RZA AGRA, Inc.
(formerly Rittenhouse Zeman & Associates, Inc.)
Engineering & Environmental Services

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6 May 1992

W-6839-11

Unocal Refining and Marketing Division
P.O. Box 76
Seattle, Washington 98111

DEPARTMENT OF ECOLOGY SR
#1975 NWRO/TCP TANK UNIT 9-8-92
INTERIM CLEANUP REPORT ☑
SITE CHARACTERIZATION ☐
FINAL CLEANUP REPORT ☐
OTHER ☐
AFFECTED MEDIA: SOIL ✓
OTHER GW
INSPECTOR (INIT.) WM DATE 9-8-92

Attention: Mr. Kipp Eckert

Subject: Underground Storage Tank, Hoist/Sump Removal Summary Report
Unocal Service Station Number 5472
3460 First Avenue South
Seattle, Washington

Dear Mr. Eckert:

Presented herein is a copy of the summary report for underground storage tank (UST) and hoist and floor sump removal at the above referenced site. This report presents RZA AGRA, Inc.'s observations of petroleum hydrocarbon underground storage tank, product line, and hoist and sump removal procedures accomplished at the subject site on 18 February and 5, 6, and 9 March 1992. Analytical test results of soil samples collected adjacent to the former tank locations, as well as beneath the service station sump, hoists, service island areas, and from soil stockpiles are also included in this report. This report has been prepared for the exclusive use of Unocal and their agents for specific application to the above referenced project in accordance with generally accepted environmental assessment practices. In the event that there are any subsequent changes on the existing site, the conclusions contained in this report should be reviewed and modified, if necessary, to reflect those changes.

SUMMARY

The main body of this report should be consulted for a detailed discussion of the report findings. A brief summary of our observations and analytical laboratory test results is presented below:

LUST REPORT REVIEW FORM

Reviewed by Wally Moon ***Date:*** 9-8-92 ***Incident #*** 1975

Comments:

UST removal report. High TPH in soils. Will explore further.

- Prior to removal, the underground storage tanks were decommissioned by A.L. Sleister Construction, Inc., for safe removal from the site;
- Upon inspection, the gasoline storage tanks appeared in fair condition, exhibiting minor pitting and corrosion. The heating oil and waste oil tanks were heavily corroded, with the heating oil tank exhibiting large holes. The diesel tank appeared in fair condition, exhibiting only minor pitting at its base. Prior to removal, approximately 7,500 gallons of water was pumped from the diesel tank by Northwest Enviroservices of Seattle, Washington. Upon removal, an additional 2,500 gallons of diesel fuel and water were pumped from the base of the diesel tank cavity;
- During excavation of the western pump island, a relic tank was discovered at a depth of approximately 5 feet. The tank appeared to have been backfilled in place with a sand slurry. The tank was not removed at that time;
- Soils collected from the sidewalls and base of the gasoline tank excavation exhibited benzene concentrations ranging from 0.64 parts per million (ppm) to 190 ppm. Soil samples collected from the south, north, and west sidewalls of the excavation exhibited gasoline TPH concentrations ranging from 180 ppm to greater than 20,000 ppm. Liquid phase hydrocarbons were observed on groundwater exposed at the base of the excavation;
- Soils collected from the sidewalls and base of the waste oil and heating oil tank excavation exhibited non-gasoline TPH concentrations ranging from 410 ppm to 6,900 ppm;
- Soils collected from the hoist No. 2/floor sump excavation exhibited non-gasoline TPH concentrations ranging from 750 ppm to 5,300 ppm;
- Soil samples collected from below the western service island area exhibited gasoline-TPH concentrations ranging from 210 ppm to 530 ppm;
- Composite samples collected from stockpiled soils exhibited TPH as gasoline, diesel, and heavy end concentrations in excess of MTCA cleanup criteria;
- The excavations are currently open and 330 cubic yards of impacted soil is stockpiled on site and awaits determination of disposition.

This summary is presented for introductory purposes and should be used only in conjunction with the full text of this report. Approximate site boundaries, locations of underground storage tank, hoist, and service island excavations, as well as sample locations are shown on the Site and Excavation Plan, Figure 1.

Purpose And Scope

Presented herein are our detailed observations of petroleum hydrocarbon underground storage tank, product line, and hoist/floor sump removal procedures accomplished on 18 February and 5, 6, and 9 March 1992. The project site is located at 3460 First Avenue South in Seattle, Washington. The purpose of our observations and laboratory analyses was to evaluate whether or not petroleum hydrocarbons were present in the soils in the immediate area of the tanks, product lines, and pump islands. In addition, assessments were made of the soils surrounding the service station hydraulic hoists and sump, as well as the soils in the vicinity of a relic UST. Our project scope of work included:

- Visual observation and photographic documentation of underground tank removal operations;
- A visual observation of the condition of the underground storage tanks, hydraulic hoists, and the floor sump after removal from the ground;
- Observations of the condition of the soil and groundwater (if present), utilizing an OVM photoionization detector and visual and olfactory sensory impressions;
- Visual observation of the soils surrounding the service station hoists, sump, former USTs, service islands and product lines;
- Collection of soil samples and subsequent chemical analyses of soils for TPH (total petroleum hydrocarbons) for all the excavations, as well as BTEX (benzene, toluene, ethylbenzene, and xylenes) for the areas of the former and recent gasoline tanks and gasoline line excavations and soil stockpiles. In addition, analyses were completed for halogenated volatiles, total metals, and PCB's from samples recovered from underneath the waste oil tank;
- Preparation of this report.

Site Description and History

The subject site is an approximately rectangular shaped parcel located at 3460 First Avenue South in Seattle, Washington. Topographically, the parcel is generally flat, sloping slightly to the west. During the time of our site work, the existing service station building and two pump island canopies were removed. The station previously operated with five underground storage tanks (UST's), (two 10,000 gallon steel gasoline UST's, one 10,000 gallon steel diesel UST, one 550 gallon steel waste oil UST, and one 550 gallon steel heating oil UST) along with two hydraulic hoists and an associated concrete floor sump located on the subject site.

Businesses and land-use in the immediate vicinity of the subject property include a moving and storage company, which includes underground storage tanks, located to the west of the site across First Avenue. The site is bounded to the north and east by a sprinkler company, a marine supply company, and a metal shop, respectively. A sheet metal company is located across Spokane Street to the south.

According to anecdotal information obtained from Unocal, prior to Unocal's service station construction in 1968, the site was occupied by McHales Service for an unknown period of time. In 1968, the station was reconstructed with steel product lines and two 10,000 gallon steel gasoline tanks and 550 gallon heating oil and waste oil tanks. A 10,000 gallon steel diesel tank with steel product lines were added in 1977. The steel product lines connected to the gasoline storage tanks were replaced with fiberglass lines in 1981. No reports of spills or leaks are documented during the operation of the station.

In July 1990, RZA AGRA performed a Phase II Environmental Assessment, which included advancing five soil borings which were installed with monitoring wells. Soil samples collected from borings B-1 and B-5 exhibited benzene and Total Petroleum Hydrocarbons (TPH) concentrations equal to or greater than the Model Toxics Control Act (MTCA) Method A cleanup criteria. Groundwater samples collected from monitoring wells MW-1 and MW-5 exhibited TPH and BTEX concentrations in excess of MTCA Method A cleanup criteria. Monitoring wells MW-1 through MW-5 exhibited concentrations of BTEX in excess of MTCA cleanup criteria. Additionally, MW-1 exhibited 0.4 feet of liquid petroleum hydrocarbons.

RZA AGRA returned to the site in February 1991 to perform an additional environmental assessment which included installation of four additional monitoring wells. A soil sample collected from boring B-6 exhibited a TPH concentration in excess of MTCA cleanup criteria. Samples collected from borings B-7, B-8 and B-9 exhibited BTEX and TPH concentrations below MTCA cleanup criteria. Groundwater samples collected from monitoring wells MW-1 through MW-5, MW-8, and MW-9 exhibited BTEX and/or TPH concentrations in excess of MTCA cleanup criteria. MW-7 exhibited a benzene concentration in excess of MTCA cleanup criteria. All existing monitoring wells exhibited dissolved lead concentrations in excess of MTCA cleanup criteria. During our involvement on the site, monitoring wells MW-1, MW-2, and MW-9 have exhibited minor accumulations of liquid phase petroleum hydrocarbons. Groundwater flow direction was determined to be generally to the west.

Beginning April 1991, RZA AGRA conducted weekly monitoring of fluid levels in the on-site wells. When encountered, liquid phase hydrocarbons were removed from the wells by bailing and bailed product and water were stored in labeled 55-gallon drums onsite.

Hoist/Floor Sump Removal Observations

Hoist and sump removal procedures took place on 18 February 1991. When we arrived onsite, the contractor had removed the concrete slab in the vicinity of the hoists and sump. Upon removal, hoist No. 1, located on the south side of the service building, appeared moderately corroded, though it did not exhibit signs of significant structural compromise. During excavation, soils exhibiting moderate petroleum hydrocarbon odors were encountered below a depth of 6 feet. Soils exhibiting obvious petroleum hydrocarbon impact were stockpiled separately. After the hoist was removed, the excavation was backfilled with relatively "clean" unimpacted fill soils.

Upon removal, hoist No. 2 and the associated floor sump, located in the center of the garage, appeared in good condition, exhibiting no signs of structural compromise. Prior to removal, approximately 5 gallons of water were pumped from the sump. During excavation procedures, soils exhibiting petroleum hydrocarbon odors were encountered at a depth of 3 feet and stockpiled separately. After removal, the excavation was backfilled with non-odorous soils and the contractor loaded and hauled the hoists offsite.

Prior to backfilling, one soil sample was collected from the hoist No.1 excavation (HS-1) and three soil samples were collected from the hoist No.2/floor sump excavation (HS-2, HS-3, and HS-4).

Tank and Product Line Removal Observations

Tank removal procedures occurred on 5, 6, and 9 March 1992. We arrived on site to observe and document the removal of five petroleum hydrocarbon underground storage tanks from the site (see Site and Excavation Plan, Figure 1). Table 1, below, represents our understanding of tank capacities, product type and observed tank construction material.

TABLE 1
Underground Tanks Removed

Construction	Approximate Volume	Contents
Steel	10,000	gasoline
Steel	10,000	gasoline
Steel	10,000	diesel
Steel	550	heating oil
Steel	550	waste oil

Tank removal procedures were completed by A.L. Sleister and Sons, Inc. of Lynnwood, Washington, utilizing a rubber-tired backhoe and a Kobelco 909LC trackhoe. Upon inspection, the gasoline storage tanks appeared to be in fair condition with moderate corrosion observed overall, though no pitting was observed. The waste oil and heating oil tanks appeared in very poor condition with heavy corrosion and large holes observed.

The diesel tank appeared to be in fair condition, exhibiting only a moderate amount of corrosion. A pin-sized hole was observed in the diesel tank shell directly below the fill aperture of the tank. Five weeks prior to removing the diesel tank, approximately 6,000 gallons of water were pumped from the tank. Immediately prior to removing the tank, an additional 7,500 gallons of water were pumped, suggesting significant leakage. After the tank was pulled, an additional 2,500 gallons of water and apparent liquid diesel fuel were pumped from the base of the tank excavation.

Subsurface Conditions

Soils encountered during the excavation of the gasoline and oil tanks consisted of loose to medium dense, brown to gray, sands to sandy silt with variable gravel and demolition debris (fill) to a depth of between 4 and 7 feet, overlying dark gray to black sand to silty sand with variable organic debris. Based on published geological maps, the soils underlying the subject site consist of alluvial silts and sands of the Duwamish River Valley and intertidal delta.

The soils immediately surrounding the gasoline tanks appeared to be moderately to strongly impacted by fugitive petroleum hydrocarbons. Soils observed along the sidewalls and base of the diesel tank excavation exhibited only minor evidence of petroleum hydrocarbons. The soils surrounding the waste oil and heating oil tanks exhibited evidence of heavy end petroleum hydrocarbon contamination. Soils in the vicinity of the western pump islands exhibited strong

gasoline odors, while other areas along the product line excavations did not exhibit evidence of petroleum hydrocarbon impacts.

The soils below the service station floor sump and hoist No. 2 exhibited strong evidence of petroleum hydrocarbon impacts, while the soils below hoist No. 1 exhibited only moderate evidence of contamination.

Observations regarding petroleum hydrocarbon odor are subjective data. The ability to detect petroleum hydrocarbon odors is dependent upon climatic factors (i.e., temperature, wind, etc.) as well as observer fatigue and olfactory sensitivity.

Groundwater

Groundwater was observed at a depth of approximately 8 feet within the gasoline, oil, and diesel tank excavations. At the time of removal, a significant amount of liquid hydrocarbons were present on the water. Immediately after the diesel tank was removed, representatives from Northwest Enviroservices pumped approximately 2,500 gallons of liquid hydrocarbons and water were pumped from the diesel tank cavity and removed from the site. Additionally, petroleum hydrocarbon sorbent pads were placed in the tank cavities to capture additional floating liquid hydrocarbons. RZA AGRA has replaced these pads periodically to continue this interim groundwater remediation procedure.

The subject parcel and surrounding properties receive their water supplies from the Tolt-Cedar River Watershed located in eastern King County, located approximately 25 miles east of the subject site. Due to the distance from the subject parcel, it is highly unlikely that contaminants from the site have affected the public water supply.

Soil Sampling

Discrete soil samples were collected from the sidewalls of the tank excavations and from soils underlying each tank, as well as from the product line and pump island excavation areas and from underneath the sump and hydraulic hoists. Samples were collected from approximately 1/2 to 2/3 of the total depth of the UST's on the sidewalls and at the bottom of each excavation. Composite soil samples were also collected from the stockpiled soils generated by this work. Samples visually representative of typical soils surrounding each tank were selected for analyses.

The approximate sample locations are shown on the Site and Excavation Plan, Figure 1. All sample containers were labeled to identify the project number, test location, sample number and depth interval. All samples were immediately placed in a chilled cooler until transferred to cold storage at the laboratory. RZA's Chain-of-Custody procedures were used to maintain sample integrity.

Analytical Test Results

The analytical testing procedures performed for this evaluation are in accordance with standard Ecology guidelines. Our observations and testing were limited to the soils present within the excavations and do not represent other areas of the subject site. Selected representative soil samples collected during our work were analyzed for the following:

- Gasoline tanks and gasoline line/pump island excavations, for Washington Total Petroleum Hydrocarbons-Gasoline Range with BTEX distinction (WTPH-G/BTEX) and total lead by EPA Method 7421;
- Diesel tanks and associated product lines/pump island excavations, for Washington Total Petroleum Hydrocarbons-diesel range (WTPH-D);Waste oil and heating oil tanks, hydraulic hoists and floor sump for WTPH by Ecology method 418.1 Modified; samples collected from underneath the waste oil tank locations and stockpiled soils impacted by waste oil for halogenated volatiles (by EPA method 8010), total metals, and PCB's.
- Stockpiled soils from all UST excavations for WTPH-G and D, and WTPH by 418.1 modified;

Table 2 summarizes the results of the quantitative chemical analyses of soil samples collected during the assessment of the UST, product line, and hoist/sump excavations. Table 2A summarizes analytical results of stockpiled soils. Samples locations are shown on the Site and Excavation Plan, Figure 1.

Analytical Results

Soil samples collected from the base of the gasoline tanks (NGT-BS1 and SGT-BS-1) exhibited WTPH-G concentrations of 1.2 and 1.6 parts per million (ppm), respectively, which are below Model Toxics Control Act (MTCA) Method A cleanup criteria of 100 ppm for gasoline TPH in soils. These samples exhibited benzene concentrations of 1.0 ppm and 0.64 ppm, which exceed MTCA cleanup criteria of 0.5 ppm for benzene in soils. Samples collected from the north and west sidewalls of the excavation (GT-NS1 and GT-WS1) exhibited TPH concentrations of 3,100 ppm and greater than 20,000 ppm and elevated concentrations of BTEX compounds, all of which were in excess of MTCA

cleanup criteria. Sample GT-ES1, collected from the east sidewall of the gasoline tank excavation, exhibited a WTPH-G concentration of 180 ppm and a benzene concentration of 1.4 ppm, which are in excess of MTCA cleanup criteria. All of the samples collected from the gasoline tank excavation exhibited total lead concentrations below MTCA cleanup criteria.

Soil samples collected from the western pump island area and near the western end of the relic gasoline tank (PL-3, PL-6 and OT-1) exhibited WTPH-G concentrations ranging from 210 ppm to 530 ppm, which are in excess of MTCA cleanup criteria. These samples also exhibited BTEX concentrations below MTCA cleanup criteria. Other soil samples collected from pump island/product line areas did not exhibit detectable concentrations of TPH and BTEX.

Soil samples collected from the sidewalls of the diesel tank excavation did not exhibit detectable concentrations of WTPH-D. Sample DT-BS1, collected from below the diesel tank, exhibited a WTPH-D concentration of 43 ppm, which is below MTCA cleanup criteria of 200 ppm for non-gasoline TPH in soils. This sample did not exhibit detectable concentrations of WTPH-G and BTEX.

Soil samples collected from the base and sidewalls of the heating oil/waste oil tank excavations exhibited WTPH concentrations ranging from 410 ppm to 6,900 ppm, which exceed MTCA cleanup criteria. Soil sample WO-BS1, collected from below the waste oil tank, was also analyzed for EP-Toxicity metals, halogenated volatile organic compounds (by EPA Method 8010) and PCBs. This sample did not exhibit detectable concentrations of PCB's or halogenated volatile compounds. The sample exhibited concentrations of barium, cadmium, chromium, and lead of 130 ppm, 2.0 ppm, 27 ppm, and 81 ppm, respectively, all of which are below MTCA cleanup criteria.

Soil samples collected from below hoist No. 2 and the floor sump (HS-2,, HS-3, and HS-4) exhibited TPH concentrations ranging from 750 ppm to 5,300 ppm, exceeding MTCA cleanup levels. Soil sample HS-1, collected from below hoist No. 1, exhibited a TPH concentration of 150 ppm which is below MTCA cleanup criteria for non-gasoline TPH in soils.

Soil samples CC-1, CC-2, CC-3, and CC-4, collected from soils stockpiled from the gasoline tanks excavation, exhibited WTPH-G concentrations ranging from 190 ppm to 4,000 ppm, WTPH-D concentrations ranging from 310 to 910 ppm, and WTPH by 418.1 concentrations ranging from 1,700 ppm to 2,800 ppm, all of which are in excess of MTCA cleanup criteria. These samples also exhibited elevated concentrations of BTEX compounds. These samples exhibited total lead

concentrations below MTCA cleanup criteria. Samples CC-5, CC-6, and CC-7, exhibited WTPH by 418.1 concentrations ranging from 220 ppm to 870 ppm, and sample CC-7 exhibited a WTPH-D concentration of 940 ppm, all of which are in excess of MTCA cleanup criteria. These samples exhibited WTPH-G and BTEX concentrations below MTCA cleanup criteria. Samples CC-8 and CC-9 exhibited WTPH-G concentrations of 170 ppm and 240 ppm, WTPH-D concentrations of 1,800 ppm and 1,200 ppm, and TPH by 418.1 concentrations of 1,200 ppm for both samples, all of which are in excess of MTCA cleanup criteria. Samples CC-8 and CC-9 exhibited BTEX concentrations below MTCA cleanup criteria.

Current Site Conditions

Approximately 330 cubic yards of gasoline, diesel, and oil impacted soil are currently stockpiled onsite (see Figure 1). Additionally, a relic UST was found filled with sand slurry is exposed adjacent to the western pump island. All of the debris generated from the building razing has been removed from the site. During a recent site visit, dirty petroleum sorbent pads were removed from the water in the UST excavation and replaced with clean ones, and much of the liquid petroleum hydrocarbons appear to have been removed from the water. The sorbent pads are currently stored onsite in 55-gallon drums.

CONCLUSIONS AND RECOMMENDATIONS

In summary, the underground storage tanks present on site were removed in general accordance with Ecology's policies and procedures for underground storage tank removal. Based on analytical test results, soils along the perimeter and base of the gasoline tank excavation and the western pump island/relic tank excavation exhibited gasoline TPH concentrations in excess of MTCA cleanup criteria. The heating oil/waste oil tank excavation and hoist No.2/floor sump excavation exhibited non-gasoline TPH concentrations in excess of MTCA cleanup criteria. Soil samples collected from the sidewalls and base of the diesel tank excavation exhibited TPH concentrations below MTCA cleanup criteria. Additionally, approximately 330 cubic yards of stockpiled soils exhibited TPH as gasoline, diesel and oil in excess of MTCA cleanup criteria.

Based on analytical test results obtained from this study, we recommend that additional exploratory test pits be performed on the site to further delineate the vertical and lateral extent of vadose zone contamination. Test pit explorations would be supplemented with in field screening and analytical testing, if deemed appropriate. A work plan outlining proposed test pit locations, offsite drilling

along with slug testing, vacuum testing, and cost estimates for these tasks is forthcoming under a separate cover.

We appreciate this opportunity to be of continued service to Unocal. If you have any questions, please do not hesitate to call at your earliest convenience.

Respectfully submitted,

RZA AGRA, INC.,

William B. Benzon Jr (for)

Charles C. Cacek
Environmental Geologist

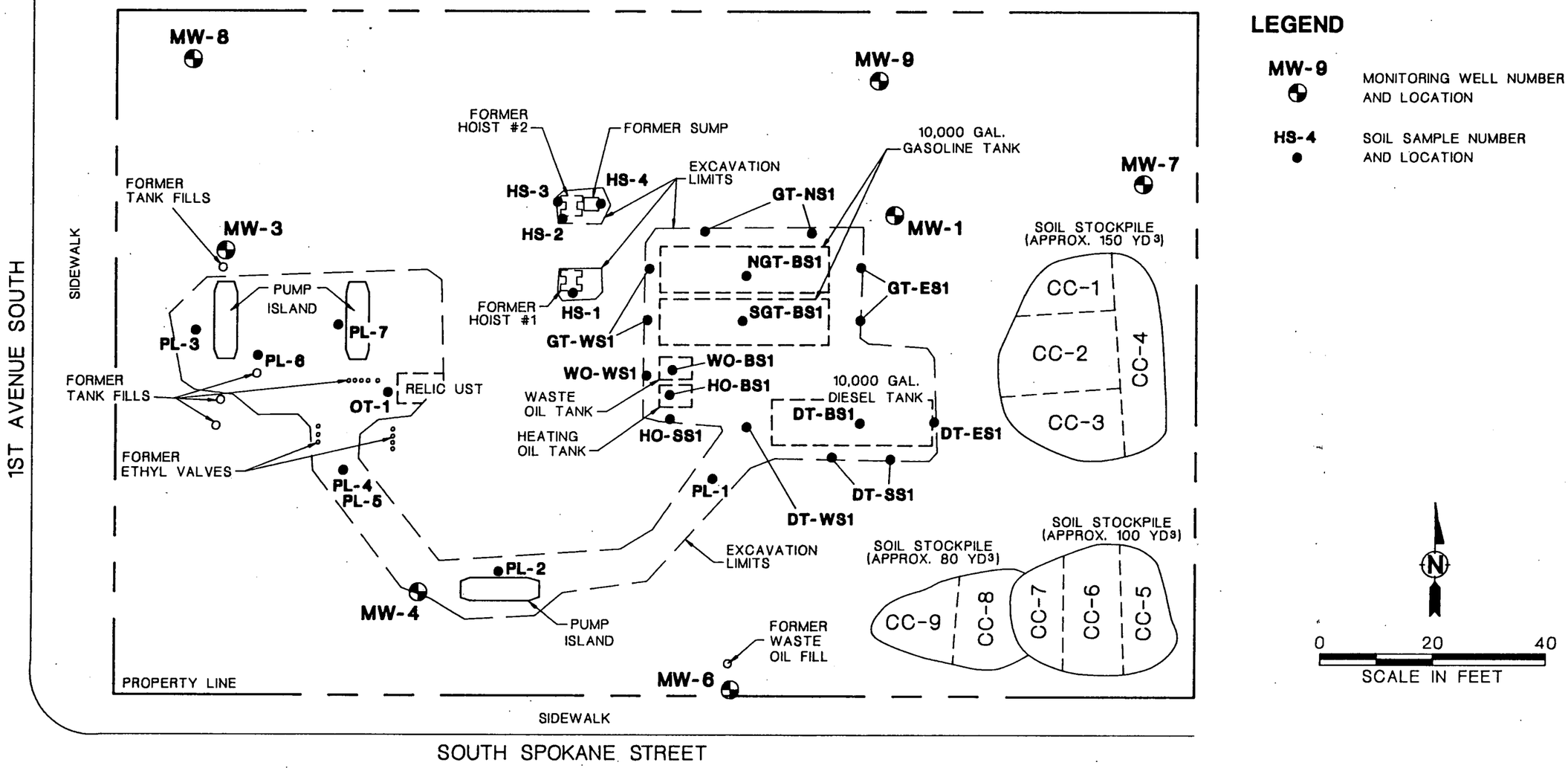
Stanley S. Thompson
Senior Environmental Geologist

(for)

David G. Cooper, P.G.
Associate Environmental Geologist

Enclosure: Figure 1 - Site and Exploration Plan
Table 2 - Analytical Test Results - Soil
Table 2A - Analytical Test Results - Soil Stockpiles
Analytical Laboratory Certificates/Chain-of-Custody Documents

ccc/sst/emc



LEGEND

MW-9 — MONITORING WELL NUMBER AND LOCATION

HS-4 — SOIL SAMPLE NUMBER AND LOCATION

N

0 20 40

SCALE IN FEET

RZA AGRA, INC.
Engineering & Environmental Services

11335 N.E. 122nd Way
Suite 100
Kirkland, Washington 98034-6918

W.O.	W-6839-11
DESIGN	CCC
DRAWN	MJF
DATE	APR 1992
SCALE	1"=20'

UNOCAL SERVICE STATION NO. 5472
SEATTLE, WASHINGTON

SITE AND EXPLORATION PLAN

FIGURE 1

DRAWING NO. \68\W6839-11\SITE2.DWG

Table 2: Summary of Analytical Results: Soil
Unocal Station No. 5472
3460 1st Avenue South
Seattle, Washington
Job No.: W-6839-11

Sample I.D.	Location	Depth Collected (feet)	B (ppm)	T (ppm)	E (ppm)	X (ppm	WTPH-G (ppm)	TPH by 418.1 (ppm)	WTPH-D (ppm)	Total Lead (ppm)
	Gasoline Tank Excavation									
GT-WS1	west sidewall	7.0	190	1,600	440	2,500	**20,000	NT	NT	3.4
GT-NS1	north sidewall	8.0	89	270	91	410	3,100	NT	NT	15.0
GT-ES1	south sidewall	7.0	1.4	0.49	3.2	16	180	NT	NT	12
NGT-BS1	Bottom; North Tank	11.0	1.0	0.06	0.18	0.30	1.2	<100	NT	2.7
SGT-BS1	Bottom; South Tank	11.0	0.64	0.074	0.24	0.50	1.6	<100	NT	3.2
	Diesel Tank Excavation									
DT-SS1	south sidewall	7.0	NT	NT	NT	NT	NT	NT	<25	NT
DT-ES1	east sidewall	7.0	NT	NT	NT	NT	NT	NT	<25	NT
DT-WS1	west sidewall	7.0	NT	NT	NT	NT	NT	NT	<25	NT
DT-BS1	bottom	7.0	<0.5	<0.5	<0.5	<0.5	<1.0	NT	43	13
	Heating Oil/Waste Oil Tank Excavation									
WO-WS1	waste oil; west sidewall	5.0	NT	NT	NT	NT	NT	1,500	NT	NT
WO-BS1	waste oil; bottom	8.0	NT	NT	NT	NT	NT	5,200	NT	*81
HO-SS1	heating oil;south sidewall	4.0	NT	NT	NT	NT	NT	410	NT	NT
HO-BS1	heating oil; bottom	8.0	NT	NT	NT	NT	NT	6,900	NT	NT
	Pump Island/Product Line Excavation									
PL-1	see site map	3.0	<0.05	<0.05	<0.05	<0.05	<1.0	NT	<25	29
PL-2	" " "	3.5	<0.05	<0.05	<0.05	<0.05	<1.0	NT	51	12
PL-3	" " "	4.5	<0.05	0.054	11	5.1	530	NT	NT	7.1
PL-4	" " "	3.5	<0.05	<0.05	<0.05	<0.05	<1.0	NT	NT	5.9
PL-5	" " "	2.5	<0.05	<0.05	<0.05	<0.05	<1.0	NT	NT	140
PL-6	" " "	3.0	0.17	0.16	2.7	3.1	360	NT	NT	19
PL-7	" " "	6.0	<0.05	<0.05	<0.05	0.064	16	NT	NT	32
	Hoist/Sump Excavations									
HS-1	hoist no. 1 (bottom)	7	NT	NT	NT	NT	NT	150	NT	NT
HS-2	hoist no. 2 (S. sidewall)	4	NT	NT	NT	NT	NT	750	NT	NT
HS-3	hoist no. 2 (bottom)	7	NT	NT	NT	NT	NT	5,300	NT	NT
HS-4	hoist no. 2 (below sump)	6.5	NT	NT	NT	NT	NT	3,500	NT	NT
	Relic Tank Excavation									
OT-1	see site map	6.5	<0.05	0.15	0.53	1.8	210	NT	NT	80
Method Detection Limit			0.05	0.05	0.05	0.05	1.0	100	25	varies
MTCA Method A Cleanup Level			0.5	40	20	20	100	200	200	250

notes:

BTEX = benzene, toluene, ethylbenzene, and xylenes

TPH = total petroleum hydrocarbons: G= gasoline, D= diesel

PPM = concentrations reported in parts per million

Total Lead by EPA Method 7420

NT - indicates not tested

= indicates in excess of MTCA Method A cleanup criteria

WTPH-G/D=Washington Total Petroleum Hydrocarbons-Gasoline/diesel range

* indicates also analyzed for halogenated volatile organics by EPA Method 8010, eight priority metals and PCB's: Concentrations were below the method detection limit except for barium, cadmium, chromium, and lead with concentrations of 130 ppm, 2.0 ppm, 27 ppm and 81 ppm, respectively.

**indicates concentrations in excess of laboratory detection limits

Table 2A: Summary of Analytical Results: Soil Stockpiles
Unocal Station No. 5472
3460 1st Avenue South
Seattle, Washington
Job No.: W-6839-11

Sample I.D.	Source	Volume (cubic yards)	B (ppm)	T (ppm)	E (ppm)	X (ppm	WTPH-G (ppm)	TPH by 418.1 (ppm)	WTPH-D (ppm)	Total Lead (ppm)
CC-1	gasoline tank excavation	150	17	27	53	280	4,000	2,000	380	24
CC-2	gasoline tank excavation		2	9.5	3.3	65	1,100	1,700	910	48
CC-3	gasoline tank excavation		0.57	0.66	0.79	4.4	190	2,800	310	49
CC-4	gasoline tank excavation		3.6	7.8	13	77	1,700	2,200	390	73
CC-5	diesel tank excavation	100	0.22	0.19	0.17	0.34	10	500	79	NT
CC-6	diesel tank excavation		0.29	0.17	0.21	0.43	8.7	220	130	NT
CC-7	diesel tank excavation		0.31	0.21	0.29	0.54	44	870	940	NT
CC-8*	oil tank excavation	80	1.8	0.78	0.52	1.4	170	1,200	1,800	NT
CC-9*	oil tank excavation		0.44	1.4	1.1	7.9	240	1,200	1,200	NT
Method Detection Limit			0.05	0.05	0.05	0.05	1.0	100	25	varies
MTCA Method A Cleanup Level			0.5	40	20	20	100	200	200	250

notes:
BTEX = benzene, toluene, ethylbenzene, and xylenes
TPH = total petroleum hydrocarbons: G= gasoline, D= diesel
PPM = concentrations reported in parts per million
Total Lead by EPA Method 7420
NT - indicates not tested
= indicates in excess of MTCA Method A cleanup criteria

* indicates also analyzed for PCB's by EPA Method 8080. Concentrations were below the method detection limit.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: RZA - AGRA

Date: February 25, 1992

Report On: Analysis of Soil

Lab No.: 22725

IDENTIFICATION:
Samples received on 02-19-92
Project: W-6839-11 Unocal #5472

ANALYSIS:

Lab Sample No.	Client ID	WTPH 418.1 Modified, mg/kg
1	HS-1	170
2	HS-2	750
3	HS-3	5,300
4	HS-4	3,500

SOUND ANALYTICAL SERVICES

STAN P. PALMQUIST

This report is issued solely for the use of the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis in accordance with industry acceptable practice. In no event shall Sound Analytical Services, Inc. or its employees be responsible for consequential or special damages in any kind or in any amount.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Client: RZA - AGRA
Project: W-6839-11 Ucocal # 5472
Lab No: 22725
Units: mg/kg
Date: February 25, 1992

DUPLICATE

Parameter	Sample(S)	Duplicate(D)	RPD
WTPH 418.1 Modified	3,500	3,400	2.9

RPD = relative percent difference
= [(S - D) / ((S + D / 2)] x 100

METHOD BLANK

Parameter	Blank Value
WTPH 418.1 Modified	< 1.0

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RZA-AGRA

Environmental & Engineering Services
11335 Northeast 122nd Way
Kirkland, Washington 98034-6918
(206) 820-4669/FAX (206) 821-3914

Chain of Custody Record / Analysis Request

Nº 10154

Project Name: UNOCAL 5472 Job No.: 0-6839-11
Project Manager: Chuck Caccek Phone #: 206 820 4669
Sampler: Chuck Caccek

RZA-AGRA Sample ID	Lab Samp ID	Date Collected	Time Collected	Matrix (S=soil, W=water, A=air)	# Containers/Preservation: 40 ml VOA /	1 L Glass /	8 oz Glass /				CHILL	BTEX by EPA 8020 Soil / EPA 602 Water	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D	TPH by EPA 8015 Mod.	WTPH-418.1 Modified	TPH by EPA 418.1	LEAD EPA 6010 7420 7421 Soil Total / Dissolved EPA 7421 Water	TOTAL METALS	TCLP EPA 1311	PCBs EPA 8080 Soil EPA 608 Water	VOCs EPA 8010 8020 Soil EPA 601 602 Water Volatiles	GC/MS EPA 8240 Volatiles	GC/MS EPA 8270 Semi-volatiles			Hold for Further Analysis	RUSH (see below)
HS-1		2/18/92	10:00AM	S			X				X							X											X	
HS-2			12:00PM	"			"				"							"											"	
HS-3			↓	"			"				"							"											"	
HS-4			↓	"			"				"							"											"	

RELINQUISHED BY SAMPLER:	RELINQUISHED BY:	RELINQUISHED BY:
Signature: Charles C. Caccek	Signature: Kelly David	Signature: Palmquist
Printed Name: Charles C. Caccek	Printed Name: KELLY DAVID	Printed Name: PALMQUIST
Firm: RZA-AGRA	Firm: RZA-AGRA	Firm: SAS
Date/Time: 2/19/92 0940	Date/Time: 2-19-92 1100	Date/Time: 2-19 12:45P
RECEIVED BY:	**RECEIVED BY:**	**RECEIVED BY:**
Signature: Kelly David	Signature: Palmquist	Signature: M Curtiss
Printed Name: KELLY DAVID	Printed Name: PALMQUIST	Printed Name: M Curtiss
Firm: RZA-AGRA	Firm: SAS	Firm: SAS
Date/Time: 2 19 92 0940	Date/Time: 2-19 11:05A	Date/Time: 2/19/92 12:45

LABORATORY: Sound
Total # Containers:
Condition of Containers?
Condition of Seals?

Special Handling
Turnaround:
- ☐ 8 hour
- ☐ 24 hour Standard
- ☐ 5 business day
- ☐ 10 business day
- ☐ other _____ (#)business day

PURPOSE OF SAMPLING / COMMENTS:

Form 100A

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator; GOLDENROD - to lab in advance

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

ANALYTICAL NARRATIVE

Client: RZA - AGRA

Date: March 18, 1992

Project: W-6839-11 Unocal #5472

Lab No.: 23102

Delivered by: SAS

Date Sampled: 03-06-92

Condition of Samples on Receipt:

Samples were received cold and in good condition. Chain-of-custody was in order.

EXTRACTION AND ANALYSIS DATES

Lab sample numbers 23102-2, -3, -4, -5, -6, and -7 were analyzed for BTEX in accordance with EPA SW-846 Method 8020. Samples were extracted on 03-10-92. The extracts were analyzed on 03-11-92.

Lab sample numbers 23102-2, -3, -4, -5, -6, and -7 were analyzed for gasoline range hydrocarbons per WA State DOE method WTPH-G. Samples were extracted on 03-10-92. The extracts were analyzed on 03-11-92 and reported on a dry weight basis.

Lab sample numbers 23102-7, -11, -12, and -13 were analyzed for diesel range hydrocarbons per WA State DOE method WTPH-D. Samples were extracted on 03-10-92. The extracts were analyzed on 03-16-92 and reported on a dry weight basis.

Lab sample numbers 23102-1, -5, -6, -8, -9, and -10 were analyzed for total petroleum hydrocarbons in accordance with WA State DOE Method WTPH-418.1 Modified. Samples were extracted on 03-10-92. The extracts were analyzed on 03-11-92 and reported on a dry weight basis.

Samples were analyzed for metals by ICP in accordance with EPA SW-846 Method 6010. Samples were digested on 03-10-92 and analyzed on 03-11-92. Mercury was analyzed by cold vapor AA per SW-846 Method 7471 on 03-10-92.

Lab sample number 23102-1 was analyzed for halogenated volatile organics in accordance with EPA SW-846 Method 8010. Sample was extracted on 03-10-92. The extract was analyzed on 03-11-92 and reported on a dry weight basis.

Lab sample number 23102-1 analyzed for PCB's in accordance with EPA SW-846 Method 8080. Sample was extracted on 03-10-92 and analyzed on 03-10-92. Results are reported on a dry weight basis.

All Quality Control was within acceptable limits.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: RZA - AGRA

Date: March 18, 1992

Report On: Analysis of Soil

Lab No.: 23102

IDENTIFICATION:

Samples received on 03-09-92

Project: W-6839-11 Unocal #5472

ANALYSIS:

Lab Sample No. 1 **Client ID: WO-BS-1**

Halogenated Volatile Organics Per EPA SW-846 Method 8010.

Compound	Concentration, mg/kg
Vinyl Chloride	< 0.06
Methylene chloride	< 0.06
1,1-dichloroethylene	< 0.06
1,1-dichloroethane	< 0.06
1,2-transdichloroethylene	< 0.06
1,2-dichloroethane	< 0.06
Chloroform	< 0.06
1,1,1-trichloroethane	< 0.06
Carbon Tetrachloride	< 0.06
1,2-dichloropropane	< 0.06
Bromodichloromethane	< 0.06
Trans-1,3-dichloropropene	< 0.06
Trichloroethylene	< 0.06
Cis-1,3-dichloropropene	< 0.06
1,1,2-trichloroethane	< 0.06
Tetrachloroethylene	< 0.06
Chlorodibromomethane	< 0.06
1,1,2,2-tetrachloroethane	< 0.06
Bromoform	< 0.06
Chlorobenzene	< 0.06
1,2 Dichlorobenzene	< 0.06
1,3 Dichlorobenzene	< 0.06
1,4 Dichlorobenzene	< 0.06
SURROGATE RECOVERY, %	
Bromochloromethane	105
2-bromo-1-chloropropane	94
1,4-dichlorobutane	80

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23102
March 18, 1992

Client ID: WO-BS-1

PCB Compounds	Conc., mg/kg	Detection Limit
Aroclor 1016	ND	0.1
Aroclor 1221	ND	0.1
Aroclor 1232	ND	0.1
Aroclor 1242	ND	0.1
Aroclor 1248	ND	0.1
Aroclor 1254	ND	0.1
Aroclor 1260	ND	0.1

ND = Not Detected.

SURROGATE RECOVERY, %	
2,4,5,6-Tetrachloro-m-xylene	96
Decachlorobiphenyl	110

Total Metals:

Arsenic, mg/kg	< 2.5
Barium, mg/kg	130
Cadmium, mg/kg	2.0
Chromium, mg/kg	27
Lead, mg/kg	81
Mercury (CVAA), mg/kg	< 0.1
Selenium, mg/kg	< 2.5
Silver, mg/kg	< 0.50

WTPH 418.1 Modified, mg/kg 5,200

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23102
March 18, 1992

Lab Sample No.	2	3	4
Client ID	GT-WS1	GT-ES1	GT-NS1
Units	mg/kg	mg/kg	mg/kg
WTPH-G			
Gasoline (C_7-C_{12})	*20,000	*180	3,100
BTEX by 8020			
Benzene	190	1.4	89
Toluene	1,600	0.49	270
Ethyl Benzene	440	3.2	91
Xylenes	2,500	16	410
SURROGATE RECOVERIES			
WTPH-G/BTEX	Diluted		Diluted
Trifluorotoluene %	Out	92	Out
Total Lead	3.4	12	15

Results are reported on a dry weight basis.

* Concentration outside of calibration range. Quantities given are estimated.

Continued . . .

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RZA - AGRA
Project: W-6839-11

Lab No. 23102
March 18, 1992

Lab Sample No.	5	6
Client ID	NGT-BS1	SGT-BS1
Units	mg/kg	mg/kg
WTPH-G		
Gasoline (C_7-C_{12})	1.2	1.6
BTEX by 8020		
Benzene	1.0	0.64
Toluene	0.060	0.074
Ethyl Benzene	0.18	0.24
Xylenes	0.30	0.50
SURROGATE RECOVERIES		
WTPH-G/BTEX		
Trifluorotoluene %	58	58
WTPH 418.1 Modified	< 100	< 100
Total Lead	2.7	3.2

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23102
March 18, 1992

Lab Sample No.	7
Client ID	DT-BS1
Units	mg/kg
WTPH-G Gasoline (C_7-C_{12})	< 1.0
BTEX by 8020 Benzene Toluene Ethyl Benzene Xylenes	 < 0.05 < 0.05 < 0.05 0.10
WTPH-D Diesel (> C_{12}-C_{24})	43
SURROGATE RECOVERIES WTPH-G/BTEX Trifluorotoluene % WTPH-D Perylene %	 53 89
Total Lead	13

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23102
March 18, 1992

Lab Sample No.	Client ID	WTPH 418.1 Modified, mg/kg
8	WO-WS1	1,500
9	HO-BS1	6,900
10	HO-SS1	410

Lab Sample No.	11	12	13
Client Identification	DT-WS1	DT-SS1	DT-ES1
Units	mg/kg	mg/kg	mg/kg
WTPH-D Diesel (> C12 - C24)	< 25	< 25	190
SURROGATE RECOVERY			
Perylene %	133	107	102

Results are reported on a dry weight basis.

SOUND ANALYTICAL SERVICES

STAN P. PALMQUIST

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SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Client: RZA - AGRA
Project: W-6839-11 Unocal #5472
Lab No: 23102
Matrix: Soil
Units: mg/kg
Date: March 18, 1992

DUPLICATES

Lab No: 23102-10 Client ID: HO-SS1

Parameter	Sample(S)	Duplicate(D)	RPD
WTPH-418.1 MODIFIED Heavy Petroleum Oils	410	380	7.8

RPD = relative percent difference
= [(S - D) / ((S + D) / 2)] x 100

METHOD BLANK

Parameter	Blank Value
Benzene	< 0.05
Toluene	0.14
Ethyl Benzene	< 0.05
Xylenes	< 0.05
WTPH-G Gasoline (C7 - C12)	0.48
%Surrogate Recovery Trifluorotoluene	74
WTPH-D Diesel (>C24-C12)	22
%Surrogate Recovery Perylene	80

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SOUND ANALYTICAL SERVICES, INC.

Client: RZA - AGRA
Project: W-6839-11 Unocal #5472
Lab No: 23102
Matrix: Soil
Units: mg/kg
Date: March 18, 1992

METHOD BLANK

Parameter	Blank Value
Aroclor 1016	< 0.1
Aroclor 1221	< 0.1
Aroclor 1232	< 0.1
Aroclor 1242	< 0.1
Aroclor 1248	< 0.1
Aroclor 1254	< 0.1
Aroclor 1260	< 0.1
%Surrogate Recovery	
2,4,5,6-TCMX	99
Decachlorobiphenyl	105

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SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

ANALYTICAL NARRATIVE

Client: RZA - AGRA

Date: March 23, 1992

Project: W-6839 Unocal #5472

Lab No.: 23156

Delivered by: SAS

Date Sampled: 3-10-92

Condition of Samples on Receipt:

Samples were received cold and in good condition. Chain-of-custody was in order.

EXTRACTION AND ANALYSIS DATES

Samples 23156-1 through -17 were analyzed for BTEX in accordance with EPA SW-846 Method 8020. Samples 23156-1 through -15 & -17 were extracted and analyzed on 3-12-92. Sample 23156-16 was extracted and analyzed on 3-19-92. RPD's for ethyl benzene & xylenes were greater than 20% on duplicate analysis. Sample was re-analyzed with similar results.

Samples 23156-1 through -17 were analyzed for gasoline range hydrocarbons per WA State DOE method WTPH-G. Samples 23156-1 through -15 & -17 were extracted and analyzed on 3-12-92. Sample 23156-16 was extracted and analyzed on 3-19-92.

Samples 23156-1 through -11 were analyzed for diesel range hydrocarbons per WA State DOE method WTPH-D. Samples were extracted on 3-12-92. The extracts were analyzed on 3-18-92.

Samples 23156-1 through -9 were analyzed for total petroleum hydrocarbons in accordance with EPA Method 418.1. Samples were extracted on 3-12-92. The extracts were analyzed on 3-16-92.

Samples 23156-6 through -9 were analyzed for lead by ICP in accordance with EPA SW-846 Method 6010. Samples were digested on 3-12-92 and analyzed on 3-16-92.

Samples 23156-1 and -2 were analyzed for PCB's in accordance with EPA SW-846 Method 8080. Samples were extracted and analyzed on 3-12-92.

All Quality Control was within acceptable limits.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: RZA - AGRA

Date: March 23, 1992

Report On: Analysis of Soil

Lab No.: 23156

IDENTIFICATION:
Samples received on 03-11-92
Project: W-6839-11 Unocal #5472

ANALYSIS:

Lab Sample No.	1	2
Client ID	CC-8	CC-9
Units	mg/kg	mg/kg
WTPH-G		
Gasoline (C7-C12)	170	240
BTEX by 8020		
Benzene	1.8	0.44
Toluene	0.78	1.4
Ethyl Benzene	0.52	1.1
Xylenes	1.4	7.9
WTPH-D		
Diesel (>C12-C24)	1,800	610
SURROGATE RECOVERIES		
WTPH-G / BTEX		
Trifluorotoluene %	Diluted Out	Diluted Out
WTPH-D		
Perylene %	88	73
WTPH 418.1 Modified	1,200	1,200

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	1	2
Client ID	CC-8	CC-9
Units	mg/kg	mg/kg
Detection Limit	0.1	0.1
PCB Compounds by Method 8080		
Aroclor 1016	ND	ND
Aroclor 1221	ND	ND
Aroclor 1232	ND	ND
Aroclor 1242	ND	ND
Aroclor 1248	ND	ND
Aroclor 1254	ND	ND
Aroclor 1260	ND	ND
SURROGATE RECOVERY, %		
2,4,5,6-Tetrachloro-m-xylene	91	95
Decachlorobiphenyl	99	96

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	3	4	5
Client ID	CC-5	CC-6	CC-7
Units	mg/kg	mg/kg	mg/kg
WTPH-G			
Gasoline (C_7-C_{12})	10	8.7	44
BTEX by 8020			
Benzene	0.22	0.29	0.31
Toluene	0.19	0.17	0.21
Ethyl Benzene	0.17	0.21	0.29
Xylenes	0.34	0.43	0.54
WTPH-D			
Diesel (> C_{12}-C_{24})	79	130	940
SURROGATE RECOVERIES			
WTPH-G / BTEX			
Trifluorotoluene %	77	72	70
WTPH-D			
Perylene %	77	73	80
WTPH 418.1 Modified	500	220	870

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	6	7	8	9
Client ID	CC-1	CC-2	CC-3	CC-4
Units	mg/kg	mg/kg	mg/kg	mg/kg
WTPH-G Gasoline (C7-C12)	4,000	1,100	190	1,700
BTEX by 8020				
Benzene	17	2.0	0.57	3.6
Toluene	27	9.5	0.66	7.8
Ethyl Benzene	53	3.3	0.79	13
Xylenes	280	65	4.4	77
WTPH-D Diesel (>C12-C24)	380	910	310	390
SURROGATE RECOVERIES				
WTPH-G / BTEX Trifluorotoluene %	Diluted Out	Diluted Out	Diluted Out	Diluted Out
WTPH-D Perylene %	81	77	86	67
WTPH 418.1 Modified	2,000	1,700	2,800	2,200
Total Lead	24	48	49	73

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	10	11
Client ID	PL-1	PL-2
Units	mg/kg	mg/kg
WTPH-G		
Gasoline (C_7-C_{12})	< 1.0	< 1.0
BTEX by 8020		
Benzene	< 0.05	< 0.05
Toluene	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05
WTPH-D		
Diesel (> C_{12}-C_{24})	< 25	51
SURROGATE RECOVERIES		
WTPH-G / BTEX		
Trifluorotoluene %	91	73
WTPH-D		
Perylene %	67	70
Total Lead	29	12

Results are reported on a dry weight basis.

Continued . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	12	13	14
Client ID	PL-3	PL-4	PL-5
Units	mg/kg	mg/kg	mg/kg
WTPH-G			
Gasoline (C_7-C_{12})	520	< 1.0	< 1.0
BTEX by 8020			
Benzene	< 0.05	< 0.05	< 0.05
Toluene	0.54	< 0.05	< 0.05
Ethyl Benzene	11	< 0.05	< 0.05
Xylenes	5.1	< 0.05	< 0.05
SURROGATE RECOVERIES			
WTPH-G / BTEX			
Trifluorotoluene %	108	109	77
Total Lead	7.1	5.9	140

Results are reported on a dry weight basis.

Continued . . . . .

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SOUND ANALYTICAL SERVICES, INC.

RZA - AGRA
Project: W-6839-11

Lab No. 23156
March 23, 1992

Lab Sample No.	15	16	17
Client ID	PL-6	PL-7	OT-1
Units	mg/kg	mg/kg	mg/kg
WTPH-G Gasoline (C7-C12)	360	16	210
BTEX by 8020			
Benzene	0.17	< 0.05	< 0.05
Toluene	0.16	< 0.05	0.15
Ethyl Benzene	2.7	< 0.05	0.53
Xylenes	3.1	0.064	1.8
SURROGATE RECOVERIES WTPH-G / BTEX Trifluorotoluene %	Diluted Out	102	69
Total Lead /	19	32	80

Results are reported on a dry weight basis.

SOUND ANALYTICAL SERVICES

STAN P. PALMQUIST

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SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

DUPLICATES

Client: RZA - AGRA
Project: W-6839-11 Unocal #5472
Lab No: 23156
Matrix: Soil
Units: mg/kg
Date: March 23, 1992

Lab Sample No: 23156-11 Client ID: PL-2

Parameter	Sample(S)	Duplicate(D)	RPD
WTPH-D Diesel (C11)-(C24)	51	50	2.0
SURROGATE RECOVERY% WTPH-D Perylene	70	75	

Lab Sample No: 23156-15 Client ID: PL-6

Parameter	Sample(S)	Duplicate(D)	RPD
WTPH-G Gasoline (C6)-(C10)	360	350	2.8
Benzene	0.17	0.18	5.7
Toluene	0.16	0.17	6.1
Ethyl Benzene	2.7	4.6	*26.0
Xylenes	3.1	4.3	*20.5
SURROGATE RECOVERY% WTPH-G / BTEX Trifluorotoluene	Diluted Out	Diluted Out	

RPD = relative percent difference
= [(S - D) / ((S + D) / 2)] x 100

* Duplicate RPD > 20%. Sample re-analyzed with similar results.

Continued . . . . .

This report is issued solely for the use of the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis in accordance with industry acceptable practice. In no event shall Sound Analytical Services, Inc. or its employees be responsible for consequential or special damages in any kind or in any amount.

SOUND ANALYTICAL SERVICES, INC.

QUALITY CONTROL REPORT

Client: RZA - AGRA
Project: W-6839-11 Unocal #5472
Lab No: 23156
Matrix: Soil
Units: mg/kg
Date: March 23, 1992

TRACE METALS
MATRIX SPIKE

Lab No. 23146-16 Client ID: PL-7

PARAMETER	SPIKED SAMPLE RESULT (SSR)	SAMPLE RESULT (SR)	SPIKE ADDED (SA)	%R
Lead	100	32	84	81.0

%R = Percent Recovery
= [(SSR - SR) / SA] x 100

TRACE METALS
MATRIX SPIKE DUPLICATE

Lab No. 23146-16 Client ID: PL-7

PARAMETER	SPIKE RESULT (S)	SPIKE DUP RESULT (D)	RPD
Lead	100	120	18.2

RPD = Relative Percent Difference
= [(S - D) / ((S + D) / 2)] x 100

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SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

QUALITY CONTROL REPORT

Client: RZA - AGRA
Project: W-6839-11 Unocal #5472
Lab No: 23156
Date: March 23, 1992

METHOD BLANKS FOR SOIL, mg/kg

Parameter	Blank Value
WTPH-418.1	< 10
WTPH-D	
Diesel Range (C_{12}-C_{24})	9.0
SURROGATE RECOVERY%	
Perylene	87
WTPH-G	
Gasoline Range (C_7-C_{12})	0.53
Benzene	< 0.022
Toluene	< 0.022
Ethyl Benzene	< 0.022
Xylenes	0.053
SURROGATE RECOVERY%	
Trifluorotoluene	103
Aroclor 1016	< 0.1
Aroclor 1221	< 0.1
Aroclor 1232	< 0.1
Aroclor 1242	< 0.1
Aroclor 1248	< 0.1
Aroclor 1248	< 0.1
Aroclor 1254	< 0.1
Aroclor 1260	< 0.1
SURROGATE RECOVERY%	
2,4,5,6-TCMX	98
Decachlorobiphenyl	97

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RECEIVED
MAY 2 2 1992
DEPT. OF ECOLOGY

RZA AGRA, Inc.
Engineering & Environmental Services

Letter of Transmittal

Unocal Refining and Marketing Division
P.O. Box 76
Seattle, Washington 98111
Attn: Mr. Kipp Eckert

Date: 20 May 1992
W.O. W-6839-11
Subject: Final Report for Unocal
Facility #5472

Enclosed:

- [ ] Letter
- [X] Report
- [ ] Plans
- [ ] Documents
- [ ] Other: _____

Purpose:

- [ ] At Your Request
- [X] For Your Use
- [ ] For Your Review
- [ ] For Your Approval
- [X] For Your Records

Copies	Date	Description of Item(s)
5	5/20/92	Underground Storage Tank, Hoist/Sump Removal Final Report

Comments:

Sincerely,

RZA AGRA, Inc.

Stephanie L. Macauley
Project Coordinator

cc: Washington Department of Ecology
Northwest Regional Office
3190 160th Ave. SE
Bellevue, WA 98008-5452
Attn: Ms. Annette Petrie