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Remedial Action Plan
Former Unocal Site No. 5919
Seattle, Washington

October 15, 1998

For

Tosco Marketing Company

File No. 4823-163-00-1150\101598

GeoEngineers

GeoEngineers

October 15, 1998

Consulting Engineers and Geoscientists
Offices in Washington, Oregon, and Alaska

Tosco Marketing Company
3977 Leary Way NW
Seattle, Washington 98107

Attention: Tim Johnson

GeoEngineers is pleased to submit our remedial action plan for Tosco Marketing Company's (Tosco) former Unocal Site No. 5919 in Seattle, Washington.

We appreciate the opportunity to be of continued service to Tosco. Please call if you have questions regarding this work plan.

Yours very truly,

GeoEngineers, Inc.

Carla R Woodworth

Carla R. Woodworth
Project Geologist

CRW:ja
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Three copies submitted

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REMEDIAL ACTION PLAN
FORMER UNOCAL SITE NO. 5919
1100 BROADWAY AVENUE
SEATTLE, WASHINGTON
FOR
TOSCO MARKETING COMPANY

1.0 INTRODUCTION AND PURPOSE

This Remedial Action Plan (RAP) summarizes the planned remedial activities to be conducted at Tosco Marketing Company's (Tosco) former Unocal Site No. 5919 in Seattle, Washington. RAP implementation will be predominantly completed prior to site sale and development. The proposed site use was provided to Tosco by Freiheit & Ho Architects Inc, the architect for Ariel. Ariel proposes to construct an Extended Stay America (ESA) Hotel on the site, including two floors of underground parking, ground floor gasoline dispensing facilities and retail shops and a five to six story hotel (Figure 1). Tosco plans to complete the remedial activities at the site by December 1, 1998.

The purposes of this RAP are to (1) describe methods for the identification and removal of residual petroleum hydrocarbons in soil at the site to allow site development to proceed on schedule (2) describe methods for the abandonment of on- and off-site monitoring wells and (3) provide a soil sampling and handling plan to remove additional petroleum contaminated soil exceeding cleanup standards, if it is encountered during the proposed ESA construction activities. After completion of the remedial action, a final cleanup report will be submitted for a "no further action" status determination through the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP).

2.0 SITE DESCRIPTION AND HISTORY

Former Unocal Site No. 5919 is located at 1100 Broadway Avenue in Seattle, Washington. The site comprises approximately 0.51 acres in a mixed residential, commercial, medical (Swedish Hospital and other medical facilities) and educational (Seattle University) area of Seattle. The site vicinity map and a site plan showing the former service station facilities are Figures 2 and 3.

The site surface slopes slightly to the east and is at an average elevation of 95 feet above sea level. All existing former service station facilities at the site were demolished and the underground storage tanks (USTs) were removed in 1992. The site surface currently is covered with asphalt pavement or gravel. Several of the UST excavations were not backfilled to site grade after the UST removal activities.

3.0 PREVIOUS INVESTIGATIONS

Unocal service station facilities operated at the site between 1967 and 1992. GeoEngineers has completed environmental assessment and monitored remedial activities at the site since 1989. GeoEngineers provided environmental services during removal of four USTs at the site in

February and March 1989. Seven monitoring wells (MW-1 through MW-7) were constructed between October 1990 and August 1991 to assess the extent and significance of subsurface contamination at the site. The approximate locations of the monitoring wells are shown in Figure 3.

Total petroleum hydrocarbons (TPH) were detected at a concentration exceeding the Model Toxics Control Act (MTCA) Method A cleanup level in a soil sample obtained from a depth of 13 feet beneath the ground surface in the boring drilled for MW-1. Aromatic volatile organic compounds (benzene, ethylbenzene, toluene and/or xylenes) were detected at concentrations exceeding MTCA Method A cleanup levels in ground water samples obtained from MW-1 and MW-4. HVOCs (halogenated volatile organic compounds) were detected at concentrations exceeding MTCA Method A cleanup levels in ground water samples obtained from MW-1, MW-2, MW-3 and MW-6.

Light nonaqueous-phase liquid (LNAPL) was measured at a thickness of approximately 18 inches in MW-1 during our February 1991 ground water sampling. LNAPL has not been encountered in wells MW-2 through MW-7. Chemical analysis identified the LNAPL as a mixture of approximately 7 parts diesel and 1 part gasoline. LNAPL has been recovered from MW-1 since February 1991 using a combination of hand-bailing and a PetroTrap™ (a downwell passive product skimmer system manufactured by EnviroProducts, Inc.). LNAPL was last measured in MW-1 June 1997.

GeoEngineers documented the excavation and removal of two gasoline USTs, one waste oil UST, one undocumented UST, two hydraulic hoists, one sump and four service islands with associated product piping from the site between October 15, 1992 and January 7, 1993. Eleven test pits were excavated in the vicinity of the former underground facilities. Based on field screening and chemical analysis of soil samples obtained from excavations and test pits, gasoline-range hydrocarbons are present at concentrations greater than MTCA Method A cleanup levels in the vicinity of the south service islands excavations and a damaged fuel dispenser area. TPH is present at concentrations exceeding MTCA Method A cleanup levels in the vicinity of the waste oil UST excavation and north hydraulic hoist and sump excavation areas. Tetrachloroethene (PCE) was detected in four soil samples that were obtained from excavations in the central portion of the site. MW-2 was damaged during the 1992 demolition activities.

GeoEngineers monitored ground water conditions at the site between October 1990 and November 1992 and between February 1996 and September 1997. BETX and gasoline-range hydrocarbons either have not been detected or have been detected at concentrations less than MTCA Method A ground water cleanup levels in the water samples obtained from MW-2 through MW-7 since February 1996. PCE has been detected at concentrations greater than the MTCA Method A cleanup levels in water samples obtained from MW-2, MW-6 since October 1990 and MW-8 since November 1996. PCE also has been periodically detected at concentrations greater than the MTCA Method A cleanup levels in water samples obtained from MW-1 and MW-3 between October 1990 and November 1996. PCE and HVOCs either have not been detected or

have been detected at concentrations less than the MTCA Method A cleanup levels in water samples obtained from MW-4, MW-5 and MW-7 since ground water sampling began in 1990.

Ground water has been measured at depths ranging from about 8.7 and 21.7 feet in monitoring wells MW-1 through MW-7 during monitoring events conducted between October 1990 and September 1997.

Environmental Resolutions, Inc. (ERI) has conducted ground water monitoring and sampling at the site since December 1997. Chemical analytical results for ground water samples obtained by ERI in June 1998 were generally consistent with data for the samples previously obtained by GeoEngineers.

4.0 CURRENT SITE CONDITIONS

4.1 SOIL

Based on previous studies, the estimated extent of petroleum-related soil remaining beneath the site at the completion of facilities removal in January 1993 is summarized below. The inferred limits of remaining petroleum-related soil contamination are shown in Figure 3.

January 1993 Excavation Location	Status
Gasoline UST	Partially backfilled with excavated, but not sampled pea gravel (approximately 300 cubic yards). Excavation limits below MTCA Method A.
Undocumented UST	Partially backfilled with excavated, but not sampled soil (approximately 50 cubic yards). Excavation limits below MTCA Method A.
South Hoist	Partially backfilled with excavated, but not sampled soil (approximately 25 cubic yards). Excavation limits below MTCA Method A.
South Service Island	Lined and partially backfilled with previously excavated, probably contaminated soil. An estimated 550 cubic yards of gasoline-contaminated soil to be excavated from area to depths of about 12 feet.
Damaged Fuel Dispenser	Lined and partially backfilled with previously excavated, probably contaminated soil. An estimated 20 cubic yards of gasoline-contaminated soil to be excavated from area to depths of about 12 feet.

Waste Oil UST	Lined and partially backfilled with previously excavated, probably contaminated soil. An estimated 400 cubic yards of PCE and diesel-range and heavy oil-range hydrocarbon contaminated soil to be excavated from area between depths of between 8 and 18 feet.
North Hoist	Lined and partially backfilled with previously excavated, probably contaminated soil. An estimated 200 cubic yards of PCE and diesel-range and heavy-oil hydrocarbon contaminated soil to be excavated from area between depths of between 8 and 13 feet.

Note that the estimated volume of soils containing hydrocarbons are based on widely spaced sample locations. The actual volume of soil containing hydrocarbons could be much greater.

4.2 GROUND WATER

PCE has been detected at concentrations greater than the MTCA Method A cleanup levels in water samples obtained from MW-2 and MW-6 since October 1990 and from MW-8 since November 1996, when MW-8 was installed.

PCE and other HVOCs either have not been detected or have been detected at concentrations less than the MTCA Method A cleanup levels in water samples obtained from MW-4, MW-5, MW-7 since ground water sampling began in 1990 and in MW-9 since November 1996.

BETX and gasoline-range hydrocarbons either have not been detected or have been detected at concentrations less than MTCA Method A ground water cleanup levels in the water samples obtained from MW-2 through MW-7 since February 1996 and from MW-1 since September 1997.

5.0 INTERIM REMEDIAL ACTION AND CONSTRUCTION DETAILS

5.1 INTRODUCTION

A potential purchaser and developer interested in the site has recently contacted Tosco. However, previous investigations have identified releases of petroleum hydrocarbons to subsurface soils beneath the site. As a result, Tosco plans to undertake interim remedial actions to remove petroleum-contaminated soil above MTCA Method A cleanup levels prior to site development. Tasks related to this action are discussed separately in the sections that follow.

5.2 CONTAMINATED SOIL REMOVAL AND DISPOSAL

5.2.1 Pre-Construction Excavation Strategy

Contaminated subsurface soil will be excavated from four areas of the site where concentrations of petroleum hydrocarbons exceeding MTCA Method A cleanup levels were identified during previous investigations. These areas are located at the (1) south service islands excavation area, (2) waste oil UST excavation area, (3) north hydraulic hoist and sump

excavation area, and (4) damaged fuel dispenser excavation area. Based on the results of the previous investigations, the depth of the remedial excavations in these areas is not expected to exceed 18 feet. The lateral dimensions of the excavations will be determined based on field screening conducted during excavation activities and the proximity of the excavation to the site property boundaries.

Excavation activities and procedures to document soil conditions, such as soil sampling, handling, field screening, and laboratory quality assurance/quality control procedures, are described in the sampling and analysis plan presented in Appendix A.

5.2.2 Utility Check

A utility check will be conducted, as necessary, to identify the location of underground utilities in the planned work area prior to excavating. Available general arrangements for the facility will also be reviewed to protect underground utilities.

5.2.3 Soil Stockpiling and Characterization

Soil removed from the excavation will be segregated based on the apparent relative degree of contamination based on field screening. Visibly affected soil will be loaded directly onto trucks based on field screening results, if possible. If necessary, excavated soil will be temporarily stockpiled on site at a location specified by Tosco. The stockpiles will be placed in a lined berm and covered with plastic sheeting. Soil samples will be collected from discrete locations within each stockpile and submitted for analysis, if additional chemical data is required to permit off-site treatment or to determine if the soil can be used as backfill.

5.2.4 Off-site Disposal

Contaminated soil removed from the remedial excavations will be transported off site and thermally treated at the TPS Technologies (TPS) facility in Tacoma, Washington.

5.2.5 Confirmation Soil Sampling

Confirmation soil samples will be collected from the walls and base of each remedial excavation to document if MTCA Method A remediation levels have been achieved or if residual concentrations of contaminants exceed the remediation levels in areas where further excavation may not be feasible (i.e., near property boundaries). Confirmation soil samples also will be obtained from backfilled soils in the gasoline UST, south hydraulic hoist and undocumented UST excavations. The confirmation soil samples will be evaluated for the presence of gasoline-, diesel-, and heavy oil-range hydrocarbons and BETX compounds.

5.2.6 Excavation Area Fencing

The limits of the excavations will be fenced or barricaded to prevent unauthorized access to the excavations during excavation activities.

5.2.7 Sidewall Slope

A 1 horizontal to 1 vertical (1H:1V) or less slope will be maintained for the excavation sidewalls if the excavations are extended to a depth greater that 4 feet. If steeper sidewalls are required to remove contaminated soil in areas adjacent to the remedial excavation activities will be suspended until ESA construction activities begin.

5.2.8 Excavation Regrading

The walls of the excavations will be regraded to a 2H:1V or less slope after the completion of remedial excavation activities. Soil removed from the walls of each excavation will be spread in the base of that excavation.

5.2.9 Site Cleanup

The site will be left in a neat and orderly condition at the conclusion of remedial activities.

5.3 GROUND WATER REMOVAL AND DISPOSAL

5.3.1 Ground Water Removal Strategy

If ground water is encountered during remedial excavation activities, it may be necessary to remove the ground water from the excavations to allow excavation activities to continue. The ground water should be pumped from the excavations into on-site containers pending waste characterization and disposal at an appropriate facility.

5.3.2 Ground Water Characterization

Ground water removed from the remedial excavations will be placed in on-site containers pending waste characterization. The water samples will be evaluated for the presence of gasoline-, diesel- and heavy oil-range hydrocarbons; BETX compounds; fats, oils and grease; and HVOCs.

5.3.3 Ground Water Treatment and Disposal

Potentially contaminated ground water removed from the remedial excavations should not be released onto the ground surface or into sanitary sewer or storm drains unless the water quality is characterized and the discharge is authorized by the appropriate agency. If the water quality does not allow for discharge into the sanitary sewer or storm drains, the water either will be 1) sparged to reduce concentrations of contaminants to below the required discharge criteria and resampled, or 2) disposed of at an approved Tosco facility.

5.4 MONITORING WELL ABANDONMENT

The on-site monitoring wells (MW-1 through MW-7) and off-site monitoring wells (MW-8 and MW-9) will be excavated and/or abandoned as a part of the remedial actions conducted at the site. The monitoring wells will be abandoned in general accordance to the Minimum

Standards for Construction and Maintenance of Wells, Chapter 173-160 WAC prior to or during the completion or remedial excavation activities.

6.0 HEALTH AND SAFETY

All GeoEngineers and contractor personnel subcontracted to Tosco will have Occupational Safety and Health Administration (OSHA) 40-hour health and safety training and perform the scope of work in accordance with a site specific health and safety plan prepared by GeoEngineers. The health and safety plan will meet OSHA standards specified in 29 Code of Federal Regulations (CFR) Part 1910.120. GeoEngineers' health and safety plan is presented in Appendix B.

7.0 DOCUMENTATION

GeoEngineers will prepare a written report to describe the remedial activities conducted at the facility. The report will include (1) figures showing the site vicinity and a site plan indicating the extent and depth of excavation and the confirmation soil sample locations, (2) tables summarizing the chemical data for soil and ground water, and (3) monitoring well abandonment logs. Discussions of field procedures, data validation results, and copies of laboratory data sheets, quality assurance/quality control (QA/QC) data, and chain-of-custody forms will be included in appendices.

We also will prepare the VCP application form to be submitted to Ecology for review after the completion of ESA construction activities.

8.0 ESA CONSTRUCTION EXCAVATION STRATEGY

Tim Johnson of Tosco [(206) 706-2341] and/or Kurt Anderson or Carla Woodworth of GeoEngineers [(425) 861-6000] should be contacted if potentially petroleum-contaminated soil is encountered during the proposed site construction excavation activities. The potentially petroleum-contaminated excavated soil should be stockpiled separately from noncontaminated soil on-site location and identified by covering the soil with a blue tarp pending waste characterization. The potentially contaminated soil should be placed on asphalt, concrete or durable plastic sheeting, and surrounded with a berm. The soil should be covered with durable plastic sheeting to prevent the soil from coming in contact with rain water and/or to contain potentially contaminated run-off water if the soil is exposed to rain water. Contaminated soil should not be placed directly on a noncontaminated unpaved ground surface.

GeoEngineers will sample the potentially contaminated soil. The soil samples will be analyzed by a chemical laboratory for waste characterization purposes as described in the sampling and analysis plan presented in Appendix A.

Soil containing hydrocarbons at concentrations greater than the MTCA Method A soil cleanup levels will be transported off site by Tosco and thermally treated at TPS. Soil containing no hydrocarbons (Class 1) or hydrocarbons at concentrations less that the MTCA Method A soil cleanup levels (Class 2) will be transported off site by Ariel. Ecology's "end

uses of soil" from Ecology's document titled "Guidance for Remediation of Releases from Underground Storage Tanks" are provided in Appendix C.

9.0 SCHEDULE

Once the remedial actions described in this work plan have been approved by Tosco, GeoEngineers will complete a detailed cost estimate to conduct the approved scope of work for Tosco's approval. We anticipate that remedial activities could begin within 2 weeks after Tosco's approval and as soon as the first week in November. Remedial activities could be completed in approximately 1 to 2 weeks, depending on field conditions. A draft summary report will be submitted to Tosco approximately 4 weeks after final analytical data results have been received.

10.0 GEOENGINEERS REFERENCES

- *Preliminary Results, Field Explorations, Subsurface Contamination Evaluation.* Prepared for Unocal, October 16, 1990.
- *Subsurface Contamination Study*. Prepared for Unocal, October 30, 1990.
- *Results of Supplemental Ground Water Sampling*. Prepared for Unocal, June 12, 1991.
- *Supplemental Subsurface Contamination Study*. Prepared for Unocal, March 23, 1992.
- *Monitoring Soil Excavation Near a Damaged Fuel Dispenser.* Prepared for Unocal, March 30, 1992.
- *Results of Ground Water Sampling, February and May 1992.* Prepared for Unocal, September 28, 1992.
- *Results of Ground Water Sampling, August and November 1992.* Prepared for Unocal, March 8, 1993.
- *Report of Underground Facilities Removal and Supplemental Explorations*. Prepared for Unocal, April 7, 1993.
- *Results of Ground Water Sampling, February, May, August 1993.* Prepared for Unocal, December 16, 1993.
- *Results of Ground Water Sampling, November 1993 and May 1995.* Prepared for Unocal, October 5, 1995.
- *Results of Ground Water Sampling, August and November 1995.* Prepared for Unocal, January 10, 1995.
- *Results of Ground Water Sampling, February and May 1996.* Prepared for Unocal, July 10, 1996.
- *Results of Ground Water Sampling, August and November 1996.* Prepared for Unocal, February 14 1995.
- *Results of Ground Water Monitoring and Sampling, March 1997.* Prepared for Unocal, April 18, 1997.

- *Report, Quarterly Report, Former Unocal Site No. 5919, Seattle, Washington.* Prepared for Tosco Marketing Company, November 13, 1997.

We appreciate the opportunity to provide Tosco with continued professional environmental services. Please contact one of the undersigned at (425) 861-6000 if you have any questions or require additional information.

Respectfully submitted,

GeoEngineers, Inc.

Carla R Woodworth

Carla R. Woodworth
Project Geologist

Kurt S. Anderson, C.P.G.
Associate

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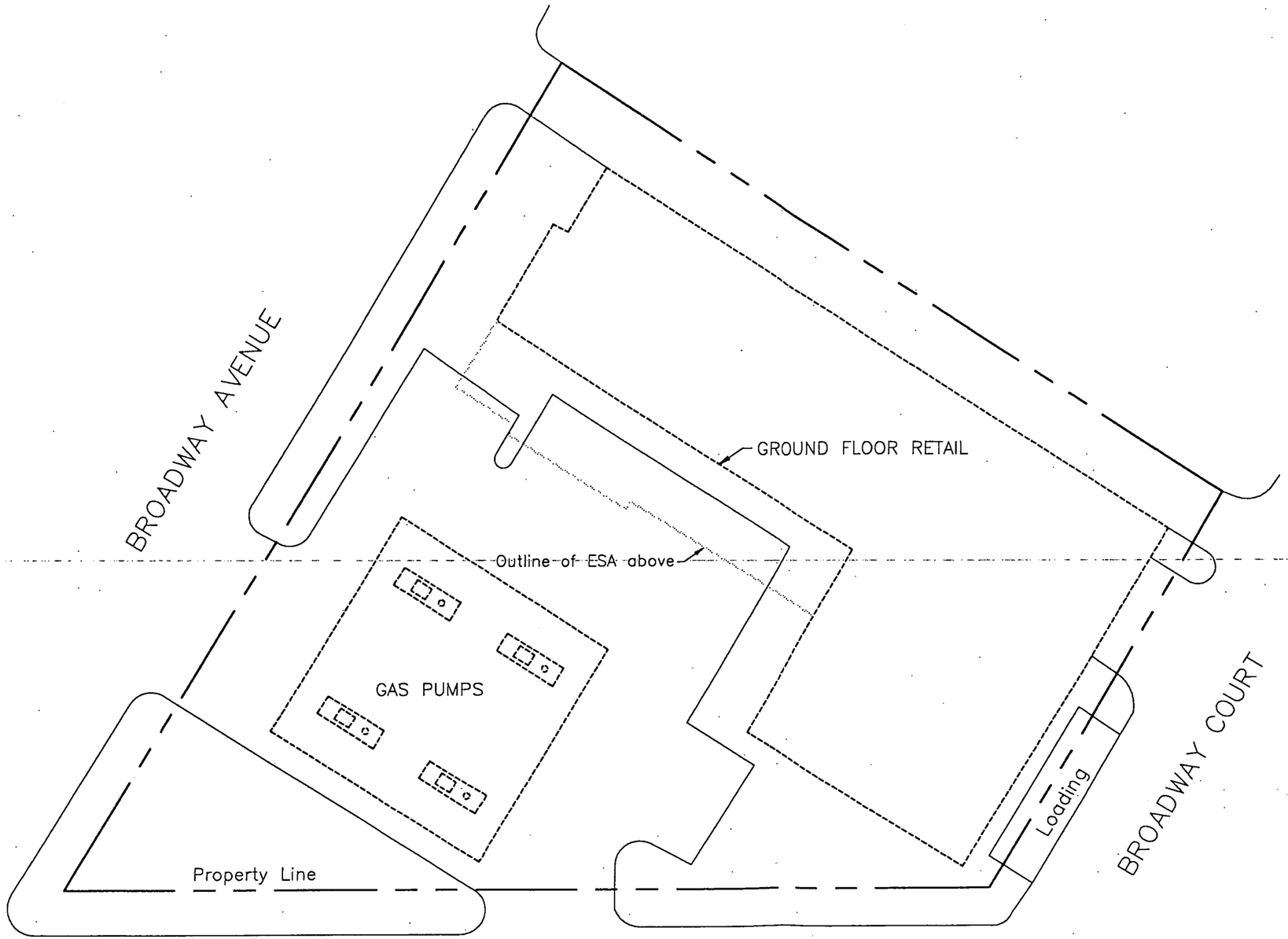

EXPLANATION:

ESA EXTENDED STAY AMERICA

N

0 30 60

SCALE IN FEET

Note: The locations of all features shown are approximate.

Reference: Drawing entitled "Site Layout Plan, Extended Stay America, Capitol Hill, City of Seattle" provided by Freiheit & Ho Architects, 08/28/98.

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PROPOSED DEVELOPMENT

FIGURE 1

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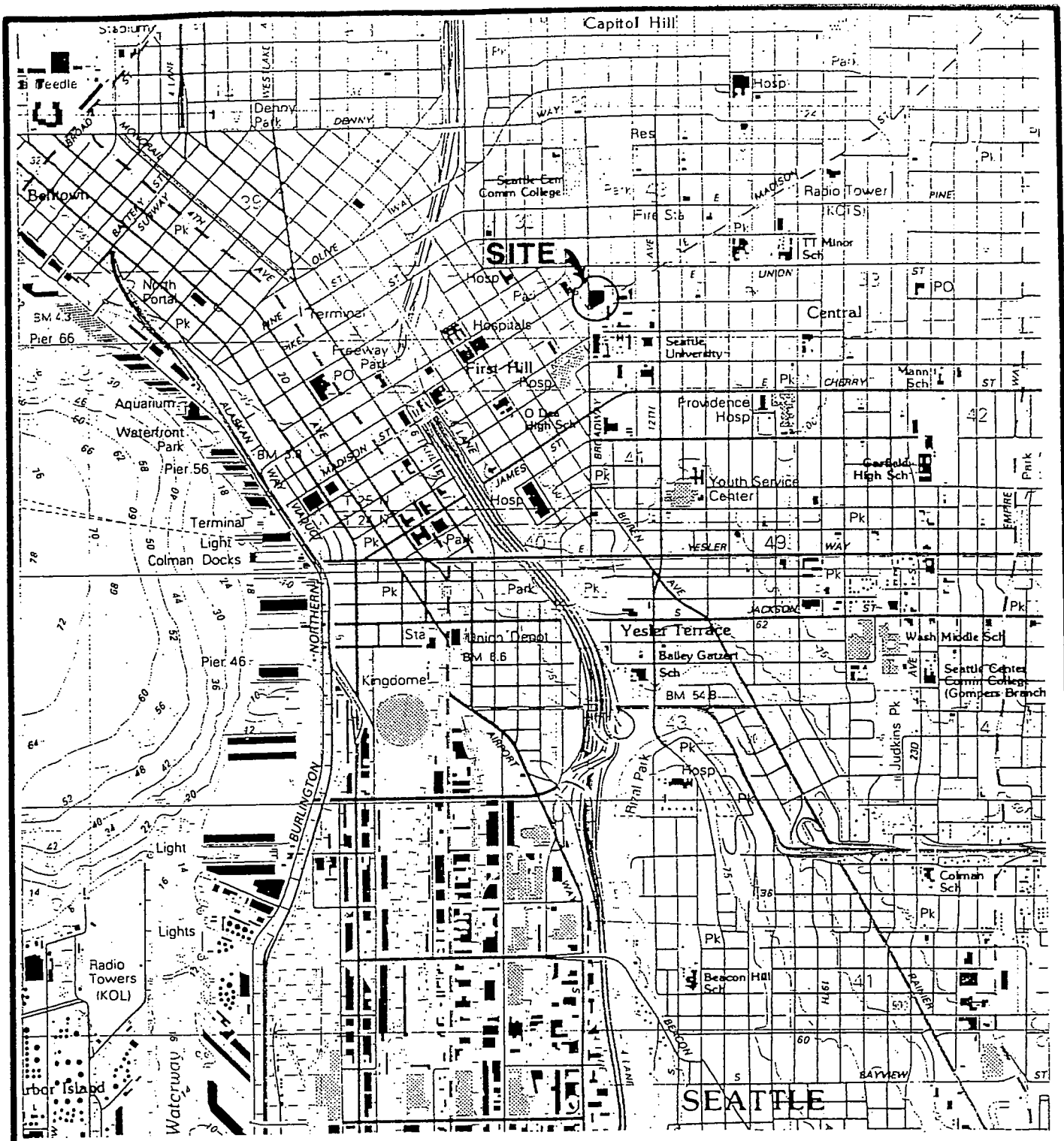

REFERENCE: USGS, NOAA 7.5' X 15' TOPOGRAPHIC-BATHYMETRIC MAP "SEATTLE SOUTH, WASHINGTON."

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VICINITY MAP

FIGURE 2

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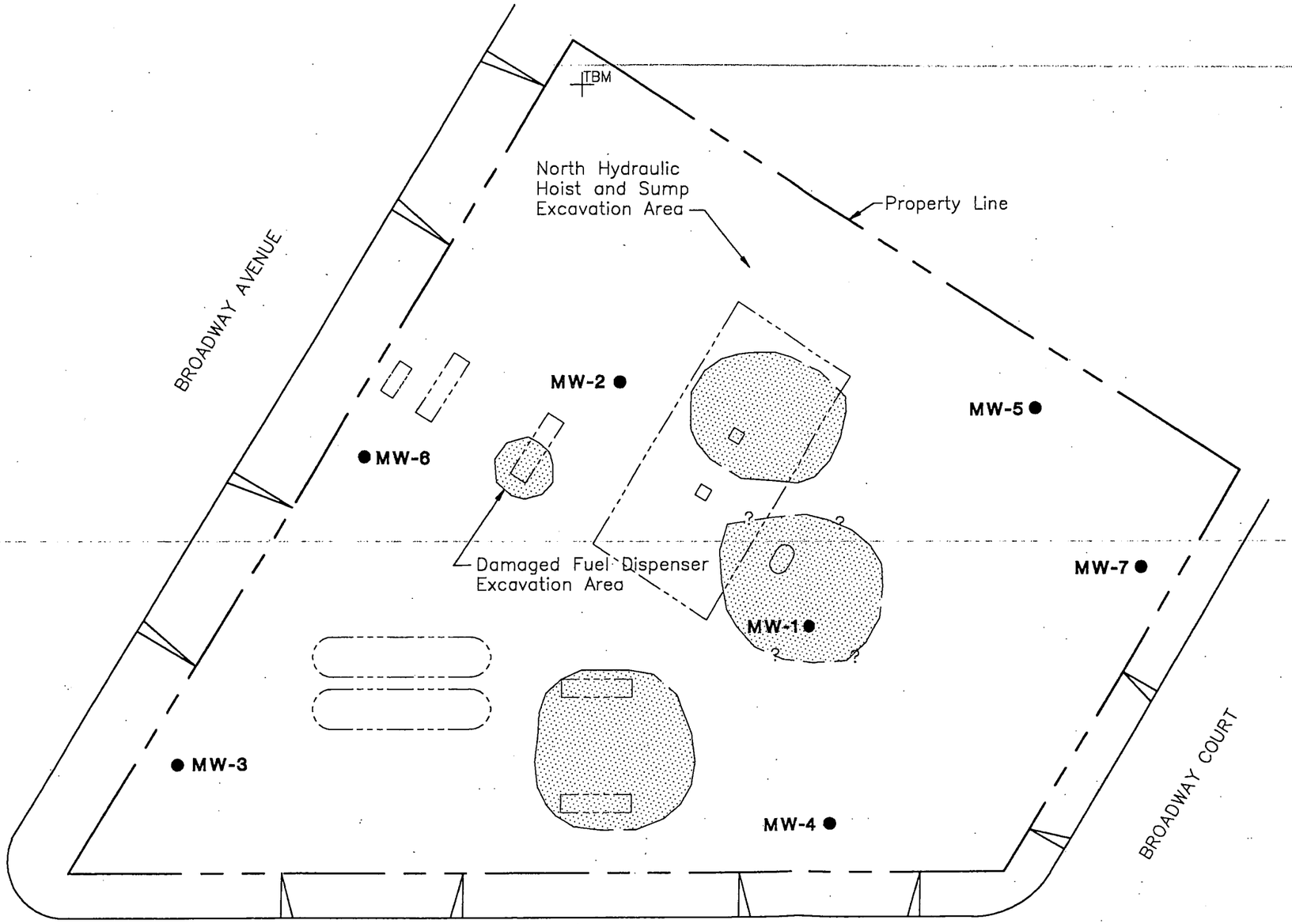

EXPLANATION:

MW-1 ● MONITORING WELL

ESTIMATED EXTENT OF PETROLEUM–RELATED SOIL CONTAMINATION

UST UNDERGROUND STORAGE TANK

N

0 30 60

SCALE IN FEET

Notes: 1. The locations of all features shown are approximate.

2. Estimated extent of petroleum–related soil contamination is based on widely spaced soil sample locations. The actual extent could be much greater.

Reference: Drawing entitled "General Arrangement, Service Station No. 5919, Broadway Ave. & E. Madison St., Seattle, Washington," by Unocal, dated 02/15/67.

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ESTIMATED EXTENT OF PETROLEUM-RELATED CONTAMINATION

FIGURE 3

10/07/98 P:\TOSCO\4823163B.DWG CRW:HLA

APPENDIX A

APPENDIX A

SAMPLING AND ANALYSIS PLAN

SOIL SAMPLING AND ANALYSIS

Excavation

Excavation activities related to the contaminated soil removal and monitoring well abandonment activities will be performed by an experienced and licensed remedial excavation contractor. All soil sampling will be conducted by an experienced geologist or engineer. The geologist or engineer will be on site during all excavation activities to evaluate the extent of contaminated soil and advise the excavator if a clean perimeter is reached based on field screening and/or laboratory analytical data.

Confirmation Soil Sampling

Confirmation soil samples will be obtained from the walls and bases of the excavations. The geologist or engineer will examine and classify the soil samples in the field in general accordance with American Society of Testing and Measurements (ASTM) D 2488-90. Unusual fill material, such as wood or rock, will generally be characterized based on visual observations. A detailed sketch of the remedial excavations and soil sample locations will be prepared in the field. Soil samples will be continually obtained for field screening, as described below, to evaluate the progress of the remedial activities. When field screening results indicate that MTCA Method A remediation levels may have been achieved, confirmation soil samples will be collected for laboratory analysis. One confirmation soil sample will be collected from approximately every 100 square feet (ft^2) of the base of each excavation and from approximately every 25 linear feet of the wall of the each excavation, and from areas within the excavation where field screening results suggest that contaminated soil may be present.

Field Screening of Soil Samples

A geologist or engineer will field screen soil samples obtained from the remedial excavations. Field screening results are used as a general guideline to delineate areas of possible petroleum-related contamination. In addition, screening results are used to aid in the selection of soil samples for laboratory analysis. The screening methods used during remedial actions will include (1) visual screening, (2) water sheen screening, and (3) headspace vapor screening.

Visual screening consists of inspecting the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons, such as motor oil, or when hydrocarbon concentrations are high. Water sheen screening and headspace vapor screening are more sensitive methods that have been effective in detecting contamination at concentrations less than regulatory cleanup levels. Field screening results are site specific. The effectiveness of field screening varies with temperature, moisture content, organic content, soil type, and type and age of the contaminant.

The presence or absence of a sheen or headspace vapors does not necessarily indicate the presence or absence of petroleum hydrocarbons.

Water sheen screening involves placing soil in water and observing the water surface for signs of sheen. Sheen classifications are as follows:

No Sheen (NS)	No visible sheen on the water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil may produce a slight sheen.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening may identify volatile petroleum hydrocarbon compounds and involves placing a soil sample in a plastic sample bag. Air is captured in the bag, and the bag is shaken to expose the soil to the air trapped in the bag. The probe of a MicroTIP™ photoionization detector is inserted in the bag, and the MicroTIP™ measures the concentration of organic vapors present within the sample bag headspace. The MicroTIP™ measures organic vapor concentrations in parts per million (ppm) and is calibrated to isobutylene. The MicroTIP™ is designed to quantify organic vapor concentrations up to 2,000 ppm.

Soil Sample Collection and Handling

Soil samples collected for field screening and laboratory analysis will be obtained from the central portion of the excavator bucket by hand using a trowel or plastic bag. The excavator bucket will be decontaminated prior to use in each excavation area. Hand trowels will be decontaminated between each sampling attempt using a Liquinox™ wash and distilled water rinse. Decontamination water will be contained in labeled steel 55-gallon drums pending characterization and disposal.

Confirmation soil samples submitted for laboratory analysis will be placed in laboratory-supplied glass jars with Teflon sealing caps. The jars will be completely filled to limit the amount of headspace vapor. The jars will be labeled sequentially, including sample identification, depth, date, and time, and placed in a cooler with blue ice for transport to the laboratory under chain of custody. The sample identification, depth, date, and time will be transferred to a chain-of-custody form and signed and dated by the geologist or engineer. The chain-of-custody form will accompany the confirmation soil samples to the laboratory where it will be signed and dated by a laboratory representative.

Soil Sample Analytical Program

The confirmation soil samples will be submitted to North Creek Analytical in Bothell, Washington and analyzed for the presence of gasoline-, diesel-, and heavy oil-range hydrocarbons by Ecology Methods WTPH-G and WTPH-D extended, and for BETX compounds by U.S. Environmental Protection Agency (EPA) Method 8020. Selected soil samples also maybe analyzed for the presence of halogenated volatile organic compounds (HVOCs) by EPA Method 8010.

Field Quality Assurance/Quality Control Samples

One equipment blank sample will be collected for each field day and analyzed for the presence of gasoline-, diesel-, and heavy oil-range hydrocarbons and BETX compounds.

Ground Water Sample Collection and Handling

Ground water samples collected for laboratory analysis will be obtained from the on-site storage container using a disposable polyethylene bailer and rope.

The water samples submitted for laboratory analysis will be placed in laboratory-supplied glass bottles with Teflon™ sealing caps. The jars will be completely filled to limit the amount of headspace vapor. The jars will be labeled, including sample identification, date, and time, and placed in a cooler with blue ice for transport to the laboratory under chain of custody. The sample identification, date, and time will be transferred to a chain-of-custody form and signed and dated by the geologist or engineer. The chain-of-custody form will accompany the confirmation soil samples to the laboratory where it will be signed and dated by a laboratory representative.

Ground Water Sample Analytical Program

The ground water samples will be submitted to North Creek Analytical in Bothell, Washington and analyzed for the presence of gasoline-, diesel-, and heavy oil-range hydrocarbons by Ecology Methods WTPH-G and WTPH-D extended; for BETX compounds by U.S. Environmental Protection Agency (EPA) Method 8020; fats, oils and grease by EPA Method 413.2; and halogenated volatile organic compounds by EPA Method 8010.

Analytical Quality Assurance/Quality Control

Chain-of-custody procedures will be followed during the transport of the soil samples to the laboratory. The samples will be held in cold storage pending extracting and/or analysis.

The laboratory will maintain an internal QA/QC program as documented in its laboratory quality assurance manual. The laboratory will use a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries, and blank spike duplicate recoveries to evaluate the validity of the analytical results in general accordance with SW-846. The laboratory also will use date quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test

methods. The data quality goals will be included in the laboratory reports. The laboratory will compare each group of samples with the existing data quality goals and note any exceptions in the laboratory report. The data quality exceptions documented by the laboratory in the laboratory reports will be reviewed by the project geologist or engineer using the applicable data validations guidelines form the following documents: "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" dated February 1994 (EPA document number EPA 540/R94/012) and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" dated July 1988 (EPA document number 540/R94/083).

Significant data quality exceptions will be documented in the laboratory reports, and their effect on study results will be discussed in the summary report.

Stockpile Soil Sampling

Soil removed from the remedial excavations will be segregated based on the apparent degree of contamination. Visibly affected soil will be loaded directly onto truck based on field screening results, if possible. Soil samples will be collected from discrete locations within the stockpile with a shovel, if additional stockpile soil samples are required for off site treatment of the soil. Soil samples will also be collected from stockpiles containing potentially Class II soils to be used as backfill. The shovel will be decontaminated with a Liquinox™ wash and a distilled water rinse prior to collecting each sample. Stockpile soil samples will be collected at a frequency dependant on the volume of stockpiled soil generally as described in Ecology guidance for site assessments of underground storage tank sites. The composite samples will be transferred to laboratory-supplied glass jars and submitted for laboratory analysis, as required by the disposal facility. Decontamination water will be contained in labeled steel 55-gallon drums pending characterization and disposal.

GROUND WATER MONITORING WELL ABANDONMENT

Monitoring wells MW-1 through MW-9 will be abandoned in general accordance to the Minimum Standards for Construction and Maintenance for Wells Chapter 173-160 WAC. Monitoring well MW-1 will likely be removed and abandoned during excavation activities in the vicinity of the waste oil UST excavation. The remaining wells will likely be abandoned using pressure grouting techniques by a licensed driller.

APPENDIX B

APPENDIX B

HEALTH AND SAFETY PLAN
FORM 1 SITE SAFETY PLAN CHECKLIST
PETROLEUM-CONTAMINATED SITES

I. GENERAL PROJECT INFORMATION

Project Name:	Remedial Actions – Tosco Unocal Site No. 5919
Project Number:	4823-163-00
Type of Project:	Interim Remedial Actions
Start/Completion Dates:	October 26, 1998/October 1999
Subcontractors:	To be Determined

II. PERSONNEL/CONTACT INFORMATION PHONE NUMBERS

Site Safety Officer:	To be Determined
Project Manager:	Carla Woodworth (425) 861-6067
Health and Safety Manager:	Carla Woodworth (425) 861-6067
Field Engineer/Geologist:	To be Determined
Client Contact:	Tosco Marketing Company (206) 706-2341

III. LIST OF FIELD ACTIVITIES

Check the activities applicable to project.

_____	Exploratory borings
X	Monitoring well installation/abandonment
_____	Surveying
_____	Ground water depth and free product measurement
_____	Recovery of free product
_____	Monitoring well development
_____	Ground water sampling
X	Vapor measurements
_____	Remediation system monitoring
_____	Test pit exploration
_____	Underground storage tank removal monitoring
X	Remedial excavation
X	Soil stockpile testing
X	Field screening of soil samples
_____	Site reconnaissance

IV. SITE DESCRIPTION Attach Site Plan (Figure 1)

Location/Size: 1100 Broadway Avenue, Seattle, Washington
Topography: Slight slope to east
Current Owner: Tosco Marketing Company
Site Security: Fenced
Road Access: Yes
Water Access: No
Electrical Access: No
Utility Check Complete: To be completed prior to beginning work

Additional information applicable to site:

History of the site: Former Unocal Service Station 5919. USTs removed in 1992

V. EMERGENCY INFORMATION

Attach map marking route to the nearest hospital/clinic.

Hospital Name: Swedish Medical Center, 747 Broadway, Seattle, Washington

Phone Numbers:
- Hospital: (206) 386-6458
- Ambulance: 911
- Poison Control: (206) 526-2121
- Police: 911
- Fire: 911

Location of Nearest Telephone: Office/GeoEngineers' Field Vehicle
Nearest Fire Extinguisher: Office/GeoEngineers' Field Vehicle
Nearest First Aid Kit: Office/GeoEngineers' Field Vehicle

VI. HAZARDS/PRECAUTIONS

1. Free petroleum product at site? No
2. Check substances known or suspected to occur at the site:
   - __X__ Motor oil (used or unused)
   - __X__ Leaded and unleaded gasoline
   - __X__ Nos. 1 and 2 fuel oil (vehicle fuel and home heating oil)
   - _____ Nos. 4 and 5 fuel oil
   - _____ No. 6 fuel oil (bunker C fuel oil)
   - __X__ Hydraulic oil
   - _____ Transmission fluid
   - _____ JP-3, 4, 5 (jet fuels)
   - _____ Gasohol
   - _____ Solvents (nonchlorinated)
   - __X__ Solvents (chlorinated)

3. Known chemical characteristics:

	Soil Chemistry (mg/kg)	Water Chemistry (µg/l)
TPH:	16,000 (heavy oil)	<1,000
Benzene:	0.58	<0.5
Toluene:	11.0	<0.5
Ethylbenzene:	7.1	<0.5
Xylene (total):	98	<1.0
Fuel Hydrocarbons:	1,900 gasoline	36.8

Other constituents (TCLP, pH, metals, etc.): PCE – 184 µg/l

4. Physical Hazards: Check equipment/conditions applicable to specific project.

- X Drill rig
- X Backhoe
- X Excavations/trenching
- _____ Shored/braced excavation if greater than 4 feet of depth
- X Overhead hazards/power lines
- _____ Debris on site (tripping/puncture hazards)
- _____ Unusual traffic hazard
- _____ Heat stress potential
- _____ Other expected physical hazards _____

5. Special Precautions: _____

VII. PERSONAL PROTECTIVE EQUIPMENT

Check applicable level of protection to be used initially:

- X Level D
- _____ Level C
- _____ Modifications (specify): _____

VIII. AIR MONITORING PLAN

Check instrumentation to be used:

- X Bacharach TLV Sniffer
- X Photovac TIP
- _____ Other (i.e., detector tubes): _____

IX. DECONTAMINATION PROCEDURES

At a minimum, decontamination consists of washing soiled boots, gloves and respirator; discarding protective clothing; and removing used respirator cartridges prior to leaving the site.

Specify other decontamination procedures: _____

X. WASTE DISPOSAL OR STORAGE (Drill cuttings, purge water, used PPE)

__X__ On site, pending analysis and further action
_____ Other (describe destination, responsible parties):

_____

XI. DOCUMENTATION EXPECTED TO BE COMPLETED:

Required forms:

Site Safety Plan Acknowledgement Form
Contractors and Subcontractor Site Safety Plan Disclaimer Form

Conditional forms: Accident Report Form
Exposure Report For GeoEngineers Employees Form

XII. HEALTH AND SAFETY MEETING

All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings are required if deemed necessary by the site Safety Officer.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

Date	Topics	Attendee	Company Name	Employee Initials

XIII. APPROVALS

1. Plan Prepared _____ _____
   Signature Date

2. Plan Approval _____ _____
   P.M. Signature Date

   _____ _____
   Safety Officer Signature Date

FORM 2
SITE SAFETY PLAN – ACKNOWLEDGEMENT FORM

(All GeoEngineers' site workers complete this form and return to the Health and Safety Records Coordinator, Traci Williams).

Project Number: 4823-163-00

Project Description/Name: Interim Remedial Actions – Tosco Unocal Site No. 5919

Client: Tosco Marketing Company

KNOWN (OR ANTICIPATED) HAZARDOUS SUBSTANCES

Petroleum Hydrocarbons:

- _____ naphthalenes
- _____ paraffins
- _____ aromatic hydrocarbons (benzene, ethylbenzene, toluene, xylenes)
- __X__ gasoline
- __X__ diesel fuel
- __X__ chlorinated and nonchlorinated solvents
- __X__ used motor oil
- _____ hydraulic oil
- _____ transmission fluid
- _____ methyl tert butyl ether (MTBE)
- _____ lead-contaminated soil

Physical Hazards: Drill rig, backhoes, and trenches

I, _____, do hereby verify that a copy of the current Safety Plan has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge a full understanding of the safety procedures and protocol for my responsibilities on site. I agree to comply with all required, specified safety regulations and procedures. I understand that I will be informed immediately of any changes that would affect site personnel safety.

SIGNED _____ Date: _____

RANGE OF DATES From: ____/____/____

To: ____/____/____

FORM 3
CONTRACTOR AND SUBCONTRACTOR SITE SAFETY PLAN DISCLAIMER FORM

GeoEngineers, Inc. is not responsible for the site safety of its subcontractors/contractors. GeoEngineers recommends that subcontractors and contractors provide a site safety plan for their employees to cover exposure to anticipated hazardous materials. All work by the subcontractor/contractor should be completed in accordance with their own plans. If the subcontractor/contractor chooses to use GeoEngineers site safety plan, they use the GeoEngineers plan completely at their own risk, and shall hold GeoEngineers harmless from, and indemnify it against, all liability in the case of any injury or death. GeoEngineers, Inc. maintains no responsibility whatsoever for the safety and welfare of any on-site personnel except its own employees.

PROJECT NUMBER: 4823-163-00
PROJECT DESCRIPTION/NAME: Remedial Actions – Tosco Unocal Site No. 5919
LOCATION: 1100 Broadway Avenue, Seattle, Washington
CLIENT: Tosco Marketing Company

KNOWN (OR ANTICIPATED) HAZARDOUS SUBSTANCES

Petroleum Hydrocarbons:

____	Naphthalenes
____	Paraffins
____	Aromatic hydrocarbons (benzene, ethylbenzene, toluene, xylenes)
X	Gasoline
X	Diesel fuel
X	Chlorinated and nonchlorinated solvents
X	Used motor oil
____	Hydraulic oil
____	Transmission fluid
____	Methyl tert butyl ether (MTBE)
____	Polycyclic aromatic hydrocarbons (PAHs)
____	Polychlorinated Biphenyls (PCBs)
____	Solvents
____	Lead-contaminated soil

Physical Hazards: Drill rigs, backhoes and trenches

I, _____, verify that a copy of the current site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on site and to provide safety procedures and protocols which will be used by GeoEngineers' staff at the site. If I choose to use GeoEngineers' site safety plan, I agree to do so on behalf of the undersigned company only at my own risk, and shall hold GeoEngineers harmless and indemnify it against all liability in the case of any injury or death. By accepting and using this site Safety Plan, I agree that the safety of my employees is the responsibility of the undersigned company.

SIGNED _____ Date: _____

Company: _____

FORM 4
ACCIDENT REPORT FORM

To (Supervisor)_____ From (Employee or Project Leader)_____

_____ _____

_____ _____

Telephone (include area code)_____

Name of Injured or Ill Employee

_____

Date of Accident _____ Time of Accident _____ Exact Location of Accident _____

Narrative Description of Accident_____

_____

_____

_____

_____

Nature of Illness or Injury and Part of Body Involved Lost Time? Yes____ No____

_____

_____

_____

Probable Disability (Check One)

Fatal	Lost Work Day With Days Away From Work	Lost Work Day With Days of Restricted Activity	No Lost Work Day	First Aid Only

Corrective Action Taken by Reporting Unit_____

_____

_____

_____

_____

Corrective Action That Remains to be Taken (by whom and when)

_____

_____

Employee's Signature_____ Date _____

Name of Supervisor (Print)_____

Supervisor's Signature_____ Date _____

FORM 5
EXPOSURE REPORT FOR GEOENGINEERS EMPLOYEES FORM

PROJECT: _____

DATE: _____

DESCRIPTION OF EXPOSURE:

_____

_____

_____

_____

MEDICAL ATTENTION:

ON SITE: _____

_____

_____

_____

_____

OTHER: _____

_____

_____

_____

_____

_____

NAME: _____

ADDRESS: _____

_____

SIGNATURE: _____ DATE _____

APPENDIX C

4.0 END USES OF TREATED SOIL

This section discusses classification of petroleum contaminated soils based on contaminant concentrations and their appropriate end uses.

4.1 POLICY STATEMENT

Under the rules for the Solid Waste Management law (RCW 70.95) and the Model Toxics Control Act (RCW 70.105D), highest priority is given to recycling, reuse, and permanent solutions for management of waste (rather than landfill disposal). The Toxics Cleanup Program (TCP) and Solid and Hazardous Waste Program are therefore promoting the treatment and reuse of petroleum-contaminated soils, consistent with the cleanup standards and selection of remedy in Chapter 173-340 WAC.

4.2 CLEANUP STANDARDS

For most leaking underground storage tanks, Method A under the MTCA regulation should be used to determine the petroleum cleanup levels. These standards are listed in Table IV of this document. Other methods for determining cleanup standards require evaluation of site-specific conditions and are typically used for more complex sites. In addition, soils with contaminants other than petroleum must also meet the cleanup standards for those constituents (e.g., waste oil contamination where metals, PCBs or solvents exist) or be taken to appropriate disposal facilities.

4.3 END USE CLASSIFICATION and DISPOSAL

Class 1 Soils

Treated or untreated soils which contain residual concentrations of contaminants at or below analytical detection limits are considered clean and may be used where they would not cause a threat to human health or the environment. Ecology designates these

soils as "Class 1" (less than Practical Quantification Limits [PQL]). See Table V, "End Use Criteria For Petroleum-Contaminated Soils," for specific contaminant concentrations.

Examples of appropriate uses for these soils include: fill underneath pavements, fill at industrial or commercial facilities, backfill at the cleanup site, cover at landfills or any other uses which would not cause threat to human health or the environment.

Class 2 Soils

Treated or untreated soils which contain detectable levels of petroleum contaminants below the MTCA Method A cleanup standards are designated by Ecology as "Class 2" soils. Appropriate uses include: backfill at the site, industrial or commercial fill, cover in landfills, road construction or other uses which will not cause a threat to human health or the environment. While these soils are below the cleanup standards; Ecology recommends that they not be used in or adjacent to: wetlands, surface water, ground water, drinking water wells or utility trenches. Ecology also recommends that they not be used as residential topsoil.

Class 3 Soils

Ecology recommends treatment for all Class 3 soils which have not yet been treated. However, Ecology recognizes that soils with high levels of heavy hydrocarbons may not be able to meet cleanup standards even after treatment. Soils with residual heavy hydrocarbons greater than the MTCA cleanup standards are designated "Class 3" soils. (Note that even for these soils, benzene, toluene, ethyl benzene and xylene must be below the cleanup standards. Soils receiving adequate treatment should be able to meet the cleanup levels for light petroleum fractions.) If soils are treated but cannot attain cleanup standards, they should be: 1) used at the original site, 2) used in road construction, 3) used or disposed of in an existing, permitted municipal landfill or 4) permitted as a new solid waste disposal area.

TABLE V. END USE CRITERIA FOR PETROLEUM-CONTAMINATED SOILS

Analyte	Analytical Method	Soil Class (ppm) 1	2	3	4
Heavy fuel hydrocarbons (C24-C30)	WTPH-418.1 mod.	<60	60-200	200-2000	>2000
Diesel (C12-C24)	WTPH-D	<25	25-200	200-500	>500
Gasoline (C6-C12)	WTPH-G	<5	5-100	100-250	>250
Benzene	8020	<0.005	0.005-0.5	≤0.5	>0.5
Ethylbenzene	8020	<0.005	0.005-20	≤20	>20
Toluene	8020	<0.005	0.005-40	≤40	>40
Xylenes (total)	8020	<0.005	0.005-20	≤20	>20

Treatment is recommended for all Class 3 and 4 soils.

NOTES:

Class 1 Soil Uses:
Any use which will not cause threat to human health or the environment.

Class 2 Soil Uses:
Backfill at the cleanup site
Fill in commercial or industrial areas
Cover or fill in permitted landfills
Road subgrade or other road construction fill
Fill in or near: wetlands, surface water, ground water, drinking water wells or utility trenches is NOT recommended. Use as residential topsoil is also NOT recommended.

Class 3 Soil Uses:
Treatment
Disposal at the original site (no solid waste diposal permit needed)
Road construction (no solid waste diposal permit needed)
Use or disposal in permitted, municipal landfills
Permitted as a new PCS landfill
(An evaluation should be made to ensure that disposal will not cause a threat to human health or the environment, e.g. use near water bodies)

Class 4 Soil Uses:
Treatment
Disposal in a permitted, municipal landfill
Permitted as a new PCS landfill