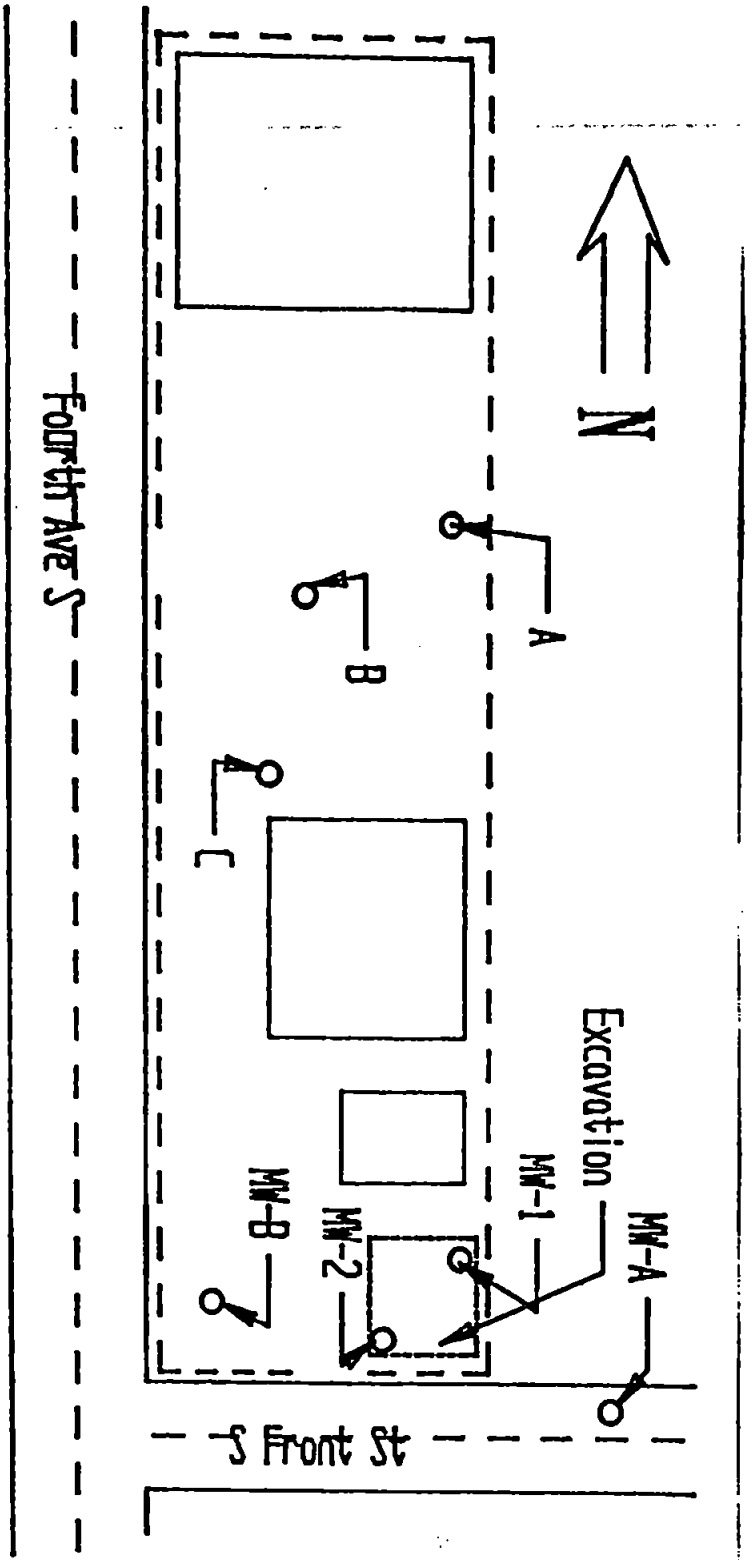
10.0 RECOMMENDATIONS, CONTINUED

Ground water located in the area where the excavation occurred remains contaminated with petroleum hydrocarbons. Soils containing excessive TPH concentrations which may impact adjacent ground water, have been successfully removed from the area by Pacific Testing Laboratories and its sub-contractors. Pacific Testing Laboratories recommends that further ground water samples from MW-1 and MW-2 be obtained and analyzed for TPH concentration on a quarterly basis. If elevated TPH concentrations persist, further ground water remediation may be necessary. Pacific Testing Laboratories will be happy to provide you with a detailed scope of work and cost estimate to obtain and analyze ground water samples, at your request.

11.0 LIMITATIONS

This report has been prepared to aid in the evaluation of the site. Our conclusions and recommendations have been prepared in accordance with generally accepted professional engineering principles and practices. We make no other warranty, either expressed or implied. Our conclusions are based on results of field explorations in a limited portion of the subject site, and on our interpretation of analytical results. If conditions are encountered that appear different from those described in this report, we must be notified so we may review and verify or modify our recommendations.

Appendix A
Site Map



Site Map
Not to Scale

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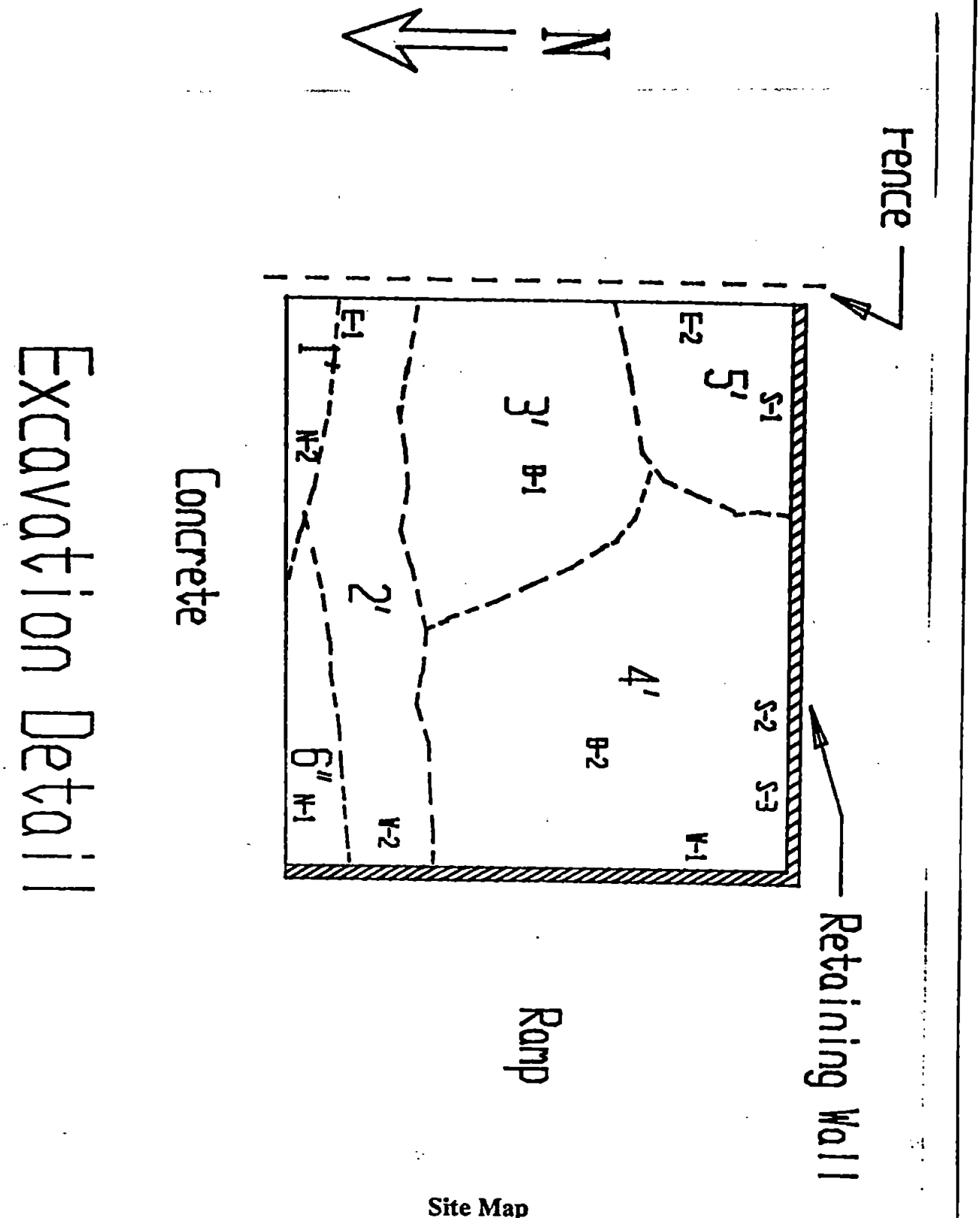

Site Map
Not to Scale

Appendix B
Laboratory Reports