Inc #1511

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Underground Storage Tank
Closure Assessment
UNOCAL Corporation
Service Station 4511
106th Avenue and NE 8th Street
Bellevue, Washington

Prepared for
UNOCAL Corporation
May 21, 1992

Prepared by
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Project U24-08.02

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EXECUTIVE SUMMARY

At the request of UNOCAL Corporation, EMCON Northwest, Inc., conducted an environmental site assessment during underground storage tank decommissioning at UNOCAL Service Station 4511 in Bellevue, Washington. The assessment was intended to document existing subsurface soil quality beneath the site with respect to petroleum hydrocarbon compounds.

In accordance with our proposed scope of work dated March 21, 1991, EMCON Northwest, Inc., completed the following assessment activities:

- Observed subsurface soil conditions revealed during removal of two gasoline tanks, one heating oil tank, two waste oil tanks, associated product piping, three hydraulic hoists, one oil/water separator, and a dry well.

- Collected soil samples from the gasoline tank, heating oil/waste oil tank, hydraulic hoist, and dry well excavations, and from beneath the product delivery lines and oil/water separator.

- Drilled seven exploratory soil borings in order to better define the limits of hydrocarbon-impacted soil.

- Coordinated quantitative chemical analyses of soil samples.

- Evaluated laboratory analytical data.

The investigation identified the following conditions:

- Results of soil sample analyses indicated that soil near the east wall of the gasoline tank excavation, heating oil/waste oil tank hydraulic hoist, and dry well excavations, and near the former gasoline tank complex contained petroleum hydrocarbons which exceeded the

Model Toxics Control Act (MTCA)[1] Method A Cleanup Levels for Soil.

- Crews excavated approximately 1,500 cubic yards of material in the areas identified above which contained petroleum hydrocarbon levels exceeding MTCA Method A Cleanup Levels for soil. Subsequent soil sampling confirmed the removal of hydrocarbon-impacted soils.

- Excavated soil was hauled to the Rabanco Regional Landfill Company's loading facility in Seattle, Washington.

This summary is presented solely for introductory purposes and is intended for use in conjunction with the full text of this report. This report contains complete descriptions of the site, project tasks performed, soil sampling procedures, analytical chemistry methods and results, and our conclusions.

[1] Chapter 173-340 WAC, "The Model Toxics Control Act Cleanup Regulation, Method A Cleanup Levels." Amended February 1991.

1 INTRODUCTION

1.1 Purpose and Scope of Work

UNOCAL Corporation retained EMCON Northwest, Inc., to conduct an environmental site assessment during tank decommissioning activities at UNOCAL Service Station 4511 in Bellevue, Washington. Our services were intended to assess and document the quality of the subsurface soil with respect to petroleum hydrocarbon compounds.

The tasks completed under the scope of work consisted of:

- Observing and documenting the subsurface conditions exposed during the excavation and removal of two gasoline tanks, one heating oil tank, two waste oil tanks, associated piping, three hydraulic hoists, an oil/water separator, and a dry well.
- Collecting soil samples from excavated areas.
- Conducting quantitative chemical analyses on soil samples.
- Interpreting the laboratory analytical data.

All tasks were completed in general accordance with our March 21, 1991, proposal to UNOCAL and completed under the terms and conditions of Blanket Contract Number B1247B between EMCON Northwest, Inc., and UNOCAL Corporation.

1.2 Site Location and Description

UNOCAL Service Station 4511 is located on the southeast corner of the intersection of 106th Avenue and NE 8th Street in Bellevue, Washington (Figure 1). The site is bordered by 106th Avenue to the west, Northeast 8th Street to the north, retail shops to the east, and an alley and parking lot to the south (Figure 2).

1.3 Project Background

EMCON Northwest, Inc., performed a preliminary environmental site assessment at UNOCAL Service Station 4511 in July 1990. The work was detailed in a report presented to UNOCAL on September 5, 1990. In summary, five exploratory soil borings were drilled and 2-inch-diameter ground water monitoring wells were constructed in each of the borings (MW-1 through MW-5). Selected soil samples from each boring were collected and submitted for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Methods 5030/8020, and total petroleum hydrocarbons (TPH) by EPA Method 418.1. In addition, one soil sample collected from boring MW-5 was also analyzed for halogenated volatile organics (EPA Method 8010).

Review of laboratory analyses indicated that TPH concentrations in the soil sample from boring MW-2 exceeded the Department of Ecology's (1988) Draft Cleanup Guidelines and (1990) Proposed[1] Model Toxics Control Act (MTCA) Method A Compliance Cleanup Levels for soil.

On July 31, 1990, an EMCON Northwest, Inc., geologist collected ground water samples from four of the five monitoring wells and submitted them for volatile and semivolatile hydrocarbon analyses. No ground water sample was collected from MW-5 as the well was dry on July 31, 1990.

Results of ground water sample analysis indicated that BTEX and TPH concentrations were not detected at or above the method detection limit in water samples obtained from wells MW-1, MW-2, and MW-4. Toluene and TPH concentrations were also below the method detection limit in the water sample from well MW-3. Benzene (3 μg/l), ethylbenzene (15 μg/l), and total xylenes (14 μg/l) were detected in the water sample from MW-3. However, these concentrations were below Washington State Department of Ecology (1988) Draft Cleanup Guidelines and Proposed (1990) MTCA Cleanup Levels for water.

Ground water at the site was encountered approximately 23 feet below existing ground surface. Ground water elevation data indicated that ground water flow was to the southeast on July 31, 1990.

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[1] Proposed July 18, 1990

2 TANK REMOVAL ACTIVITIES

Tank removal activities at UNOCAL Service Station 4511 occurred between June 1991 and April 1992. Work completed during this time occurred in several phases using different contractors. Phase I involved removal of several underground storage tanks, associated piping, and other station hardware. During Phase II, drillers advanced exploratory boreholes to better define the limits of hydrocarbon-impacted soil. In Phase III, EMCON Northwest, Inc., personnel directed excavation of hydrocarbon-impacted soil. A detailed description of each phase is given below.

2.1 Phase I - Tank Removal Field Observations

Prior to removal of the gasoline, heating oil, and waste oil tanks, crews drained product within the delivery lines back into the tanks. The tanks were subsequently washed, pumped free of residual liquids, and inerted using carbon dioxide. Fluids were also pump from the oil/water separator, prior to its removal.

Due to limited maneuverability at the site, the station canopy was demolished June 13, 1991, to allow access to pump islands on the north side of the building and to increase the available area for stockpiling excavated soil.

Based on soil quality data for samples collected from the north wall of the heating oil/waste oil tank excavation, the station building was demolished on August 14, 1991, in order to facilitate removal of hydrocarbon-impacted soil located beneath the building.

Gasoline Tank Excavation: Bighaus Petroleum & Environmental, Inc., of Wilsonville, Oregon, excavated and removed two 10,000-gallon steel gasoline tanks and associated piping on June 12, 1991.

Native soil was exposed on the sidewalls of the gasoline tank excavation at approximately 2 to 3 feet below ground surface and consisted of interlayered dense gray and brown sand with silt and gravel. Native soil was interpreted to be glacial till. Backfill material consisted of pea gravel.

Heating Oil/Waste Oil Tank Excavation: One heating oil and one waste oil tank were removed June 18, 1991. At the time of their removal, both the heating and waste oil tanks appeared corroded with small holes on their outer surfaces.

Exploratory Test Pits: An EMCON Northwest, Inc., geologist directed excavation of six exploratory test pits on June 26, 1991, in the vicinity of the dry well, the two north pump islands, and the former gasoline tank complex at the west edge of the site. The purpose of these test pits was to determine the condition of subsurface soils near these areas.

Hydraulic Hoist Excavation: Following station building demolition, crews removed three hydraulic hoists on August 15, 1991. Hydrocarbon-like odors were detected during hoist excavation activities.

While removing soil from between two of the hoists, a cylindrical hydraulic fluid reservoir was encountered. Fluid was observed inside the tank through an opening at its top. The fluid was drained from the tank into a 55-gallon drum.

Dry Well Excavation: A dry well located beneath the storm drain near the southwest corner of the station building was excavated on June 20, 1991. The dry well was discovered to be plumbed directly to the storm drain.

Oil/Water Separator: The oil/water separator was removed from the site February 17, 1992. No hydrocarbon-like odors were detected during removal of the oil/water separator.

Unmarked Waste Oil Tank: During excavation activities, an unmarked, approximately 280-gallon, waste oil tank was encountered near the southern edge of the site (Figure 2). This second waste oil tank was removed March 3, 1992. The tank was ruptured during excavation causing approximately 50 gallons of fluid to drain into loose soil at the base of the excavation. The soil was subsequently removed from the excavation and disposed of at the Rabanco Regional Landfill Company's loading facility in Seattle, Washington.

Well Abandonment: During tank removal activities, crews excavated near four ground water monitoring wells (MW-2, MW-3, MW-4,and MW-5). These wells were abandoned by filling each with bentonite grout and capping with cement. Well MW-1 was abandoned March 2, 1992, during soil excavation activities, using a trackhoe. Letters notifying the Washington Department of Ecology of the abandoned wells are included in Appendix D.

2.1.1 Soil Sampling

An EMCON Northwest, Inc., geologist collected soil samples from the gasoline, heating oil/waste oil, hydraulic hoist, and dry well excavations, and from the base of exploratory test pits and below the oil/water separator. A complete list of samples collected during tank removal activities and a description of the sample locations can be found in Table 1. Sample locations are shown in Figure 2.

Prior to collection, each sample was screened using a photoionization detector (PID). Other pertinent information regarding the sample, such as time of collection, depth, and PID reading, was also recorded. Selected soil samples from the gasoline tank excavation and soil stockpiles were laboratory composited to increase the area represented by a sample while reducing the number of analyses. Soil sampling and field screening methods are discussed in Appendix B.

2.1.2 Soil Stockpiling

Approximately 500 cubic yards of soil were excavated during initial tank removal activities. Excavated soils from both the gasoline tank, heating oil/waste oil, and hydraulic hoist excavations were stockpiled in the northeast portion of the site. The stockpiled soils were sampled June 26 and 27, 1991, and August 8, 1991.

During Phase III soil excavation activities, soils were temporarily stockpiled in the center of the site. These stockpiles contained soils removed from the western pump island, hydraulic hoist, heating oil/waste oil, and dry well excavations. These stockpiles were sampled February 17 and March 2, 1992.

Selected stockpile soil samples were analyzed for volatile fuel hydrocarbons (by EPA Methods 5030/8020/8015 Modified) and semivolatile fuel hydrocarbons (by EPA Methods 3550/8015 Modified). Analytical results of stockpile soil samples, listed in Table 1, were used to determine the method of disposal for soil stockpiles.

2.2 Phase II - Exploratory Drilling

EMCON Northwest, Inc., retained the services of Geoboring & Development, Inc., to advance exploratory soil borings at UNOCAL Service Station 4511, in order to better define the limits of hydrocarbon-impacted soil. Geoboring drilled seven borings on August 26 and 27, 1991. An

EMCON Northwest, Inc., geologist logged each boring and field-screened selected soil samples for petroleum hydrocarbons using a PID. Boring logs documenting the soil conditions encountered in each boring are located in Appendix C.

The exploratory borings were advanced to depths ranging from 14 to 40 feet below ground surface. The borings were advanced on the site at locations shown in Figure 2. Boring MW-12 was advanced off-site, to the west, in the northbound lane of 106th Avenue. A 2-inch-diameter ground water monitoring well was constructed in boring MW-12. Borings MW-6, MW-7, MW-8, MW-9, MW-10, and MW-11 were abandoned with bentonite chips. Split spoon samples collected from each boring were screened for the presence of petroleum hydrocarbons using a PID. A soil sample collected from boring MW-11 (MW-11-12.5) was submitted to Columbia Analytical Services, Inc., of Bothell, Washington, for quantitative chemical analysis. The analytical data for this sample is presented in Table 1.

Native soil encountered during drilling consisted of dense brown to gray sand with silt and gravel to a depth of 40 feet, the maximum depth attained during drilling. Native soil was interpreted to be glacial till.

2.3 Phase III - Soil Excavation

Between February 17 and April 21, 1992, Joe Hall Construction, Inc., of Tacoma, Washington, excavated hydrocarbon-impacted soil at UNOCAL Service Station 4511. Approximately 1,500 cubic yards of soil were removed from areas near the east wall of the gasoline tank excavation, western pump island, heating oil tank, two waste oil tanks, former hydraulic hoists, and dry well excavations (Figure 3). Excavated soils were hauled to Rabanco Regional Landfill Company's loading facility in downtown Seattle for disposal.

Additional soil samples were collected from the excavation sidewalls and floors, following removal of hydrocarbon-impacted soil. The samples were collected in order to confirm that remaining soil met MTCA Method A Cleanup Levels for soil. A summary of the analytical data for these soil samples is presented in Table 1.

3 QUANTITATIVE ANALYTICAL RESULTS

3.1 General Hydrocarbon Analytical Procedures

Soil analyses were performed by Columbia Analytical Services, Inc., of Bothell and Kelso, Washington. The analyses quantified the concentrations of:

- volatile fuel hydrocarbons (specifically benzene, toluene, ethylbenzene, total xylenes [BTEX], and total petroleum hydrocarbons [TPH] as gasoline)

- semivolatile fuel hydrocarbons (specifically, [TPH] as diesel, jet fuel, kerosene, mineral spirits, and as oil)

Volatile fuel hydrocarbon concentrations were determined by gas chromatography in accordance with EPA Methods 5030/8020 (BTEX) and 5030/8015 Modified (TPH as gasoline). Semivolatile fuel hydrocarbon concentrations were determined by gas chromatography in accordance with EPA Methods 3550/8015 Modified.

3.2 Volatile and Semivolatile Hydrocarbon Results for Soil

The laboratory performed volatile petroleum hydrocarbon analyses on selected soil samples from the gasoline tank, heating oil/waste oil tank, hoist and dry well excavations, and on samples collected from product line trenches, exploratory test pits, and pump island areas. Semivolatile fuel hydrocarbon analyses were performed on samples collected from the heating oil/waste oil, hydraulic hoist, and dry well excavations, and from several exploratory test pits. Results of both volatile and semivolatile fuel hydrocarbon analyses are presented in Table 1. A description of the analytical methods and the laboratory reports are presented in Appendix B.

Results of soil sample analyses revealed that soil near the east wall of the gasoline tank excavation, heating oil/waste oil tank, hydraulic hoist, and dry well excavations, and former gasoline tank complex contained concentrations of volatile and/or semivolatile fuel hydrocarbons which exceeded MTCA Method A Cleanup Levels for soil.

4 CONCLUSIONS

Underground storage tank removal and soil excavation activities at UNOCAL Service Station 4511 occurred between June 1991 and April 1992. The activities generally consisted of three tasks: tank removal, exploratory drilling, and soil excavation.

Crews excavated and removed two 10,000-gallon gasoline tanks, one heating oil tank, two waste oil tanks, associated product piping, three hydraulic hoists, an oil/water separator, and a dry well from the site. During excavation and removal activities, an EMCON Northwest, Inc., geologist collected soil samples from each of these areas and submitted them for quantitative chemical analyses.

Native soil exposed in the sidewalls of the tank excavations consisted of dense gray and brown sand with silt and gravel and was interpreted to be glacial till.

Results of soil sample analyses indicated that soil in the vicinity of the east wall of the gasoline tank excavation, heating oil/waste oil tank, hydraulic hoist, and dry well excavations, and near the former gasoline tank complex contained concentrations of volatile and semivolatile petroleum hydrocarbons which exceeded MTCA Method A Cleanup Levels for soil.

During the initial phase of tank removal activities, approximately 500 cubic yards of soil were stockpiled on the northeast portion of the site. Soil generated during soil excavation activities was stockpiled in the center of the site. Soil samples were collected from the stockpiles and submitted for volatile and/or semivolatile fuel hydrocarbon analyses. Stockpile soil sample analytical data were used to determine the appropriate disposal method for the stockpiled soil.

Following receipt of initial laboratory data, EMCON Northwest, Inc., retained the services of a driller to advance exploratory soil borings near the excavated areas to better define the limits of hydrocarbon-impacted soils.

Following exploratory boring, approximately 1,500 cubic yards of hydrocarbon-impacted soil were removed from the gasoline tank, heating

oil/waste oil tank, hoist, and dry well excavations, and from the former gasoline tank complex. Excavated soil was disposed of at Rabanco Regional Landfill Company's loading facility in Seattle, Washington.

Analytical laboratory data for confirmation soil samples collected from sidewalls and base of excavated areas indicated that concentrations of petroleum hydrocarbons in remaining soil were below MTCA Method A Cleanup Levels for soil.

5 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

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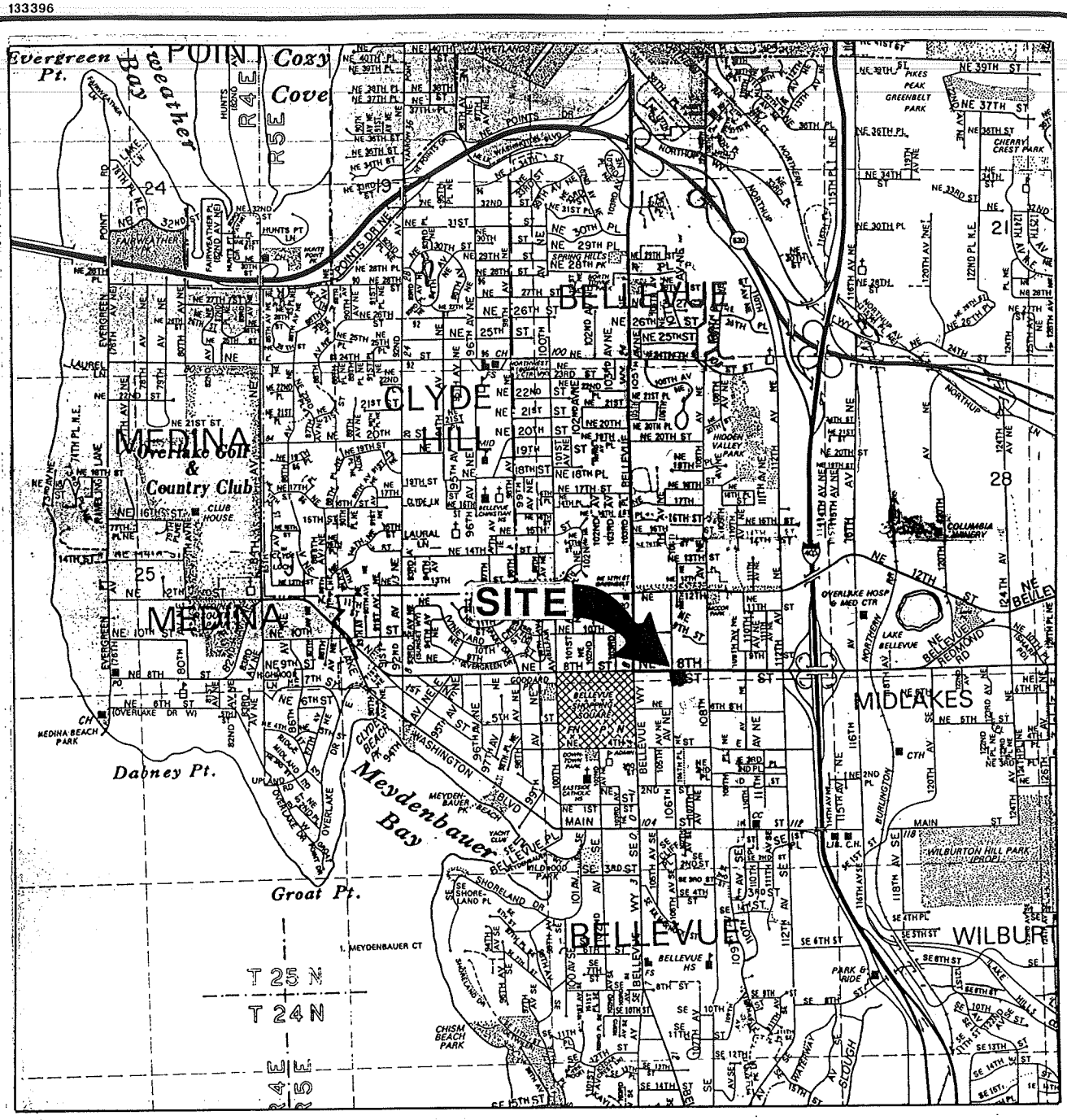

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Figure 1
UNOCAL STATION #4511
BELLEVUE, WASHINGTON
SITE LOCATION MAP

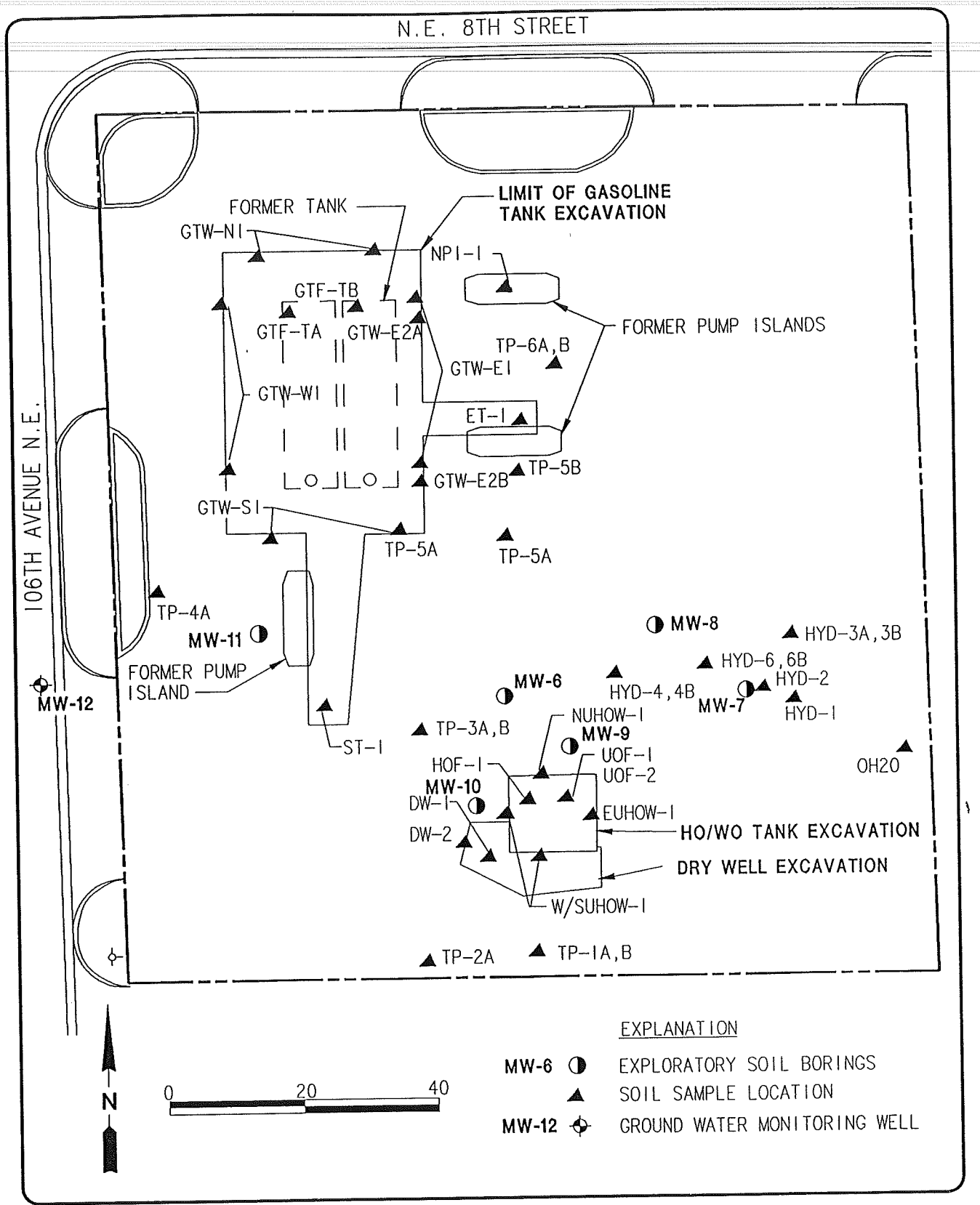

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Figure 2
UNOCAL SERVICE STATION 4511
N.E. 8TH & 106TH AVE. N.E.
BELLEVUE, WASHINGTON
SITE MAP AND SOIL SAMPLE LOCATIONS

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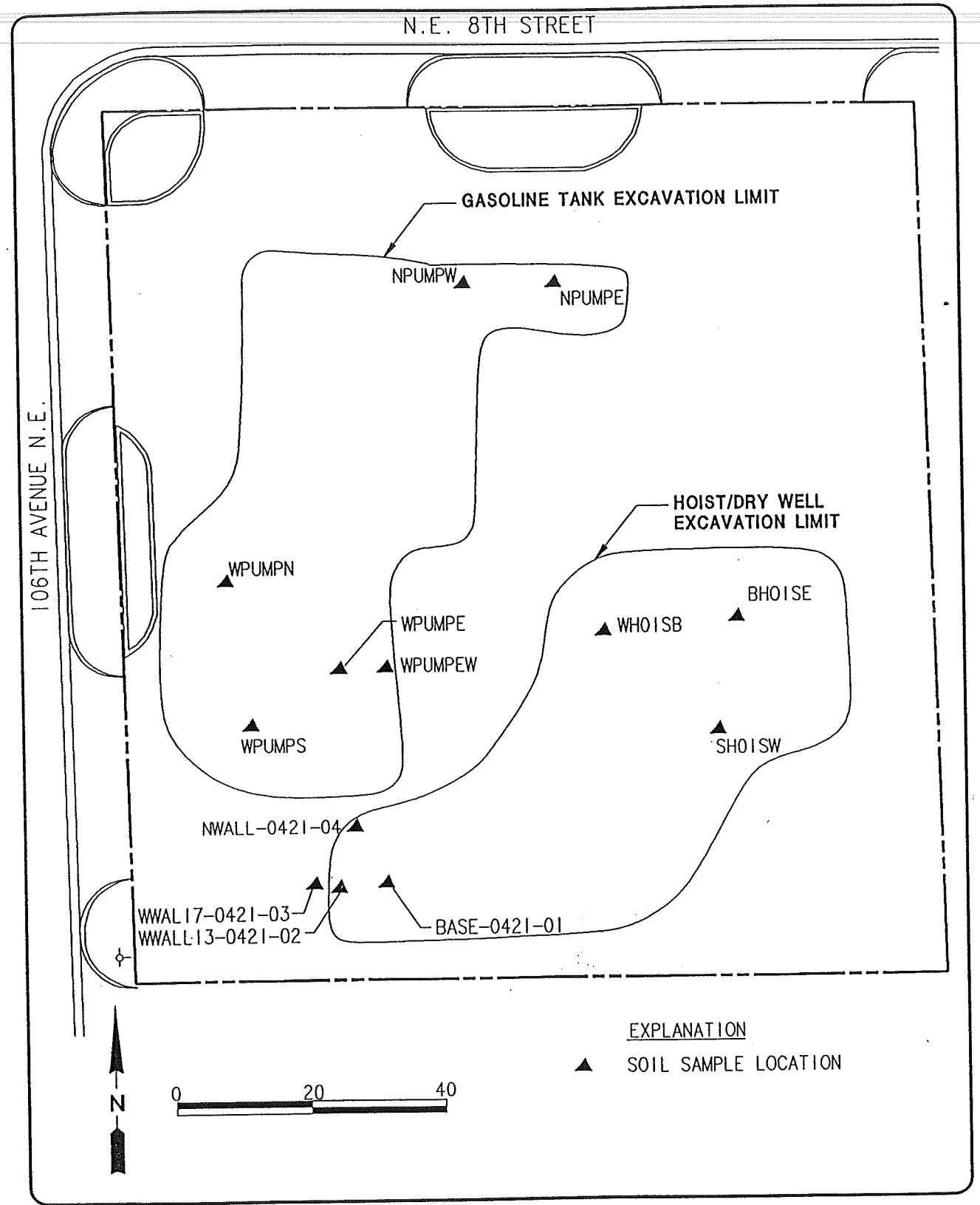

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Figure 3
UNOCAL SERVICE STATION 4511
N.E. 8TH & 106TH AVE. N.E.
BELLEVUE, WASHINGTON
SOIL EXCAVATION SAMPLE LOCATIONS

UNOCAL U2400C83 5-13-92

Table 1

Summary of Analytical Data - Soil
UNOCAL Service Station 4511
Bellevue, Washington

Sample I.D.	Date Collected	Benzene[1] (mg/kg)	Toluene[1] (mg/kg)	Ethylbenzene[1] (mg/kg)	Total Xylenes[1] (mg/kg)	TPH as Gasoline[2] (mg/kg)	TPH as Diesel[3] (mg/kg)	TPH as Other[3] (mg/kg)	TPH[4] 418.1	Total Lead[5] (mg/kg)	Sampling Location
GTW-N1 Comp.	6-19-91	ND	ND	ND	ND	ND	--	--	--	ND	N wall gas tank excavation
GTW-S1 Comp.	6-19-91	ND	ND	ND	0.3	ND	--	--	--	ND	S wall gas tank excavation
GTW-E1 Comp.	6-19-91	ND	0.3	0.5	4.7	**101**	--	--	--	ND	E wall gas tank excavation
GTW-W1 Comp.	6-19-91	ND	ND	ND	ND	ND	--	--	--	ND	W wall gas tank excavation
GTF-TA	6-19-91	ND	ND	ND	ND	ND	--	--	--	ND	below east tank fill
GTF-TB	6-19-91	ND	0.2	ND	0.2	ND	--	--	--	ND	below west tank fill
ET-1	6-19-91	ND	ND	ND	ND	ND	--	--	--	ND	E product line trench
ST-1	6-19-91	ND	ND	ND	ND	ND	--	--	--	ND	S product line trench
NPI-1	6-20-91	ND	ND	ND	ND	ND	--	--	--	ND	below N pump island
NUHOW-1	6-20-91	--	--	--	--	ND	ND	**17,400**	**35,400**	--	N wall HO/WO tank excavation
EUHOW-1	6-20-91	ND	ND	ND	ND	ND	ND	ND	26	--	E wall HO/WO tank excavation
W/SUHOW-1	6-20-91	--	--	--	--	ND	ND	ND	90	--	Comp. W,S walls HO/WO exc.
UOF-1	6-20-91	ND	ND	ND	ND	ND	ND	ND	ND	--	below WO tank fill
UOF-2	6-20-91	ND	ND	ND	ND	ND	ND	ND	90	--	below WO tank fill - duplicate
HOF-1	6-20-91	ND	ND	ND	ND	ND	ND	ND	ND	--	below HO tank fill
DW-1	6-20-91	ND	ND	0.12	2.08	**1,940**	ND	ND	**1,260**	--	W wall dry well excavation
DW-2	6-20-91	ND	ND	ND	1.45	**2,050**	ND	ND	**1,690**	--	base of dry well excavation
GTW-E2A	6-26-91	ND	ND	ND	ND	ND	--	--	ND	--	N end of E wall g.t. excavation
GTW-E2B	6-26-91	ND	ND	ND	ND	ND	--	--	ND	--	S end of E wall g.t. excavation
TP-1A	6-26-91	ND	ND	ND	ND	ND	ND	ND	ND	--	test pit S of dry well excav.
TP-1B	6-26-91	ND	ND	ND	ND	ND	ND	ND	ND	--	test pit S of dry well excav.
TP-2A	6-26-91	ND	ND	ND	ND	ND	ND	ND	ND	--	test pit SW of dry well excav.
TP-3A	6-26-91	ND	ND	ND	0.1	17	--	--	ND	--	near SW corner of building
TP-3B	6-26-91	ND	ND	ND	ND	ND	--	--	32	--	near SW corner of building
TP-4A	6-26-91	ND	0.3	6.3	**30.7**	**740**	--	--	**363**	--	W end of former tank complex
TP-5A	6-26-91	ND	ND	ND	0.3	ND	--	--	ND	--	N of NW corner of building
TP-5B	6-26-91	ND	ND	ND	ND	ND	--	--	ND	--	N of NW corner of building
TP-6A	6-26-91	ND	ND	0.3	3.0	25	--	--	86	--	between N pump islands

Table 1

UNOCAL Service Station 4511
(Continued)

Sample I.D.	Date Collected	Benzene[1] (mg/kg)	Toluene[1] (mg/kg)	Ethylbenzene[1] (mg/kg)	Total Xylenes[1] (mg/kg)	TPH as Gasoline[2] (mg/kg)	TPH as Diesel[3] (mg/kg)	TPH as Other[3] (mg/kg)	TPH[4] 418.1	Total Lead[5] (mg/kg)	Sampling Location
TP-6B	6-26-91	ND	ND	ND	ND	ND	--	--	74	--	between N pump islands
U/D-SS-1	6-26-91	ND	ND	ND	29	77	ND	154	431	--	stockpile sample
SS-1C	6-27-91	0.20	7.8	5.2	55.4	996	--	--	616	6	stockpile sample
SS-2C	6-27-91	ND	0.4	0.3	10	174	--	--	307	12	stockpile sample
STOCKPILE#1	8-8-91	ND	ND	ND	0.06	ND	--	--	--	7	stockpile sample
STOCKPILE#2	8-8-91	0.10	0.63	2.16	18.7	406	--	--	--	5	stockpile sample
STOCKPILE#3	8-8-91	ND	ND	ND	0.20	5	--	--	--	5	stockpile sample
STOCKPILE#4	8-8-91	5.08	110	20.2	239	3,260	--	--	--	6	stockpile sample
STOCKPILE#5	8-8-91	ND	ND	0.16	0.61	130	--	--	--	7	stockpile sample
STOCKPILE#6	8-8-91	0.24	4.07	4.50	33.1	436	--	--	--	8	stockpile sample
STOCKPILE#7	8-8-91	ND	2.35	3.56	35.9	1,350	--	--	--	8	stockpile sample
STOCKPILE#8	8-8-91	ND	ND	ND	0.06	23	--	--	--	5	stockpile sample
HYD-1	8-16-91	ND	ND	ND	ND	ND	ND	ND	ND	--	base of hoist #1 (allignment)
HYD-2	8-16-91	ND	ND	0.8	9.0	394	ND	261	495	--	sidewall of hoist excavation
HYD-3A	8-19-91	ND	ND	ND	ND	ND	ND	ND	ND	--	below E hoist (allignment)
HYD-3B	8-19-91	ND	ND	ND	ND	ND	ND	ND	ND	--	below E hoist (allignment)
HYD-4	8-19-91	1.44	18.8	5.21	23.8	162	ND	26,700	61,200	--	below middle hoist
HYD-4B	8-19-91	ND	ND	1.0	8.6	899	ND	326	1,450	--	below middle hoist
HYD-6	8-19-91	ND	4.9	4.4	34.0	6,670	ND	1030	6,460	--	below west hoist
HYD-6B	8-19-91	ND	ND	0.28	2.76	115	ND	238	377	--	below west hoist
MW-11-12.5	8-27-91	ND	ND	2.03	6.31	216	--	--	--	--	sample from boring MW-11
NPUMPE[6]	2-17-92	ND	ND	ND	0.06	1	--	--	--	--	E end of N pump island
NPUMPW[6]	2-17-92	ND	ND	ND	ND	ND	--	--	--	--	W end of N pump island
OH20	2-17-92	--	--	--	--	ND	ND	ND	--	--	below oil/water separator
SS-2	2-17-92	ND	0.43	0.53	4.84	202	--	--	--	--	stockpile sample
SS-3	2-17-92	0.19	2.63	3.91	20.6	541	--	--	--	--	stockpile sample
SS-4	2-17-92	0.26	2.90	3.71	20.9	481	--	--	--	--	stockpile sample
SS-5	2-17-92	1.13	11.0	7.90	26	900	--	--	--	--	stockpile sample
WPUMPN[6]	2-18-92	ND	ND	ND	0.23	3	--	--	--	--	N end of W pump island

Table 1

UNOCAL Service Station 4511
(Continued)

Sample I.D.	Date Collected	Benzene[1] (mg/kg)	Toluene[1] (mg/kg)	Ethylbenzene[1] (mg/kg)	Total Xylenes[1] (mg/kg)	TPH as Gasoline[2] (mg/kg)	TPH as Diesel[3] (mg/kg)	TPH as Other[3] (mg/kg)	TPH[4] 418.1	Total Lead[5] (mg/kg)	Sampling Location
WPUMPS[6]	2-18-92	ND	ND	ND	ND	ND	--	--	--	--	S end of W pump island
WPUMPE[6]	2-24-92	ND	ND	ND	ND	ND	--	--	--	--	base of W pump island excav.
WPUMPEW[6]	2-24-92	ND	ND	ND	ND	ND	--	--	--	--	E wall of W pump island excav.
BHOISE[6]	2-28-92	--	--	--	--	ND	ND	ND	--	--	base of hoist excavation
SHOISW[6]	2-28-92	--	--	--	--	ND	ND	ND	--	--	S wall of hoist excavation
WHOISB[6]	3-2-92	--	--	--	--	ND	ND	ND	--	--	W wall of hoist excavation
SPILE1	3-2-92	--	--	--	--	ND	ND	120	--	--	stockpile sample
SPILE2	3-2-92	--	--	--	--	ND	ND	40	--	--	stockpile sample
SPILE3	3-2-92	--	--	--	--	ND	ND	60	--	--	stockpile sample
BASE-0421-01[6]	4-21-92	--	--	--	--	--	ND	ND	--	--	base of dry well excavation
WWALL13-0421-02[6]	4-21-92	--	--	--	--	--	ND	ND	--	--	W wall of dry well excavation
WWALL17-0421-03[6]	4-21-92	--	--	--	--	--	ND	ND	--	--	W wall of dry well excavation
NWALL-0421-04[6]	4-21-92	--	--	--	--	--	ND	ND	--	--	N wall of dry well excavation
MTCA		**0.5**	**40**	**20**	**20**	**100**	**200**	**200**	**200**	**250**	

NOTES: -- denotes analyte not tested
ND indicates below method detection limit

[1] Benzene, toluene, ethyl benzene, and total xylenes (BTEX) by EPA Method 5030/8020
[2] Volatile fuel hydrocarbons (TPH as gasoline) by EPA Method 5030/8015 Modified
[3] Semivolatile fuel hydrocarbons (TPH as diesel, other) by EPA Method 3550/8015 Modified
[4] Total Petroleum Hydrocarbons (TPH) by EPA method 418.1
[5] Total lead by EPA method 7420
[6] Confirmation soil sample collected following soil excavation

Appendix A

FIELD METHODS AND SAMPLING PROCEDURES

FIELD METHODS AND SAMPLING PROCEDURES

This appendix documents the procedures EMCON Northwest, Inc., used to perform the field investigation described in this report. The discussion includes information on the following subjects:

- excavation soil sampling procedures
- sample jars, sample handling, and chain-of-custody
- field screening for organic vapors (including monitoring of the breathing zone air quality)
- field equipment decontamination procedures

A.1 Excavation Soil Sampling Procedures

Soil samples collected during the field investigation were obtained from the trackhoe bucket. Samples taken from the trackhoe bucket were collected from the least disturbed and most representative soils. Typically, these soils have accumulated directly behind the trackhoe bucket teeth. To minimize the potential of cross-contamination, every effort was made to collect a sample from soils which had not come in direct contact with the backhoe bucket. Samples taken directly from an excavation or test pit were collected from undisturbed soils near the base of a side wall or base of the excavation. One to six inches (depending on sample volume and soil type) of soil were scraped from the surface of the sample location before the sample was transferred to the sample container, to insure the collection of an undisturbed and representative soil sample.

Each soil sample was split into two approximately equal portions. The first portion was transferred to a laboratory-prepared glass container. The second portion was transferred to a clean glass jar and set aside for field screening. Sample handling and field screening methods are discussed in subsequent sections of this Appendix.

A.2 Sample Jars, Sample Handling, and Chain-of-Custody

Each discrete sample and each aliquot of a composite sample was submitted in a separate laboratory-prepared glass container. Sample jars were obtained specifically for use on this project, and consisted of glass jars with teflon lid inserts. Samples were collected, labeled, and placed immediately into a chilled cooler for transport to the analytical laboratory. Chain-of-custody records were maintained recording sample number, location, depth, type of preservative (if any), and handling procedures.

A.3 Field Screening for Organic Vapors

Field tests consisted of portable photoionization detector (PID) measurements for the presence of volatile organic vapors for each recovered soil sample. An Environmental Instruments Model 580B OVM, calibrated daily to 100 ppm isobutylene, was used to obtain these measurements. Typically, a small hole is poked into the soil with a gloved finger, then the PID probe is placed directly into the hole and covered with the hand. The maximum reading on the PID indicates the concentration of hydrocarbons in that soil sample. This screening equipment was also used for health and safety air quality monitoring in the breathing zone, during excavation operations.

The purpose of the field tests was to determine the relative magnitude of volatile organic vapors, if any, in the explorations. The intent of this analysis is to qualitatively compare samples and assist in sample selection for chemical analysis. Field screening with a PID is a subjective analysis affected by, among other influences, climate (e.g., temperature and humidity), soil type and conditions, instrument calibration and operation.

Appendix B

LABORATORY MEASUREMENT OF PETROLEUM HYDROCARBONS AND ANALYTICAL CHEMISTRY DATA

LABORATORY MEASUREMENT OF PETROLEUM HYDROCARBONS AND ANALYTICAL CHEMISTRY DATA

There are currently a wide variety of methods available for the analysis of petroleum products in environmental samples. These tests range in specificity from non-specific or indicator tests like Total Petroleum Hydrocarbons, EPA Method 418.1, to compound specific methods such as EPA Method 8020, which measures the benzene, toluene, ethylbenzene, and xylenes (BTEX) which may be present in the petroleum hydrocarbon. Other petroleum hydrocarbon methods, such as EPA 8015 Modified, attempt to identify the product by pattern profile and quantify the product present by summing the total hydrocarbon response over the appropriate boiling range. Often a combination of petroleum hydrocarbon methods is required to fully characterize the petroleum hydrocarbons in environmental samples. The goal is to provide information that will enable the data user to choose the appropriate methodology to meet both regulatory and project requirements.

B.1 Laboratory Procedures for Petroleum Hydrocarbons

B.1.1 Total Petroleum Hydrocarbons

This procedure measures total petroleum hydrocarbons by infrared spectrometry (IR). TPH-IR is measured in the sample by extraction with solvent, followed by silica gel cleanup to remove non-petroleum hydrocarbons. The extract is then analyzed by IR, which results in an empirical quantitation. This method is usually used for petroleum products such as jet fuel, mineral spirits, diesel, or oils. The method is suitable for both soil and water, although sample complexity may result in either a low or high bias because of lack of analytical specificity.

The method is not applicable to the measurement of low-boiling fraction (i.e., volatile solvents or gasoline) that can volatilize at temperatures below 70°C. This represents a theoretical lower limit of C-6, but for practical purposes C-10 may be a more reliable lower limit of quantitation

(Figure B-1). The higher-boiling (semivolatile) fraction can also be limited by the solubility in the extraction solvent. The solvent generally used for TPH-IR is a fluorochlorocarbon (Freon 113), which has less solvating power than the solvents (e.g., methylene chloride) used with other TPH methods. Heavier residuals of petroleum may contain a significant portion of materials that are not extractable with the Freon. The solubility of the petroleum hydrocarbons, combined with the complexity of the sample matrix, such as a soil highly contaminated with petroleum wastes, may result in an upper hydrocarbon limit as low as C-22. This limitation can lead to underestimating the TPH for heavy petroleum hydrocarbons using this method. Nonpetroleum polar hydrocarbons are selectively removed using silica gel cleanup. But samples with excessively high organic backgrounds, such as woodwaste or soils with high organic content (i.e., peat), may lead to a result not truly representative of the petroleum hydrocarbon content. The result may be biased high in this type of sample because of the contribution of nonpolar hydrocarbon background.

B.1.2 Semivolatile Fuel Hydrocarbons by Method 8015M

This procedure denoted as semivolatile-TPH, identifies and measures fuels such as jet fuel, kerosene, mineral spirits, and diesel. It can also identify and measure oils such as lubricating oil, but oil quantitation is less sensitive and accurate than for the fuels. The analysis of total petroleum hydrocarbons by gas chromatography (GC) offers the analyst the ability to measure both the volatile fraction (C-6 to C-12) and the semivolatile fraction (C-10 to C-40) (Figure B-1). The sample is extracted by sonication (Method 3550), soxhlet (Method 3540), or separatory funnel (Method 3510) using methylene chloride. The analysis of the semivolatile extract employs the use of a gas chromatograph (GC) equipped with a flame ionization detector (FID). The FID is considered a universal detector since it does not significantly discriminate between one hydrocarbon and another. However, because the method is specific for individual compounds, the analyst has the ability to select the region (by carbon number) of the gas chromatogram on which to base the final quantitation of total hydrocarbons present. The range of the individual hydrocarbons are then summed, and the result expressed relative to the fuel type identified. This method does not specifically allow for the cleanup of nonpetroleum hydrocarbon interferences as in Method 418.1. This method is flexible in that the analyst can select a range of hydrocarbons on which to base quantitation most representative of the sample and thereby eliminate certain background interference. For this reason, this method is often considered more representative of the true value of specific petroleum hydrocarbons in the sample. The resulting gas chromatogram, or GC fingerprint, of the sample extract represents the unique suite of compounds associated with the type of petroleum

contamination present in the sample and may be used for product identification as well as quantitation. The quantitation is usually based the pure product which may introduce a positive or negative bias for "weathered" products.

B.1.3 Volatile Fuel Hydrocarbons by Method 8015M and Volatile Aromatic Hydrocarbons (BTEX) by Method 8020

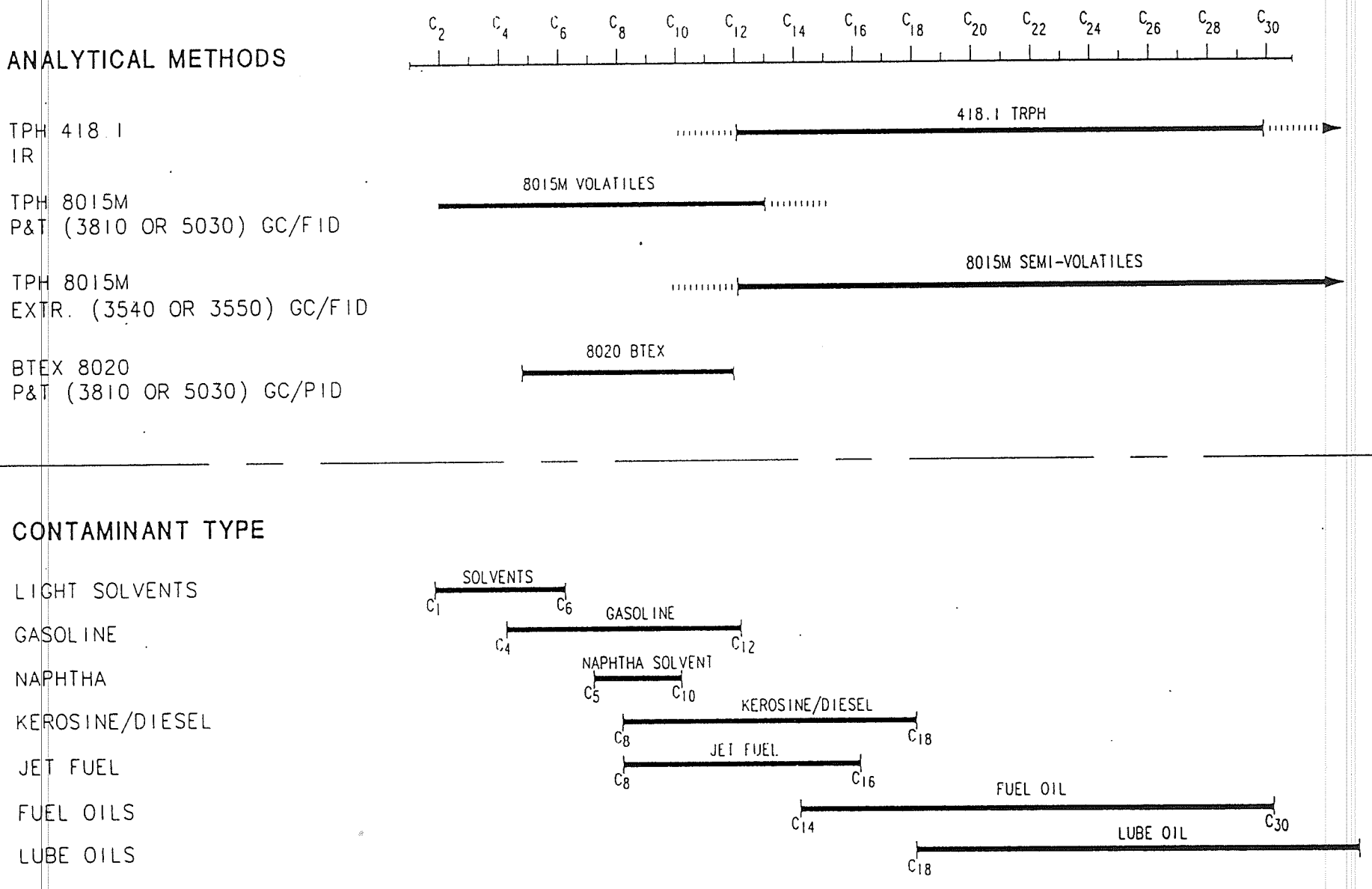
This method also known as volatile-TPH, TPH as gasoline, or gas/BTEX allows for the analysis of volatile fuel hydrocarbons. Due to the loss of volatiles using an extraction technique, samples for volatile analysis are introduced to the GC by either the purge-and-trap method (Method 5030) or the headspace method (Method 3810). These methods protect against the loss of volatile organic compounds during sample introduction to the gas chromatograph. As in other GC methods, a unique fingerprint representing the suite of compounds present in the petroleum hydrocarbon matrix is used for product and compound identification of volatile hydrocarbons. The aromatic hydrocarbon components in the sample, including benzene, toluene, ethyl benzene, and xylenes (BTEX) by Method 8020, are also identified and quantitated using purge and trap. Simultaneous analyses of gasoline and BTEX (8015M/8020) can be accomplished by introducing the purge-and-trap fraction into a photoionization detector (PID) to quantitate low levels of BTEX and then to the FID to quantitate as volatile TPH. The quantitation of gasoline is based upon the original product which may introduce a positive or negative bias for "weathered" products.

B.1.4 Total Lead Analysis (EPA Method 7421)

EPA Method 7421 is a direct aspiration, atomic absorption technique used to detect lead. This analysis may be appropriate when leaded gasoline has been stored at a site.

Figure B-1

PETROLEUM HYDROCARBON RANGES



CADD FILE: MISC.\CAS-1\1-8-91

UNOCAL 4511 Bellevue

Columbia Analytical Services Inc.

March 12, 1992

John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511/Project #U24-08.03/B920116**

Dear John:

Enclosed are the results of the rush samples submitted to our lab on March 2, 1992. Preliminary results were transmitted via facsimile on March 9, 1992. For your reference, these analyses have been assigned our work order number K921337B.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin B. Elliott
Senior Project Chemist

CBE/das

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Northwest
Project: UNOCAL #4511
Sample Matrix: Soil

Date Received: 03/02/92
Date Extracted: 03/04/92
Work Order #: K921337B

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		SPILE 1	SPILE 2	SPILE 3
Lab Code:		K1337-1	K1337-2	K1337-3
Date Analyzed:		03/07/92	03/07/92	03/07/92
Analyte	**MRL**			
Aroclor 1016	1	ND	ND	ND
Aroclor 1221	1	ND	ND	ND
Aroclor 1232	1	ND	ND	ND
Aroclor 1242	1	ND	ND	ND
Aroclor 1248	1	ND	ND	ND
Aroclor 1254	1	ND	ND	ND
Aroclor 1260	1	ND	ND	ND
Total Aroclors	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glen Elliott Date 3/12/92

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Northwest
Project: UNOCAL #4511
Sample Matrix: Soil

Date Extracted: 03/04/92
Work Order #: K921337B

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Method Blank
Lab Code:		K1337-MB
Date Analyzed:		03/07/92
Analyte	**MRL**	
Aroclor 1016	1	ND
Aroclor 1221	1	ND
Aroclor 1232	1	ND
Aroclor 1242	1	ND
Aroclor 1248	1	ND
Aroclor 1254	1	ND
Aroclor 1260	1	ND
Total Aroclors	1	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 3/12/92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	03/02/92
Project:	UNOCAL #4511	**Date Extracted:**	03/04/92
Sample Matrix:	Soil	**Date Analyzed:**	03/05/92
		Work Order #:	K921337B

Polynuclear Aromatic Hydrocarbons
EPA Methods 3540/8310
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		SPILE 1	SPILE 2	SPILE 3
Lab Code:		K1337-1	K1337-2	K1337-3
Analyte	**MRL**			
Naphthalene	0.1	ND	ND	ND
Acenaphthene	0.1	ND	ND	ND
Acenaphthylene	0.1	ND	ND	ND
Fluorene	0.02	ND	ND	ND
Phenanthrene	0.01	0.03	ND	ND
Anthracene	0.01	ND	ND	ND
Fluoranthene	0.02	0.08	ND	0.02
Pyrene	0.02	0.12	ND	0.03
Benz(a)anthracene	0.01	ND	ND	ND
Chrysene	0.01	ND	ND	ND
Benzo(b)fluoranthene	0.02	0.04	ND	ND
Benzo(k)fluoranthene	0.01	0.03	ND	ND
Benzo(a)pyrene	0.01	0.04	ND	ND
Dibenz(a,h)anthracene	0.01	ND	ND	ND
Benzo(g,h,i)perylene	0.02	0.09	ND	ND
Indeno(1,2,3-cd)pyrene	0.01	0.04	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glenn Elliott Date 3/12/92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Extracted:**	03/04/92
Project:	UNOCAL #4511	**Date Analyzed:**	03/05/92
Sample Matrix:	Soil	**Work Order #:**	K921337B

Polynuclear Aromatic Hydrocarbons
EPA Methods 3540/8310
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Method Blank
Lab Code:		K1337-MB
Analyte	MRL	
Naphthalene	0.1	ND
Acenaphthene	0.1	ND
Acenaphthylene	0.1	ND
Fluorene	0.02	ND
Phenanthrene	0.01	ND
Anthracene	0.01	ND
Fluoranthene	0.02	ND
Pyrene	0.02	ND
Benz(a)anthracene	0.01	ND
Chrysene	0.01	ND
Benzo(b)fluoranthene	0.02	ND
Benzo(k)fluoranthene	0.01	ND
Benzo(a)pyrene	0.01	ND
Dibenz(a,h)anthracene	0.01	ND
Benzo(g,h,i)perylene	0.02	ND
Indeno(1,2,3-cd)pyrene	0.01	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Colin Elliott Date 3/12/92

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-106

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	03/02/92
Project:	UNOCAL #4511	**Date Extracted:**	03/04/92
Sample Matrix:	Soil	**Date Analyzed:**	03/07/92
		Work Order #:	K921337B

QA/QC Report
Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
SPILE 1	K1337-1	93
SPILE 2	K1337-2	99
SPILE 3	K1337-3	94
SPILE 3	K1337-3MS	99
SPILE 3	K1337-3DMS	103
Method Blank	K1337-MB	99
	CAS Acceptance Criteria	66-132

Approved by Colin Elliott Date 3/12/92

4317 South 42th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-106

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: UNOCAL #4511
Sample Matrix: Soil

Date Received: 03/02/92
Date Extracted: 03/04/92
Date Analyzed: 03/07/92
Work Order #: K921337B

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name: SPILE 3
Lab Code: K1337-3

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
Aroclor 1260	1.5	1.4	ND	1.4	1.4	93	100	8-127	7

ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 3/12/92

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: UNOCAL #4511
Sample Matrix: Soil

Date Received: 03/02/92
Date Extracted: 03/04/92
Date Analyzed: 03/05/92
Work Order #: K921337B

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons
EPA Methods 3540/8310
mg/Kg (ppm)
Dry Weight Basis

Sample Name: SPILE 3
Lab Code: K1337-3

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
Acenaphthene	0.73	0.73	ND	0.47	0.42	64	58	31-137	10
Fluoranthene	0.15	0.15	ND	0.14	0.12	93	80	40-130	15
Benzo(a)pyrene	0.07	0.07	ND	0.05	0.05	71	71	40-130	<1

ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 3/12/92

Columbia Analytical Services, Inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 3-2-92 PAGE 1 OF 1

PROJECT NAME ONOCAL 4511 #U24-08.03
PROJECT MNGR. JOHN NORTH
COMPANY/ADDRESS EMCON NW, INC.
18912 NORTH CREEK PKWY, SUITE
210, BOTHELL, WA 98011 PHONE 206-485-5000
SAMPLERS SIGNATURE John T. Bertrand

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH-HCID	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☒	TPH Gas/BTEX 5030/8015/8020 Gas ☐ BTEX ☐	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	TCLP Metals ☐ VOA ☐ Semi ☐ Pest/ Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	PAH EPA 8010	REMARKS
BHOLE	2-28	1030		SOIL	2		X														
SHOISW	2-28	1120		SOIL	1		X														
SPILE 1	3-2	1305		SOIL	2		X			X									X		ASSUME SAMPLE IS HOT (PID)
SPILE 2	3-2	1310		SOIL	2		X			X									X		ASSUME SAMPLE IS HOT (PID)
SPILE 3	3-2	1315		SOIL	2		X			X									X		" "
* WHOEXB	3-2	1340		SOIL	1		X														* SEE BELOW
WHOISB	3-2	1430		SOIL	1		X														
* SDWELLW	3-2	1500		SOIL	1		X														* SEE BELOW
* WDWELLB	3-2	1530		SOIL	1		X														

RELINQUISHED BY:
Signature John T. Bertrand
Printed Name EMCON NW
Firm 3-2-92
Date/Time

RECEIVED BY:
Signature CAS
Printed Name
Firm 3-2-92 17:00
Date/Time

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature Ruth Allison
Printed Name Ruth Allison
Firm CAS 3/4/92 1000
Date/Time

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr ✓ 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP, MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. # ___
Bill to: ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping #: ___
Condition: ___
Lab No.: B92-0116

SPECIAL INSTRUCTIONS/COMMENTS:
* TALK TO JOHN NORTH BEFORE RUNNING THESE SAMPLES. HOLD per JN 3/3/92

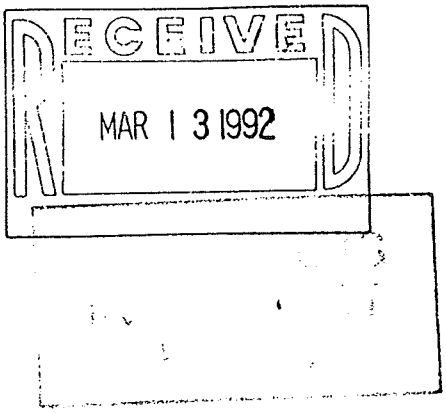
400-05

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

UNOCAL 4511 Bellevue

Columbia Analytical Services inc.

March 11, 1992



John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Unocal 4511 - Bellevue/Project #U24-08.03**

Dear John:

Enclosed are the results of the samples submitted to our Bothell laboratory on March 2, 1992. Preliminary results were given on March 9, 1992. For your reference, this work has been assigned our service request number B920116.

All analyses were performed in accordance with both Washington State Department of Ecology Accreditation procedures and our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Michael C. Higgins
Project Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	03/02/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	03/04/92
Sample Matrix:	Soil	**Date Analyzed:**	03/06/92
		Work Order #:	B920116

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
BHOISE	B0116-1	100
SHOISE	B0116-2	95
SPILE1	B0116-3	100
SPILE2	B0116-4	*53
SPILE3	B0116-5	92
WHOISB	B0116-7	99
BHOISE	B0116-1MS	98
BHOISE	B0116-1DMS	96
Laboratory Control Sample	B0116-LCS	102
Method Blank	B0116-MB	101
	CAS Acceptance Criteria	64-123

* Outside acceptance limits, 95 % confidence level (2s), but within 99 % confidence level (3s).

Approved by _____ Date 920311

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: Unocal 4511 - Bellevue
Sample Matrix: Soil

Date Received: 03/02/92
Date Extracted: 03/04/92
Date Analyzed: 03/06/92
Work Order #: B920116

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: BHOISE
Lab Code: B0116-1

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Diesel	175	183	ND	179	185	102	101	45-120	<1

ND None Detected at or above the method reporting limit

Approved by _____ Date 920311

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Extracted:**	03/04/92
Project:	Unocal 4511 - Bellevue	**Date Analyzed:**	03/06/92
Sample Matrix:	Soil	**Work Order #:**	B920116

QA/QC Report
Laboratory Control Sample
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Laboratory Control Sample

Analyte	Spike Level	Spike Result	Percent Recovery	EPA Acceptance Criteria
Diesel	200	218	109	--

Approved by _____ Date 920311

Columbia Analytical Services, Inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 3-2-92 PAGE 1 OF 1

PROJECT NAME UNOCAL 4511 #U24-08.05
PROJECT MNGR. JOHN NORTH
COMPANY/ADDRESS EMCON NW, INC.
18912 NORTH CREEK PKWY, SUITE 210, BOTHELL WA 98011
PHONE 206-485-5000
SAMPLERS SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐	TPHGas/BTEX5000/8015/8020 Oregon 418.1 ☐ Gas ☐ BTEX ☐	TPH/8015 Modified Diesel ☐	TPH - HCID Hydrocarbon Scan ☐	TCLP Metals ☐	Semi / Pest/ Metals (total or dissolved) ☐ VOA ☐ VOA ☐ Herb ☐ List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	PAH EPA 8040		REMARKS
BHOISE	2-28-92	1030		SOIL	2						X											
SHOISW	2-28	1120		SOIL	1						X											
SPILE1	3-2-92	1305		SOIL	2				X		X									X		ASSUME SAMPLE IS HOT (PID)
SPILE2	3-2	1310		SOIL	2				X		X									X		ASSUME SAMPLE IS HOT (PID)
SPILE3	3-2	1315		SOIL	2				X		X									X		" "
* WHOEXB	3-2	1340		SOIL	1						X											* SEE BELOW
WITOUSB	3-2	1430		SOIL	1						X											
* SDWELLW	3-2	1500		SOIL	1						X											* SEE BELOW
* WDWELLB	3-2	1530		SOIL	1						X											

ANALYSIS REQUESTED

RELINQUISHED BY:
Signature
Printed Name: John Bertrand
Firm: EMCON NW
Date/Time: 3-2-92

RECEIVED BY:
Signature
Printed Name
Firm: 3-2-92 17:00
Date/Time

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr ✓ 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. #
Bill to:

SAMPLE RECEIPT:
Shipping VIA:
Shipping #:
Condition:
Lab No.: B92-0116

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
* TALK TO JOHN NORTH BEFORE RUNNING THESE SAMPLES. HOLD per JN 3/3/92

To Kelso Lab 3/3/92

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

ACO-05

UNOCAL 4511 Bellevue

Columbia Analytical Services inc.

May 5, 1992

John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Unocal #4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the samples submitted to our Bothell laboratory on April 22, 1992. For your reference, this service request has been assigned our work order number B920197.

All analyses were performed in accordance with both Washington State Department of Ecology Accreditation procedures and our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Michael C. Higgins
Laboratory Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	04/21/92
Project:	Unocal #4511 - Bellevue	**Date Received:**	04/22/92
Sample Matrix:	Soil	**Date Extracted:**	04/24/92
		Date Analyzed:	04/30/92
		Work Order No.:	B920197

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	**Lab Code**	**MRL**	**Result**	**MRL**	**Result**
BASE-0421-01	B0197-1	25	ND	100	ND
WWALL13-0421-02	B0197-2	25	ND	100	ND
WWALL17-0421-03	B0197-3	25	ND	100	ND
NWALL-0421-04	B0197-4	25	ND	100	ND
Method Blank	B0197-MB	25	ND	100	ND

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920505

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7605

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	04/21/92
Project:	Unocal #4511 - Bellevue	**Date Received:**	04/22/92
Sample Matrix:	Soil	**Date Extracted:**	04/24/92
		Date Analyzed:	04/30/92
		Work Order No.:	B920197

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
BASE-0421-01	B0197-1	91
WWALL13-0421-02	B0197-2	91
WWALL17-0421-03	B0197-3	91
NWALL-0421-04	B0197-4	95
NWALL-0421-04	B0197-4Dup	98
NWALL-0421-04	B0197-4MS	91
Laboratory Control Sample	B0197-LCS	92
Method Blank	B0197-MB	94
	CAS Acceptance Criteria	50-114

Approved by _____ Date 920505

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	04/21/92
Project:	Unocal #4511 - Bellevue	**Date Received:**	04/22/92
Sample Matrix:	Soil	**Date Extracted:**	04/24/92
		Date Analyzed:	04/30/92
		Work Order No.:	B920197

Duplicate Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: NWALL-0421-04
Lab Code: B0197-4

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Diesel	25	ND	ND	--	--
Oil	100	ND	ND	--	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920505

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	04/21/92
Project:	Unocal #4511 - Bellevue	**Date Received:**	04/22/92
Sample Matrix:	Soil	**Date Extracted:**	04/24/92
		Date Analyzed:	04/30/92
		Work Order No.:	B920197

Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: NWALL-0421-04
Lab Code: B0197-4

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	167	ND	140	84	41-136

ND None Detected at or above the method reporting limit

Approved by _____ Date 920505

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	04/24/92
Project:	Unocal #4511 - Bellevue	**Date Analyzed:**	04/30/92
LCS Matrix:	Soil	**Work Order No.:**	B920197

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	200	171	86	41-136

Approved by _____ Date 970505

Columbia Analytical Services, Inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 4-21-92 PAGE 1 OF 1

PROJECT NAME UNOCAL #511 # 1124-08.02
PROJECT MNGR. John North
COMPANY/ADDRESS EMCON NW
PHONE 485-5900
SAMPLERS SIGNATURE Brian S Carl

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED: TPH/8015 Modified Diesel ☐ Hydrocarbon Scan	REMARKS
BASE-0421-01		1315		Soil	2	X	
WWALL13-0421-02		1410			2	X	
WWALL17-0421-03		1415			2	X	
NWALL-0421-04		1455			2	X	

RELINQUISHED BY:
Signature: Brian S Carl
Printed Name: Brian S. Carl
Firm: EMCON NW
Date/Time: 4-21-92 1800

RECEIVED BY:
Signature: David Maier
Printed Name: DAVID Maier
Firm: Columbia Analytical
Date/Time: 4-22-92 8:00

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr X 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ____

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV.CLP Deliverable Report

INVOICE INFORMATION:
P.O. # ____
Bill to: ____

SAMPLE RECEIPT:
Shipping VIA: ____
Shipping #: ____
Condition: ____
Lab No.: B92-0197

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

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

400-05

[UNOCAL 4511 Bellevue

Columbia Analytical Services, Inc.

March 4, 1992

John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Unocal 4511 - Bellevue/Project #U24-11.03**

Dear John:

Enclosed are the results of the samples submitted to our Bothell laboratory on February 18, 1992. Preliminary results were given on February 19, 1992. For your reference, this work has been assigned our service request number B920084.

All analyses were performed in accordance with both Washington State Department of Ecology Accreditation procedures and our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Michael C. Higgins
Project Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/18/92
Sample Matrix:	Soil	**Work Order #:**	B920084

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		SS-2	SS-3	SS-4
Lab Code:		B0084-1	B0084-2	B0084-3
Date Analyzed:		02/18/92	02/18/92	02/18/92
Analyte	**MRL**			
Benzene	0.05	ND	0.19	0.26
Toluene	0.05	0.43	2.63	2.90
Ethylbenzene	0.05	0.53	3.91	3.71
Total Xylenes	0.05	4.84	20.6	20.9
TPH as Gasoline	1	202	541	481

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/18/92
Sample Matrix:	Soil	**Work Order #:**	B920084

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		SS-5	NPUMPE	NPUMPW
Lab Code:		B0084-4	B0084-5	B0084-6
Date Analyzed:		02/18/92	02/18/92	02/18/92
Analyte	**MRL**			
Benzene	0.05	1.13	ND	ND
Toluene	0.05	11.0	ND	ND
Ethylbenzene	0.05	7.90	ND	ND
Total Xylenes	0.05	26	0.06	ND
TPH as Gasoline	1	900	1	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/18/92
Sample Matrix:	Soil	**Work Order #:**	B920084

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Method Blank
Lab Code:		B0084-MB
Date Analyzed:		02/18/92
Analyte	**MRL**	
Benzene	0.05	ND
Toluene	0.05	ND
Ethylbenzene	0.05	ND
Total Xylenes	0.05	ND
TPH as Gasoline	1	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/18/92
Sample Matrix:	Soil	**Date Analyzed:**	02/19/92
		Work Order #:	B920084

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other♦
OH2O	B0084-7	10	ND	ND	ND
Method Blank	B0084-MB	10	ND	ND	ND

MRL Method Reporting Limit
♦ Quantitated using 30-wt. motor oil as a standard. The MRL for this product is four times the listed MRL.
ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/18/92
Sample Matrix:	Soil	**Date Analyzed:**	02/19/92
		Work Order #:	B920084

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
OH2O	B0084-7	101
Laboratory Control Sample	B0084-LCS	102
Method Blank	B0084-MB	104
	CAS Acceptance Criteria	64-123

Approved by _____ Date 920226

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: Unocal 4511 - Bellevue
Sample Matrix: Soil

Date Received: 02/18/92
Date Extracted: 02/18/92
Date Analyzed: 02/19/92
Work Order #: B920084

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Batch QC
Lab Code: B0078-2

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	Result	MS	DMS	MS	DMS	Criteria	Difference
Diesel	256	257	ND	259	254	101	99	45-120	2

ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Extracted:**	02/18/92
Project:	Unocal 4511 - Bellevue	**Date Analyzed:**	02/19/92
Sample Matrix:	Water	**Work Order #:**	B920084

QA/QC Report
Laboratory Control Sample
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Laboratory Control Sample

Analyte	Spike Level	Spike Result	Percent Recovery	EPA Acceptance Criteria
Diesel	200	201	101	--

Approved by _____ Date 920226

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: Unocal 4511 - Bellevue
Sample Matrix: Soil

Date Received: 02/18/92
Date Extracted: 02/18/92
Date Analyzed: 02/18/92
Work Order #: B920084

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
SS-2	B0084-1	114
SS-3	B0084-2	108
SS-4	B0084-3	119
SS-5	B0084-4	111
SS-5	B0084-4MS	113
SS-5	B0084-4DMS	113
NPUMPE	B0084-5	121
NPUMPW	B0084-6	112
Method Blank	B0084-MB	109
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by _____ Date 920226

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Northwest
Project: Unocal 4511 - Bellevue
Sample Matrix: Soil

Date Received: 02/18/92
Date Extracted: 02/18/92
Date Analyzed: 02/18/92
Work Order #: B920084

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name: SS-5
Lab Code: B0084-4

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.903	0.896	1.13	1.93	1.99	89	96	39-150	8
Toluene	0.903	0.896	11.0	13.04	11.7	226	78	46-148	NA
Ethylbenzene	0.903	0.896	7.90	10.04	8.34	237	49	32-160	NA

ND None Detected at or above the method reporting limit
NA Not Applicable because of the sample matrix. Accuracy of spike recovery value is reduced since the sample concentration was greater than ten times the amount spiked.

Approved by _____ Date 92026

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

Columbia Analytical Services, Inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 2-17-92 PAGE 1 OF 1

PROJECT NAME UNOCAL 4511 # 024-08.03
PROJECT MNGR. JOHN NORTH
COMPANY/ADDRESS EMCON NW, INC.
18912 NORTH CREEK PKWY SUITE 210, BOTHELL, WA 98011
PHONE 206 485-5000
SAMPLERS SIGNATURE John T. Bertrand

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 60(8010) ☐ Pesticides/PCBs 608/8080 ☐ 602/8020 ☐	Total Petroleum Hydrocarbons ~~EPA 418.1~~ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐	TPH - HCID Hydrocarbon Scan ☒	TCLP Metals ☒ VOA ☒ Semi ☐ Pest/ VOA ☒ Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	REMARKS
* SS-2	2-17-92	1130	1	SOIL	3				X	X			X						
* SS-3	2-17	1145	2	SOIL	3				X	X			X						
* SS-4	2-17	1200	3	SOIL	3				X	X			X						
* SS-5	2-17	1235	4	SOIL	3				X	X			X						
NPUMPE	2-17	1550	5	SOIL	2					X			X						
NPUMPW	2-17	1540	6	SOIL	2					X			X						
OH2O	2-17	1430	7	SOIL	4			X	X		X		X						TCLP Metals Only

ANALYSIS REQUESTED

RELINQUISHED BY:	RECEIVED BY:
Signature: John Bertrand	Signature:
Printed Name: EMCON NW INC	Printed Name:
Firm: 2-18-92 800AM	Firm:
Date/Time	Date/Time

RELINQUISHED BY:	RECEIVED BY:
Signature: Stan Spurgeon	Signature:
Printed Name: CAS	Printed Name:
Firm: 2-18-92 0850	Firm:
Date/Time	Date/Time

TURNAROUND REQUIREMENTS:
X 24 hr ___ 48 hr ___ 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV.CLP Deliverable Report

INVOICE INFORMATION:
P.O. # ___
Bill to: ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping #: ___
Condition: ___
Lab No.: B92-0084

SPECIAL INSTRUCTIONS/COMMENTS:
*24HR TAT ALL OTHERS NORM TAT JH 2/18
HOLD TCLP PENDING 8015/8020 RESULTS (on samples 1-6)
PCB's only on 8080

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

400-

UNOCAL 4511 Bellevue

Columbia Analytical Services, Inc.

March 3, 1992

John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Unocal 4511 - Bellevue/Project #U24-08.03**

Dear John:

Enclosed are the results of the samples submitted to our Bothell laboratory on February 24, 1992. Preliminary results were given on February 25, 1992. For your reference, this work has been assigned our service request number B920095.

All analyses were performed in accordance with both Washington State Department of Ecology Accreditation procedures and our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Michael C. Higgins
Project Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/24/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/24/92
Sample Matrix:	Soil	**Work Order #:**	B920095

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		WPUMPE	WPUMPEW	Method Blank
Lab Code:		B0095-1	B0095-2	B0095-MB
Date Analyzed:		02/25/92	02/25/92	02/24/92
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.05	ND	ND	ND
Ethylbenzene	0.05	ND	ND	ND
Total Xylenes	0.05	ND	ND	ND
TPH as Gasoline	1	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920303

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	02/24/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/24/92
Sample Matrix:	Soil	**Date Analyzed:**	02/25/92
		Work Order #:	B920095

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
WPUMPE	B0095-1	76
WPUMPEW	B0095-2	74
Method Blank	B0095-MB	54
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by _____ Date 920303

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	02/24/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/24/92
Sample Matrix:	Soil	**Date Analyzed:**	02/25/92
		Work Order #:	B920095

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Batch QC
Lab Code: B0090-10

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	1.03	1.04	ND	0.463	0.507	45	49	39-150	9
Toluene	1.03	1.04	ND	0.493	0.531	48	51	46-148	6
Ethylbenzene	1.03	1.04	ND	0.484	0.528	47	51	32-160	8

ND None Detected at or above the method reporting limit

Approved by _____ Date 920303

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

Analytical Services Inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 2-24-92 PAGE 1 OF 1

PROJECT NAME UNOCAL 4511 # U24-08.03
PROJECT MNGR. JOHN NORTH
COMPANY/ADDRESS EMCON NORTHWEST, INC.
18912 NORTH CREEK PKWY SUITE 210
BOTHELL WA 98011 PHONE 206 485-5000
SAMPLERS SIGNATURE John T. Bertrand

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐	TPH/Gas/BTEX/5030/8015/8020 Oregon 418.1 ☐	TPH/8015 Modified Gas ☐ BTEX ☐	Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐	Semi Pest/ VOA ☐ VOA ☐ Herb ☐ Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3, (circle)	NH_3-N, COD, Total P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020		REMARKS
WPUMPE	2-24-92	1430	2ea	SOIL	X						X											RUSH ORDER!
WPUMPEW	2-24	1445	3ea	SOIL	X						X											

RELINQUISHED BY:
Signature: John T. Bertrand
Printed Name: John T. Bertrand
Firm: EMCON NW, Inc.
Date/Time: 2-24-92 16:00

RECEIVED BY:
Signature:
Printed Name: CAS
Firm:
Date/Time: 2-24-92 16:00

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

TURNAROUND REQUIREMENTS:
✓ 24 hr ___ 48 hr ___ 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP, MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. #
Bill to:

SAMPLE RECEIPT:
Shipping VIA:
Shipping #:
Condition:
Lab No. B920095

SPECIAL INSTRUCTIONS/COMMENTS:
STRONG "SOLVENT" SMELL w/ >50ppm TIP

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

400-05

UNOCAL 4511 Bellevue

Columbia Analytical Services inc.

February 26, 1992

ORIGINAL IN PROJECT

RECEIVED
FEB 27 1992

John North
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Unocal 4511 - Bellevue/Project #U11-08.03**

Dear John:

Enclosed are the results of the samples submitted to our Bothell laboratory on February 19, 1992. Preliminary results were given on February 20, 1992. For your reference, this work has been assigned our service request number B920087.

All analyses were performed in accordance with both Washington State Department of Ecology Accreditation procedures and our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Michael C. Higgins
Project Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	02/19/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/19/92
Sample Matrix:	Soil	**Work Order #:**	B920087

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		WPUMPN	WPUMPS	Method Blank
Lab Code:		B0087-1	B0087-2	B0087-MB
Date Analyzed:		02/19/92	02/19/92	02/19/92
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.05	ND	ND	ND
Ethylbenzene	0.05	ND	ND	ND
Total Xylenes	0.05	0.23	ND	ND
TPH as Gasoline	1	3	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

18912 North Creek Parkway, Suite 118 • Bothell, WA 98011 • 206/486-6983 • Fax 206/486-7695

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	02/19/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/19/92
Sample Matrix:	Soil	**Date Analyzed:**	02/19/92
		Work Order #:	B920087

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
WPUMPN	B0087-1	90
WPUMPS	B0087-2	82
Method Blank	B0087-MB	105
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by _____ Date 920226

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	EMCON Northwest	**Date Received:**	02/19/92
Project:	Unocal 4511 - Bellevue	**Date Extracted:**	02/19/92
Sample Matrix:	Soil	**Date Analyzed:**	02/19/92
		Work Order #:	B920087

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Batch QC
Lab Code: B0088-1

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.837	0.818	ND	0.379	0.448	45	55	39-150	20
Toluene	0.837	0.818	ND	0.398	0.470	48	57	46-148	17
Ethylbenzene	0.837	0.818	ND	0.411	0.484	49	59	32-160	19

ND None Detected at or above the method reporting limit

Approved by _____ Date 920226

Columbia Analytical Services, Inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 2-18-92 PAGE 1 OF 1

PROJECT NAME UNOCAL 4511 #024-08.03

PROJECT MNGR. JOHN NORTH

COMPANY/ADDRESS EMCON NW INC.

18912 NORTH CREEK PKWY SUITE 210

BOTHELL, WA 98011 PHONE (206) 485-5000

SAMPLERS SIGNATURE John T. Bert

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐	TPH/Gas/BTEX/5030/8015/8020 Oregon 418.1 ☐ Gas ☐ BTEX ☐	TPH/8015 Modified Diesel ☐	TPH - HCID Hydrocarbon Scan ☐	TCLP Metals ☒ VOA ☒	Semi Pes/V Metals (total or dissolved) VOA ☒ Herb ☐ List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	REMARKS
WPUMPN	2-18-92	10:45		SOIL	2						X			X						
WPUMPS	2-18-92	1130		SOIL	2						X			X						

RELINQUISHED BY:

Signature: John Bertrand

Printed Name: John Bertrand

Firm: EMCON NW, INC.

Date/Time: 2-18-92 16:15

RECEIVED BY:

Signature: Stan Spurgeon

Printed Name: Stan Spurgeon

Firm: CAS

Date/Time: 2-18-92 1615

RELINQUISHED BY:

Signature:

Printed Name:

Firm:

Date/Time:

RECEIVED BY:

Signature:

Printed Name:

Firm:

Date/Time:

TURNAROUND REQUIREMENTS:

X 24 hr ___ 48 hr ___ 5 day

___ Standard (~ 10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX Preliminary Results

Requested Report Date: ___

REPORT REQUIREMENTS

___ I. Routine Report

___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ IV.CLP Deliverable Report

INVOICE INFORMATION:

P.O. #: ___

Bill to: ___

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping #: ___

Condition: ___

Lab No.: B92-0087

SPECIAL INSTRUCTIONS/COMMENTS:

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - [illegible]

UNOCAL 7511 Bellevue

Columbia Analytical Services inc.

September 24, 1991

RECEIVED
SEP 27 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U2408.03**

Dear John:

Enclosed are the results of the samples submitted to our lab on August 19, 1991. Preliminary results were transmitted via facsimile on September 17, 1991. For your reference, our service request number for this work is B914726.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin Elliott

Colin B. Elliott
Senior Project Chemist

CBE/mbm

ORIGINAL IS IN PROJECT FILING

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/20/91
Sample Matrix:	Soil	**Date Analyzed:**	08/20/91
		Work Order #:	B914726

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
HYD-1	B4726-1	25	ND
HYD-2	B4726-2	25	495
HYD-3A	B4726-3	25	ND
HYD-3B	B4726-4	25	ND
HYD-4	B4726-5	25	61,200
HYD-4B	B4726-6	25	1,450
HYD-6	B4726-7	25	6,460
HYD-6B	B4726-8	25	377
Method Blank	B4726-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glen Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	08/20/91
Sample Matrix:	Soil	Date Analyzed:	08/20/91
		Work Order #:	B914726

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other♦
HYD-1	B4726-1	10	ND	ND	ND
HYD-2	B4726-2	10	*394	ND	261
HYD-3A	B4726-3	10	ND	ND	ND
HYD-3B	B4726-4	10	ND	ND	ND
HYD-4	B4726-5	10	*162	ND	26,700
HYD-4B	B4726-6	10	*899	ND	326
HYD-6	B4726-7	10	*6,670	ND	1,030
HYD-6B	B4726-8	10	*115	ND	238
Method Blank	B4726-MB	10	ND	ND	ND

MRL Method Reporting Limit
♦ Quantitated using hydraulic oil as a standard. The MRL for this product is four times the listed MRL.
ND None Detected at or above the method reporting limit
* Mineral spirits

Approved by Colin Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	08/30 & 09/01/91
Sample Matrix:	Soil	Work Order #:	B914726

Volatile Organic Compounds
EPA Method 8240
mg/Kg (ppm) Dry Weight Basis

Sample Name:		HYD-2	HYD-4B
Lab Code:		B4726-2	B4726-6
Date Analyzed:		09/03/91	09/03/91
Analyte	**MRL***		
Chloromethane	5	ND	ND
Vinyl Chloride	5	ND	ND
Bromomethane	5	ND	ND
Chloroethane	5	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND
Trichlorotrifluoroethane (Freon 113)	5	ND	ND
1,1-Dichloroethene	5	ND	ND
Acetone	10	ND	ND
Carbon Disulfide	0.5	ND	ND
Methylene Chloride	5	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND
2-Butanone (MEK)	5	ND	ND
1,1-Dichloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
Benzene	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
Vinyl Acetate	5	ND	ND
Trichloroethene (TCE)	0.5	ND	ND
1,2-Dichloropropane	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND
2-Hexanone	5	ND	ND
4-Methyl-2-pentanone (MIBK)	5	ND	ND
Toluene	0.5	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Tetrachloroethene (PCE)	0.5	ND	ND
Dibromochloromethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Ethylbenzene	0.5	0.8	1.0
Styrene	0.5	ND	ND
Total Xylenes	0.5	9.0	8.6
Bromoform	0.5	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND
1,3-Dichlorobenzene	0.5	ND	ND
1,4-Dichlorobenzene	0.5	ND	ND
1,2-Dichlorobenzene	0.5	ND	ND

MRL Method Reporting Limit
* Elevated MRLs because of matrix interferences.
ND None Detected at or above the method reporting limit

Approved by John Elliott Date 9/25/91

1317 South 13th Ave. P.O. Box 479 Kelso, Washington 98626 Telephone 206/577-7222

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	09/01/91
Sample Matrix:	Soil	Work Order #:	B914726

Volatile Organic Compounds
EPA Method 8240
mg/Kg (ppm) Dry Weight Basis

Sample Name:		HYD-4	HYD-6B
Lab Code:		B4726-5	B4726-8
Date Analyzed:		09/03/91	09/03/91
Analyte	**MRL**		
Chloromethane	0.5	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Trichlorofluoromethane (Freon 11)	0.05	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND
1,1-Dichloroethene	0.1	ND	ND
Acetone	1.0	ND	ND
Carbon Disulfide	0.05	ND	ND
Methylene Chloride	0.5	ND	ND
trans-1,2-Dichloroethene	0.05	ND	ND
cis-1,2-Dichloroethene	0.05	ND	ND
2-Butanone (MEK)	0.5	ND	ND
1,1-Dichloroethane	0.05	ND	ND
Chloroform	0.05	ND	ND
1,1,1-Trichloroethane (TCA)	0.05	ND	ND
Carbon Tetrachloride	0.05	ND	ND
Benzene	0.05	1.44	ND
1,2-Dichloroethane	0.05	ND	ND
Vinyl Acetate	0.5	ND	ND
Trichloroethene (TCE)	0.05	ND	ND
1,2-Dichloropropane	0.05	ND	ND
Bromodichloromethane	0.05	ND	ND
2-Chloroethyl Vinyl Ether	0.5	ND	ND
trans-1,3-Dichloropropene	0.05	ND	ND
2-Hexanone	0.5	ND	ND
4-Methyl-2-pentanone (MIBK)	0.5	ND	ND
Toluene	0.05	*18.8	ND
cis-1,3-Dichloropropene	0.05	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND
Tetrachloroethene (PCE)	0.05	ND	ND
Dibromochloromethane	0.05	ND	ND
Chlorobenzene	0.05	ND	ND
Ethylbenzene	0.05	5.21	0.28
Styrene	0.05	ND	ND
Total Xylenes	0.05	*23.8	2.76
Bromoform	0.05	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND
1,3-Dichlorobenzene	0.05	ND	ND
1,4-Dichlorobenzene	0.05	ND	ND
1,2-Dichlorobenzene	0.05	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Result is from the analysis of a diluted sample performed on September 4, 1991.

Approved by Chris Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	09/01/91
Sample Matrix:	Soil	Work Order #:	B914726

Volatile Organic Compounds
EPA Method 8240
mg/Kg (ppm) Dry Weight Basis

Sample Name:		HYD-6
Lab Code:		B4726-7
Date Analyzed:		09/03/91

Analyte	MRL*	
Chloromethane	5	ND
Vinyl Chloride	5	ND
Bromomethane	5	ND
Chloroethane	5	ND
Trichlorofluoromethane (Freon 11)	0.5	ND
Trichlorotrifluoroethane (Freon 113)	5	ND
1,1-Dichloroethene	5	ND
Acetone	10	ND
Carbon Disulfide	0.5	ND
Methylene Chloride	5	ND
trans-1,2-Dichloroethene	0.5	ND
cis-1,2-Dichloroethene	0.5	ND
2-Butanone (MEK)	5	ND
1,1-Dichloroethane	0.5	ND
Chloroform	0.5	ND
1,1,1-Trichloroethane (TCA)	0.5	ND
Carbon Tetrachloride	0.5	ND
Benzene	0.5	ND
1,2-Dichloroethane	0.5	ND
Vinyl Acetate	5	ND
Trichloroethene (TCE)	0.5	ND
1,2-Dichloropropane	0.5	ND
Bromodichloromethane	0.5	ND
2-Chloroethyl Vinyl Ether	5	ND
trans-1,3-Dichloropropene	0.5	ND
2-Hexanone	5	ND
4-Methyl-2-pentanone (MIBK)	5	ND
Toluene	0.5	4.9
cis-1,3-Dichloropropene	0.5	ND
1,1,2-Trichloroethane	0.5	ND
Tetrachloroethene (PCE)	0.5	ND
Dibromochloromethane	0.5	ND
Chlorobenzene	0.5	ND
Ethylbenzene	0.5	4.4
Styrene	0.5	ND
Total Xylenes	0.5	34.0
Bromoform	0.5	ND
1,1,2,2-Tetrachloroethane	0.5	ND
1,3-Dichlorobenzene	0.5	ND
1,4-Dichlorobenzene	0.5	ND
1,2-Dichlorobenzene	0.5	ND

MRL Method Reporting Limit
* Elevated MRLs because of matrix interferences.
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	08/30 & 09/01/91
Sample Matrix:	Soil	Work Order #:	B914726

Volatile Organic Compounds
EPA Method 8240
mg/Kg (ppm) Dry Weight Basis

Sample Name:		Method Blank	Method Blank
Lab Code:		B4726-MB1	B4726-MB2
Date Analyzed:		09/03/91	09/03/91
Analyte	MRL		
Chloromethane	0.5	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Trichlorofluoromethane (Freon 11)	0.05	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND
1,1-Dichloroethene	0.1	ND	ND
Acetone	1.0	ND	ND
Carbon Disulfide	0.05	ND	ND
Methylene Chloride	0.5	ND	ND
trans-1,2-Dichloroethene	0.05	ND	ND
cis-1,2-Dichloroethene	0.05	ND	ND
2-Butanone (MEK)	0.5	ND	ND
1,1-Dichloroethane	0.05	ND	ND
Chloroform	0.05	ND	ND
1,1,1-Trichloroethane (TCA)	0.05	ND	ND
Carbon Tetrachloride	0.05	ND	ND
Benzene	0.05	ND	ND
1,2-Dichloroethane	0.05	ND	ND
Vinyl Acetate	0.5	ND	ND
Trichloroethene (TCE)	0.05	ND	ND
1,2-Dichloropropane	0.05	ND	ND
Bromodichloromethane	0.05	ND	ND
2-Chloroethyl Vinyl Ether	0.5	ND	ND
trans-1,3-Dichloropropene	0.05	ND	ND
2-Hexanone	0.5	ND	ND
4-Methyl-2-pentanone (MIBK)	0.5	ND	ND
Toluene	0.05	ND	ND
cis-1,3-Dichloropropene	0.05	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND
Tetrachloroethene (PCE)	0.05	ND	ND
Dibromochloromethane	0.05	ND	ND
Chlorobenzene	0.05	ND	ND
Ethylbenzene	0.05	ND	ND
Styrene	0.05	ND	ND
Total Xylenes	0.05	ND	ND
Bromoform	0.05	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND
1,3-Dichlorobenzene	0.05	ND	ND
1,4-Dichlorobenzene	0.05	ND	ND
1,2-Dichlorobenzene	0.05	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Sweet-Edwards/EMCON, Inc. Date Received: 08/19/91
Project: UNOCAL #4511 - Bellevue Work Order #: B914726
Sample Matrix: Soil

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		HYD-1
Lab Code:		B4726-1
Date Analyzed:		08/27/91
Analyte	**MRL**	
Chloromethane	5	ND
Vinyl Chloride	5	ND
Bromomethane	5	ND
Chloroethane	5	ND
Trichlorofluoromethane (Freon 11)	5	ND
Trichlorotrifluoroethane (Freon 113)	50	ND
1,1-Dichloroethene	5	ND
Acetone	50	ND
Carbon Disulfide	5	ND
Methylene Chloride	10	ND
trans-1,2-Dichloroethene	5	ND
cis-1,2-Dichloroethene	5	ND
2-Butanone (MEK)	10	ND
1,1-Dichloroethane	5	ND
Chloroform	5	ND
1,1,1-Trichloroethane (TCA)	5	ND
Carbon Tetrachloride	5	ND
Benzene	5	ND
1,2-Dichloroethane	5	ND
Vinyl Acetate	10	ND
Trichloroethene (TCE)	5	ND
1,2-Dichloropropane	5	ND
Bromodichloromethane	5	ND
2-Chloroethyl Vinyl Ether	10	ND
trans-1,3-Dichloropropene	5	ND
2-Hexanone	10	ND
4-Methyl-2-pentanone (MIBK)	10	ND
Toluene	5	ND
cis-1,3-Dichloropropene	5	ND
1,1,2-Trichloroethane	5	ND
Tetrachloroethene (PCE)	5	ND
Dibromochloromethane	5	ND
Chlorobenzene	5	ND
Ethylbenzene	5	ND
Styrene	5	ND
Total Xylenes	5	ND
Bromoform	5	ND
1,1,2,2-Tetrachloroethane	5	ND
1,3-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Sweet-Edwards/EMCON, Inc. Date Received: 08/19/91
Project: UNOCAL #4511 - Bellevue Work Order #: B914726
Sample Matrix: Soil

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		HYD-3A	HYD-3B
Lab Code:		B4726-3	B4726-4
Date Analyzed:		08/30/91	08/30/91
Analyte	MRL		
Chloromethane	5	ND	ND
Vinyl Chloride	5	ND	ND
Bromomethane	5	ND	ND
Chloroethane	5	ND	ND
Trichlorofluoromethane (Freon 11)	5	ND	ND
Trichlorotrifluoroethane (Freon 113)	10	ND	ND
1,1-Dichloroethene	5	ND	ND
Acetone	50	ND	ND
Carbon Disulfide	5	ND	ND
Methylene Chloride	10	ND	14
trans-1,2-Dichloroethene	5	ND	ND
cis-1,2-Dichloroethene	5	ND	ND
2-Butanone (MEK)	10	ND	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Vinyl Acetate	10	ND	ND
Trichloroethene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
trans-1,3-Dichloropropene	5	ND	ND
2-Hexanone	10	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND
Toluene	5	ND	ND
cis-1,3-Dichloropropene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Styrene	5	ND	ND
Total Xylenes	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	08/19/91
Project:	UNOCAL #4511 - Bellevue	Work Order #:	B914726
Sample Matrix:	Soil		

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		Method Blank	Method Blank
Lab Code:		B4726-MB	B4726-MB
Date Analyzed:		08/27/91	08/30/91
Analyte	**MRL**		
Chloromethane	5	ND	ND
Vinyl Chloride	5	ND	ND
Bromomethane	5	ND	ND
Chloroethane	5	ND	ND
Trichlorofluoromethane (Freon 11)	5	ND	ND
Trichlorotrifluoroethane (Freon 113)	50	ND	ND
1,1-Dichloroethene	5	ND	ND
Acetone	50	ND	ND
Carbon Disulfide	5	ND	ND
Methylene Chloride	10	ND	ND
trans-1,2-Dichloroethene	5	ND	ND
cis-1,2-Dichloroethene	5	ND	ND
2-Butanone (MEK)	10	14	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Vinyl Acetate	10	ND	ND
Trichloroethene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
trans-1,3-Dichloropropene	5	ND	ND
2-Hexanone	10	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND
Toluene	5	ND	ND
cis-1,3-Dichloropropene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Styrene	5	ND	ND
Total Xylenes	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glen Elliott Date 9/25/91

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/20/91
Sample Matrix:	Soil	**Date Analyzed:**	08/20/91
		Work Order #:	B914726

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
HYD-3A	B4726-3MS	25	716	ND	718	100	75-125
HYD-3A	B4726-3DMS	25	727	ND	884	122	75-125

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/20/91
Sample Matrix:	Soil	**Date Analyzed:**	08/20/91
		Work Order #:	B914726

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
HYD-1	B4726-1	101
HYD-2	B4726-2	92.9
HYD-3A	B4726-3	99.9
HYD-3B	B4726-4	95.7
HYD-4	B4726-5	NA
HYD-4B	B4726-6	96.1
HYD-6	B4726-7	93.8
HYD-6B	B4726-8	93.4
HYD-3A	B4726-3MS	89.1
HYD-3A	B4726-3DMS	97.3
Method Blank	B4726-MB	98.9
	CAS Acceptance Criteria	64-123

NA Not Applicable because of the sample matrix. Analysis of this sample required a dilution such that the surrogate concentration was diluted below the MRL.

Approved by Alan Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/20/91
Sample Matrix:	Soil	**Date Analyzed:**	08/20/91
		Work Order #:	B914726

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: HYD-3A
Lab Code: B4726-3

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	Result	MS	DMS	MS	DMS	Criteria	Difference
Diesel	479	505	ND	456	499	95.2	98.8	45-120	3.7

ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/30 & 09/01/91
Sample Matrix:	Soil	**Date Analyzed:**	09/03/91
		Work Order #:	B914726

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240

Sample Name	Lab Code	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
HYD-2	B4726-2	107	101	118
HYD-4	B4726-5	108	101	103
HYD-4B	B4726-6	109	101	107
HYD-6	B4726-7	108	102	*125
HYD-6B	B4726-8	108	102	*140
Method Blank	B4726-MB1	103	100	84.8
Method Blank	B4726-MB2	104	98.4	85.4
EPA Acceptance Criteria		70-121	81-117	74-121

* Outside acceptance limits because of matrix interferences. The gas chromatogram showed nontarget components that interfered with the analysis. The sample was not reanalyzed.

Approved by Alan Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	08/27/91
Sample Matrix:	Soil	**Work Order #:**	B914726

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240 (Low Level)

Sample Name	Lab Code	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
HYD-1	B4726-1	107	101	87.6
Method Blank	B4726-MB	103	100	89.2
EPA Acceptance Criteria		70-121	81-117	74-121

Approved by Chris Elliott Date 9/25/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	08/30/91
Sample Matrix:	Soil	**Work Order #:**	B914726

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240 (Low Level)

Sample Name	Lab Code	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
HYD-1	B4726-1MS	113	103	91.2
'YD-1	B4726-1DMS	117	103	91.6
.YD-3A	B4726-3	120	104	91.6
HYD-3B	B4726-4	120	103	94.2
Method Blank	B4726-MB	113	102	89.4
EPA Acceptance Criteria		70-121	81-117	74-121

Approved by Alan Elliott Date 9/25/91

00016

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/19/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	08/30/91
Sample Matrix:	Soil	**Work Order #:**	B914726

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb)
Dry Weight Basis

Sample Name: HYD-1
Lab Code: B4726-1

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
1,1-Dichloroethene	47	48	ND	49	52	104	108	59-172	4
Trichloroethene	47	48	ND	48	48	102	100	62-137	2
Chlorobenzene	47	48	ND	29	28	61.7	*58.3	60-133	6
Toluene	47	48	ND	41	41	87.2	85.4	59-139	2
Benzene	47	48	ND	52	55	111	114	66-142	3

ND None Detected at or above the method reporting limit
***** Outside acceptance limits because of matrix effects. This sample was analyzed a second time and again produced unacceptable recovery values. The results from the initial analysis are reported.

Approved by Chris Elliott Date 9/25/91

Chain of Custody / Laboratory Analysis Request

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

DATE 8/19/91 PAGE 1 OF 2

PROJECT UNOCAL 4571 # 121-40803
CLIENT INFO. Bellevue, Wash. CONTACT John North / Jeff Kirtland
ADDRESS SE/E Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kirtland PHONE# 485-5000
SAMPLERS SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	418.1	8015m semivol.*				PID	NUMBER OF CONTAINERS
1. HYD-1	8/16/91	1522		Soil		X												X	X					2
2. HYD-2	8/16/91	1530		Soil		X												X	X					2
~~3. HYD-3~~	~~8/16/91~~	~~1540~~		~~Soil~~										DNR										
4. HYD-3A	8/19/91	100		Soil		X												X	X				43	2
5. HYD-3B	8/19/91	1100		Soil		X												X	X				346	2
6. HYD-4	8/19/91	1010		Soil		X												X	X				627	2
7. HYD-4B	8/19/91	1120		Soil		X												X	X				1084	2
8. HYD-6E SAK	8/19/91	1030		Soil		X												X	X				1085	2

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature Jeffrey A Kirtland	Signature	Signature	Hand Delivered	
Printed Name JE/E	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm 8/19/91 1620	Firm	Firm	VIA	Chain of Custody Seals
Date/Time	Date/Time	Date/Time	Project	Received in good condition
				LAB NO.

Received By	Received By	Received By	SPECIAL INSTRUCTIONS/COMMENTS
Signature Stan Spurgeon	Signature	Signature	* quantify Mineral Spirits If Identified
Printed Name Stan Spurgeon CTS	Printed Name Lance Jordan	Printed Name	
Firm 8/19/91 1620	Firm CAS	Firm	
Date/Time	Date/Time 8/20/91	Date/Time	

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of Custody / Laboratory Analysis Request

DATE 8/19/91 PAGE 2 OF 2

PROJECT UNOCAL 4511 #U2408.03
CLIENT INFO. Bellevue, Utah
CONTACT John North / Jeff Kirkland
ADDRESS SE/E Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kirkland PHONE# 485-5000
SAMPLERS SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	418.1	8015M Semi! Vol.				NUMBER OF CONTAINERS
1. HYP-6B	8/19/91	1130		Soil		X												X	X			1062	2
2.																							
3.																							
4.																							
5.																							
6.																							
7.																							
8.																							

Relinquished By Sweet-Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature	Signature	Signature	Hand Delivered	
Printed Name Jeff Kirkland	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm SE/E	Firm	Firm	VIA	Chain of Custody Seals
Date/Time 8/19/91 1620 JDE	Date/Time	Date/Time	Project	Received in good condition
				LAB NO.
Received By Stan Spurgeon	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature Stan Spurgeon	Signature	Signature		
Printed Name CAS	Printed Name Lance Jordin	Printed Name		
Firm 8/19/91 1620	Firm CAS	Firm		
Date/Time	Date/Time 8/20/91	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

UNOCAL 4511 Bellevue

3

Columbia Analytical Services inc.

ORIGINAL IS IN PROJECT FILING

RECEIVED
SEP 18 1991

September 16, 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U2408.03**

Dear John:

Enclosed are the amended results of the sample submitted to our lab on August 28, 1991. The sample name was corrected to MW-11-12.5 from MW-11-R.5. For your reference, our service request number for this work is B914915.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin Elliott

Colin B. Elliott
Senior Project Chemist

CBE/mbm

cc: Jeff Kirtland (SE-E/Bothell)

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/28/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/27,28/91
Sample Matrix:	Soil	**Work Order #:**	B914915

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		MW-11-12.5	Method Blank
Lab Code:		B4915-1	B4915-MB
Date Analyzed:		08/29/91	08/29/91
Analyte	**MRL**		
Benzene	0.05	ND	ND
Toluene	0.05	ND	ND
Ethylbenzene	0.05	2.03	ND
Total Xylenes	0.05	6.31	ND
TPH as Gasoline	1	216	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 9/16/91

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/28/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/27,28/91
Sample Matrix:	Soil	**Date Analyzed:**	08/29/91
		Work Order #:	B914915

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
MW-11-12.5	B4915-1	94.3
Method Blank	B4915-MB	89.8
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Alan Elliott Date 9/16/91

Columbia Analytical Services, Inc.

1317 South 13th Avenue • Kelso, WA 98626 • 206/577-7222, Fax 206/636-1068

Chain of Custody/ Laboratory Analysis Request

DATE 8/28/91 PAGE 1 OF 1

PROJECT UNOCAL 4511 - Bellevue #U2408.03

SEND REPORT TO John North / Jeff Kirkland

ADDRESS SBE Bothell

TELEPHONE# 485-5000

SAMPLERS NAME Jeff Kirkland PHONE# 485-5000

SAMPLERS SIGNATURE Jeff Kirkland

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020 BTEX	Gas/BTEX MOD 8015/8020	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons - Mod 8015	Total Petroleum Hydrocarbons - 418.1	Total Organic Halides (TOX) 9020	Total Organic Carbon (TOC) 415/9060	EPTOX Metals As, Ba, Cd, Cr, Pb, Hg, Se, Ag	Metals (total or dissolved) List Below	Cyanide	Ph, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3, (Circle)	NH3-N, COD, Total-P, TKN (Circle)	Coliform (Circle) Total, Fecal			BTEX	NUMBER OF CONTAINERS
1. MW-11-B.5	8/27/91	1051		soil					X														1091	2
2.																								
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								

Relinquished By	Relinquished By
Signature	Signature
Printed Name Jeff Kirkland	Printed Name
Firm SBE	Firm
Date/Time 8/28/91 1337	Date/Time
Received By: Candice Aikins	Received By:
Signature	Signature
Printed Name CANDICE AIKINS	Printed Name
Firm	Firm
Date/Time 8/29/91 1340	Date/Time

Invoice Information:
P.O.#
Bill to:

Project Information
Site Contact:
Site Address:

Sample Receipt
Shipped Via:
Seals Intact:
Condition:
Lab No. B91 1915

Special Instruction/Comments:

SR Number:

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

UNOCAL 4511 Bellevue

ORIGINAL IS IN PROJECT FILING

Columbia Analytical Services Inc.

August 15, 1991

RECEIVED
AUG 19 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the rush samples submitted to our lab on August 8, 1991. Preliminary results were transmitted via facsimile on August 12, 1991. For your reference, our service request number for this work is B914441.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Charles Morrow for

Colin B. Elliott
Senior Project Chemist

CBE/so

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	08/12/91
Sample Matrix:	Soil	**Work Order #:**	B914441

Total Lead
EPA Method 7420
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
Stockpile #1	K4441-1	3	7
Stockpile #2	K4441-2	3	5
Stockpile #3	K4441-3	3	5
Stockpile #4	K4441-4	3	6
Stockpile #5	K4441-5	3	7
Stockpile #6	K4441-6	3	8
Stockpile #7	K4441-7	3	8
Stockpile #8	K4441-8	3	5
Method Blank	K4441-MB	3	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/16/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/07/91
Sample Matrix:	Soil	**Work Order #:**	B914441

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Stockpile #1	Stockpile #2	Stockpile #3
Lab Code:		B4441-1	B4441-2	B4441-3
Date Analyzed:		08/09/91	08/09/91	08/09/91
Analyte	**MRL**			
Benzene	0.05	ND	0.10	ND
Toluene	0.05	ND	0.63	ND
Ethylbenzene	0.05	ND	2.16	ND
Total Xylenes	0.05	0.06	18.7	0.20
TPH as Gasoline	1	ND	406	5

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/16/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/07/91
Sample Matrix:	Soil	**Work Order #:**	B914441

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Stockpile #4	Stockpile #5	Stockpile #6
Lab Code:		B4441-4	B4441-5	B4441-6
Date Analyzed:		08/10/91	08/09/91	08/09/91
Analyte	**MRL**			
Benzene	0.05	5.08	ND	0.24
Toluene	0.05	110	ND	4.07
Ethylbenzene	0.05	20.2	0.16	4.50
Total Xylenes	0.05	239	0.61	33.1
TPH as Gasoline	1	3,260	130	436

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/16/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/07/91
Sample Matrix:	Soil	**Work Order #:**	B914441

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Stockpile #7	Stockpile #8	Method Blank
Lab Code:		B4441-7	B4441-8	B4441-MB
Date Analyzed:		08/10/91	08/10/91	08/09/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.05	2.35	ND	ND
Ethylbenzene	0.05	3.56	ND	ND
Total Xylenes	0.05	35.9	0.06	ND
TPH as Gasoline	1	1,350	23	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/16/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/07/91
Sample Matrix:	Soil	**Date Analyzed:**	08/09,10/91
		Work Order #:	B914441

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
Stockpile #1	B4441-1	102
Stockpile #1	B4441-1MS	106
Stockpile #1	B4441-1DMS	104
Stockpile #2	B4441-2	106
Stockpile #3	B4441-3	101
Stockpile #4	B4441-4	112
Stockpile #5	B4441-5	103
Stockpile #6	B4441-6	108
Stockpile #7	B4441-7	108
Stockpile #8	B4441-8	108
Method Blank	B4441-MB	102
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Charles Mourn Date 8/16/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/08/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	08/07/91
Sample Matrix:	Soil	**Date Analyzed:**	08/09/91
		Work Order #:	B914441

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Stockpile #1
Lab Code: B4441-1

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative* Percent Difference
Benzene	1.00	0.93	ND	1.01	0.74	101	79.6	39-150	23.7
Toluene	1.00	0.93	ND	1.10	0.79	110	84.9	46-148	25.8
Ethylbenzene	1.00	0.93	ND	1.13	0.80	113	86.0	32-160	27.1

TPH Total Petroleum Hydrocarbons
***** Elevated Relative Percent Difference due to carryover into MS from previous sample.
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/16/91

00006

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of Custody / Laboratory Analysis Request

DATE 8/8/91 PAGE 1 OF 1

PROJECT Unocal # 4511 Bellevue # 424-08.02
CLIENT INFO.
CONTACT John North
ADDRESS SC/C
TELEPHONE# 485-5000
SAMPLERS NAME P. Sargent PHONE# 485-5000
SAMPLERS SIGNATURE Peter A. Sargent

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8015m/8020	Total Pb					NUMBER OF CONTAINERS
1. Stockpile #1	8/8/91	9:10		Soil														X	X					2
2. " #2		9:25		Soil														X	X					2
3. " #3		9:50		Soil														X	X					2
4. " #4		10:10		Soil														X	X					2
5. " #5		10:25		Soil														X	X					2
6. " #6		10:40		Soil														X	X					2
7. " #7		11:00		Soil														X	X					2
8. " #8		11:20		Soil														X	X					2

ANALYSIS REQUESTED — GENERAL CHEMISTRY (Specify) — OTHER (Specify)

Relinquished By/Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature: Peter A. Sargent	Signature	Signature	Shipping I.D. No.	Total No. of Containers
Printed Name: Peter A. Sargent	Printed Name	Printed Name	VIA	Chain of Custody Seals
Firm: SC/C	Firm	Firm	Project	Received in good condition
Date/Time: 8-8-91 / 12:15	Date/Time	Date/Time		LAB NO. 891-4441
Received By: Stan Spurgeon	Received By: Maureen Joanne	Received By	SPECIAL INSTRUCTIONS/COMMENTS	
Signature: Stan Spurgeon	Signature: Maureen Joanne	Signature	48 Turn around	
Printed Name: CAS	Printed Name: CAS	Printed Name	No later than 8/14/91	
Firm: 8-8-91 1215	Firm: 8/9/91 10:30	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

UNOCAL 4511 Bellevue

Columbia Analytical Services, Inc.

ORIGINAL IS IN PROJECT FILING

July 23, 1991

RECEIVED
JUL 25 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the sample requested for analysis on July 10, 1991, from previous service request number K913406. Preliminary results were transmitted via facsimile on July 16, 1991. For your reference, our service request number for this work is K913843.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Charles Morrow for
Colin B. Elliott
Senior Project Chemist

CBE/so

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-106

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	07/10/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/11/91
Sample Matrix:	Soil	**Date Analyzed:**	07/12/91
		Work Order #:	K913843

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

	Sample Name:	UOF-1	Method Blank
	Lab Code:	K3406-7	K3843-MB

Analyte	Method	MRL	Regulatory Limit*		
Arsenic	3010/6010	0.1	5.0	ND	ND
Barium	3010/6010	0.1	100	0.8	ND
Cadmium	3010/6010	0.01	1.0	ND	ND
Chromium	3010/6010	0.01	5.0	ND	ND
Lead	3010/6010	0.05	5.0	ND	ND
Mercury	7470	0.001	0.2	ND	ND
Selenium	3010/6010	0.1	1.0	ND	ND
Silver	3010/6010	0.01	5.0	ND	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by Charles Morris Date 7/23/91

00001

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	07/10/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/11/91
Sample Matrix:	Soil	**Date Analyzed:**	07/12/91
		Work Order #:	K913843

QA/QC Report
Duplicate Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: UOF-1
Lab Code: K3406-7

Analyte	Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Arsenic	3010/6010	0.1	ND	ND	ND	--
Barium	3010/6010	0.1	0.8	0.8	0.8	<1
Cadmium	3010/6010	0.01	ND	ND	ND	--
Chromium	3010/6010	0.01	ND	ND	ND	--
Lead	3010/6010	0.05	ND	ND	ND	--
Mercury	7470	0.001	ND	ND	ND	--
Selenium	3010/6010	0.1	ND	ND	ND	--
Silver	3010/6010	0.01	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Christine Moriarty Date 7/23/91

00002

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	07/10/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/11/91
Sample Matrix:	Soil	**Date Analyzed:**	07/12/91
		Work Order #:	K913843

QA/QC Report
Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: UOF-1
Lab Code: K3406-7

Analyte	Method	Spike Level	MRL	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Arsenic	3010/6010	5.0	0.1	ND	4.9	98	75-125
Barium	3010/6010	5.0	0.1	0.8	5.4	92	75-125
Cadmium	3010/6010	1.0	0.01	ND	0.91	91	75-125
Chromium	3010/6010	5.0	0.01	ND	4.64	93	75-125
Lead	3010/6010	5.0	0.05	ND	4.77	95	75-125
Mercury	7470	0.01	0.001	ND	0.009	90	75-125
Selenium	3010/6010	1.0	0.1	ND	1.1	110	75-125
Silver	3010/6010	1.0	0.01	ND	0.96	96	75-125

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Williams Date 7/23/91

00003

UNOCAL 4511 Bellevue

Columbia Analytical Services, Inc.

ORIGINAL IS IN PROJECT FILING

RECEIVED
JUL 15 1991

July 11, 1991

Jeff Kirtland
Sweet-Edwards/EMCON, Inc.
P.O. Drawer B
Kelso, WA 98626

Re: **UNOCAL #4511 - Bellevue/Project #U24-08.02**

Dear Jeff:

Enclosed are the results of the rush samples submitted to our lab on June 27, 1991. Preliminary results were telephoned on July 1, and transmitted via facsimile on July 8 , 1991. For your reference, our service request number for this work is B913568.

Trace levels of acetone and methylene chloride were detected in all the samples. Both of these solvents are common laboratory contaminants and may be due to the laboratory, even though neither of these components were detected in the method blank.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Dave Edelman for
Colin B. Elliott
Senior Project Chemist

CBE/tlt

3... South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913568

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other*
TP-1A	B3568-1	10	ND	ND	ND
TP-1B	B3568-2	10	ND	ND	ND
TP-2A	B3568-3	10	ND	ND	ND
U/D-SS-1	B3568-6	10	**77	ND	154
Method Blank	B3568-MB	10	ND	ND	ND

MRL Method Reporting Limit
* Quantitated using hydraulic oil as a standard, the MRL for this product is four times the listed MRL.
ND None Detected at or above the method reporting limit
** Reported as gasoline, but more closely resembles mineral spirits fingerprint.

Approved by Dave Edelman Date 7/11/91

00001

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Work Order #:**	B913568

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		TP-3A	TP-3B	TP-4A
Lab Code:		B3568-7	B3568-8	B3568-9
Date Analyzed:		06/27/91	06/27/91	06/27/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	0.3
Ethylbenzene	0.1	ND	ND	6.3
Total Xylenes	0.1	0.1	ND	30.7
TPH as Gasoline	5	17	ND	740

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edwards Date 7/11/91

00002

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Work Order #:**	B913568

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		TB-5A	TB-5B	GTW-E2A
Lab Code:		B3568-10	B3568-11	B3568-12
Date Analyzed:		06/27/91	06/27/91	06/27/91
Analyte	MRL			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.1	0.3	ND	ND
TPH as Gasoline	5	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Shelton Date 7/11/91

00003

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Work Order #:**	B913568

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		GTW-E2B	TB-6A	TB-6B
Lab Code:		B3568-13	B3568-14	B3568-15
Date Analyzed:		06/27/91	06/27/91	06/27/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	ND	0.3	ND
Total Xylenes	0.1	ND	3.0	ND
TPH as Gasoline	5	ND	25	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/11/91

00004

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Work Order #:**	B913568

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		SS-1C	SS-2C	Method Blank
Lab Code:		B3568-19	B3568-23	B3568-MB
Date Analyzed:		06/27/91	06/27/91	06/27/91
Analyte	**MRL**			
Benzene	0.05	0.20	ND	ND
Toluene	0.1	7.8	0.4	ND
Ethylbenzene	0.1	5.2	0.3	ND
Total Xylenes	0.1	55.4	10.0	ND
TPH as Gasoline	5	996	174	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Shelby Date 7/11/91

00005

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913568

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
TP-1A	B3568-1	25	ND
TP-1B	B3568-2	25	ND
TP-2A	B3568-3	25	ND
U/D-SS-1	B3568-6	25	431
TP-3A	B3568-7	25	ND
TP-3B	B3568-8	25	32
TP-4A	B3568-9	25	363
TP-5A	B3568-10	25	ND
TP-5B	B3568-11	25	ND
GTW-E2A	B3568-12	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Stelzer Date 7/11/91

00006

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913568

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
GTW-E2B	B3568-13	25	ND
TP-6A	B3568-14	25	86
TP-6B	B3568-15	25	74
SS-1C	B3568-19	25	616
SS-2C	B3568-23	25	307
Method Blank	B3568-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/11/91

00007

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	07/02/91
Sample Matrix:	Soil	**Work Order #:**	B913568

Total Lead
EPA Method 7421
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
SS-1C Comp	K3568-19	3	6
SS-2C Comp	K3568-23	3	12
Method Blank	K3568-MB	3	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/11/91

00008

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/01/91
Sample Matrix:	Soil	**Date Analyzed:**	07/03/91
		Work Order #:	B913568

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

	Sample Name:	U/D-SS-1	Method Blank
	Lab Code:	K3568-6	K3568-MB

Analyte	Method	MRL	Regulatory Limit*		
Arsenic	3010/6010	0.1	5.0	ND	ND
Barium	3010/6010	0.1	100	0.6	ND
Cadmium	3010/6010	0.01	1.0	ND	ND
Chromium	3010/6010	0.01	5.0	ND	ND
Lead	3010/6010	0.05	5.0	ND	ND
Mercury	7470	0.001	0.2	ND	ND
Selenium	3010/6010	0.1	1.0	ND	ND
Silver	3010/6010	0.01	5.0	ND	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by Dave Shelburne/ Date 7/11/91

00009

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/30/91
Sample Matrix:	Soil	**Date Analyzed:**	07/04/91
		Work Order #:	B913568

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		U/D-SS-1	Method Blank
Lab Code:		K3568-6	K3568-MB
Analyte	MRL		
Aroclor 1016	1	ND	ND
Aroclor 1221	1	ND	ND
Aroclor 1232	1	ND	ND
Aroclor 1242	1	ND	ND
Aroclor 1248	1	ND	ND
Aroclor 1254	1	ND	ND
Aroclor 1260	1	ND	ND
Total Aroclors	1	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Ekelund Date 7/11/91

00010

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Work Order #:**	B913568
Sample Matrix:	Soil		

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		TP-1A	TP-1B	TP-2A
Lab Code:		K3568-1	K3568-2	K3568-3
Date Analyzed:		07/02/91	07/02/91	07/02/91
Analyte	**MRL**			
Chloromethane	5	ND	ND	ND
Vinyl Chloride	5	ND	ND	ND
Bromomethane	5	ND	ND	ND
Chloroethane	5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	10	ND	ND	ND
1,1-Dichloroethene	5	ND	ND	ND
Acetone	50	82	58	61
Carbon Disulfide	5	ND	ND	ND
Methylene Chloride	10	22	23	19
trans-1,2-Dichloroethene	5	ND	ND	ND
cis-1,2-Dichloroethene	5	ND	ND	ND
2-Butanone (MEK)	10	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND
Chloroform	5	ND	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND
Benzene	5	ND	ND	ND
1,2-Dichloroethane	5	ND	ND	ND
Vinyl Acetate	10	ND	ND	ND
Trichloroethene (TCE)	5	ND	ND	ND
1,2-Dichloropropane	5	ND	ND	ND
Bromodichloromethane	5	ND	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND	ND
trans-1,3-Dichloropropene	5	ND	ND	ND
2-Hexanone	10	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND	ND
Toluene	5	ND	ND	ND
cis-1,3-Dichloropropene	5	ND	ND	ND
1,1,2-Trichloroethane	5	ND	ND	ND
Tetrachloroethene (PCE)	5	ND	ND	ND
Dibromochloromethane	5	ND	ND	ND
Chlorobenzene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
Total Xylenes	5	7.2	ND	ND
Bromoform	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
1,3-Dichlorobenzene	5	ND	ND	ND
1,4-Dichlorobenzene	5	ND	ND	ND
1,2-Dichlorobenzene	5	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

00011

Approved by Dave Edwards Date 7/11/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Sweet-Edwards/EMCON, Inc. Date Received: 06/27/91
Project: UNOCAL #4511 - Bellevue Work Order #: B913568
Sample Matrix: Soil

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		U/D-SS-1
Lab Code:		K3568-6
Date Analyzed:		07/02/91
Analyte	**MRL***	
Chloromethane	14	ND
Vinyl Chloride	14	ND
Bromomethane	14	ND
Chloroethane	14	ND
Trichlorofluoromethane (Freon 11)	14	ND
Trichlorotrifluoroethane (Freon 113)	27	ND
1,1-Dichloroethene	14	ND
Acetone	136	ND
Carbon Disulfide	14	ND
Methylene Chloride	27	55 ←
trans-1,2-Dichloroethene	14	ND
cis-1,2-Dichloroethene	14	ND
2-Butanone (MEK)	27	ND
1,1-Dichloroethane	14	ND
Chloroform	14	ND
1,1,1-Trichloroethane (TCA)	14	ND
Carbon Tetrachloride	14	ND
Benzene	14	ND
1,2-Dichloroethane	14	ND
Vinyl Acetate	27	ND
Trichloroethene (TCE)	14	ND
1,2-Dichloropropane	14	ND
Bromodichloromethane	14	ND
2-Chloroethyl Vinyl Ether	27	ND
trans-1,3-Dichloropropene	14	ND
2-Hexanone	27	ND
4-Methyl-2-pentanone (MIBK)	27	ND
Toluene	14	ND
cis-1,3-Dichloropropene	14	ND
1,1,2-Trichloroethane	14	ND
Tetrachloroethene (PCE)	14	ND
Dibromochloromethane	14	ND
Chlorobenzene	14	ND
Ethylbenzene	14	ND
Styrene	14	ND
Total Xylenes	14	29 ←
Bromoform	14	ND
1,1,2,2-Tetrachloroethane	14	ND
1,3-Dichlorobenzene	14	ND
1,4-Dichlorobenzene	14	ND
1,2-Dichlorobenzene	14	ND

MRL Method Reporting Limit
* Elevated MRLs because of matrix interferences.
ND None Detected at or above the method reporting limit

00012

Approved by Dave Edelen Date 7/11/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Work Order #:**	B913568
Sample Matrix:	Soil		

Volatile Organic Compounds
EPA Method 8240 (Low Level)
µg/Kg (ppb) Dry Weight Basis

Sample Name:		**Method Blank**
Lab Code:		**K3568-MB**
Date Analyzed:		**07/02/91**
Analyte	**MRL**	
Chloromethane	5	ND
Vinyl Chloride	5	ND
Bromomethane	5	ND
Chloroethane	5	ND
Trichlorofluoromethane (Freon 11)	5	ND
Trichlorotrifluoroethane (Freon 113)	10	ND
1,1-Dichloroethene	5	ND
Acetone	50	ND
Carbon Disulfide	5	ND
Methylene Chloride	10	ND
trans-1,2-Dichloroethene	5	ND
cis-1,2-Dichloroethene	5	ND
2-Butanone (MEK)	10	ND
1,1-Dichloroethane	5	ND
Chloroform	5	ND
1,1,1-Trichloroethane (TCA)	5	ND
Carbon Tetrachloride	5	ND
Benzene	5	ND
1,2-Dichloroethane	5	ND
Vinyl Acetate	10	ND
Trichloroethene (TCE)	5	ND
1,2-Dichloropropane	5	ND
Bromodichloromethane	5	ND
2-Chloroethyl Vinyl Ether	10	ND
trans-1,3-Dichloropropene	5	ND
2-Hexanone	10	ND
4-Methyl-2-pentanone (MIBK)	10	ND
Toluene	5	ND
cis-1,3-Dichloropropene	5	ND
1,1,2-Trichloroethane	5	ND
Tetrachloroethene (PCE)	5	ND
Dibromochloromethane	5	ND
Chlorobenzene	5	ND
Ethylbenzene	5	ND
Styrene	5	ND
Total Xylenes	5	ND
Bromoform	5	ND
1,1,2,2-Tetrachloroethane	5	ND
1,3-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelen Date 7/11/91

00013

APPENDIX A

LABORATORY QC RESULTS

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913568

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
TP-1A	B3568-1	99.1
TP-1B	B3568-2	101
TP-2A	B3568-3	96.7
U/D-SS-1	B3568-6	93.4
TP-1B	B3568-2MS	96.1
TP-1B	B3568-2DMS	101
Method Blank	B3568-MB	99.4
	CAS Acceptance Criteria	64-123

Approved by Dave Edson Date 7/11/91

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Sweet-Edwards/EMCON, Inc.
Project: UNOCAL #4511 - Bellevue
Sample Matrix: Soil

Date Received: 06/27/91
Date Extracted: 06/27/91
Date Analyzed: 06/28/91
Work Order #: B913568

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: TP-1B
Lab Code: B3568-2

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Diesel	421	480	ND	405	492	96.2	103	45-120	6.8

ND None Detected at or above the method reporting limit

Approved by Dave Eberman Date 7/11/91

00016

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Sweet-Edwards/EMCON, Inc.
Project: UNOCAL #4511 - Bellevue
Sample Matrix: Soil

Date Received: 06/27/91
Date Extracted: 06/27/91
Date Analyzed: 06/27/91
Work Order #: B913568

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: TB-6B
Lab Code: B3568-15

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.88	0.86	ND	0.68	0.66	77.3	76.7	39-150	0.8
Toluene	0.88	0.86	ND	0.69	0.68	78.4	79.1	46-148	0.9
Ethylbenzene	0.88	0.86	ND	0.69	0.68	78.4	79.1	32-160	0.9

ND None Detected at or above the method reporting limit

Approved by Dave Edwards Date 7/11/91

00017

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/27/91
		Work Order #:	B913568

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
TP-3A	B3568-7	108
TP-3B	B3568-8	98.8
TP-4A	B3568-9	102
TP-5A	B3568-10	98.4
TP-5B	B3568-11	104
GTW-E2A	B3568-12	102
GTW-E2B	B3568-13	101
TB-6A	B3568-14	103
TB-6B	B3568-15	101
TB-6B	B3568-15MS	103
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Dave Ehl, J Date 7/11/91

00018

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/27/91
		Work Order #:	B913568

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
TB-6B	B3568-15DMS	102
SS-1C	B3568-19	90.8
SS-2C	B3568-23	106
Method Blank	B3568-MB	104
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Dave Erdman Date 7/11/91

00019

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913568

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
TP-5B	B3568-11MS	25	332	ND	344	104	75-125
TP-5B	B3568-11DMS	25	343	ND	386	113	75-125

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Ehlman Date 7/11/91

00020

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/01/91
Sample Matrix:	Soil	**Date Analyzed:**	07/03/91
		Work Order #:	B913568

QA/QC Report
Duplicate Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: U/D-SS-1
Lab Code: K3568-6

Analyte	Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Arsenic	3010/6010	0.1	ND	ND	ND	--
Barium	3010/6010	0.1	0.6	0.6	0.6	<1
Cadmium	3010/6010	0.01	ND	ND	ND	--
Chromium	3010/6010	0.01	ND	ND	ND	--
Lead	3010/6010	0.05	ND	ND	ND	--
Mercury	7470	0.001	ND	ND	ND	--
Selenium	3010/6010	0.1	ND	ND	ND	--
Silver	3010/6010	0.01	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/11/91

00021

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	07/01/91
Sample Matrix:	Soil	**Date Analyzed:**	07/03/91
		Work Order #:	B913568

QA/QC Report
Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: U/D-SS-1
Lab Code: K3568-1

Analyte	Method	Spike Level	MRL	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Arsenic	3010/6010	5.0	0.1	ND	5.1	102	75-125
Barium	3010/6010	5.0	0.1	0.6	5.4	96	75-125
Cadmium	3010/6010	1.0	0.01	ND	0.96	96	75-125
Chromium	3010/6010	5.0	0.01	ND	4.86	97	75-125
Lead	3010/6010	5.0	0.05	ND	4.89	78	75-125
Mercury	7470	0.01	0.001	ND	0.011	110	75-125
Selenium	3010/6010	1.0	0.1	ND	1.0	100	75-125
Silver	3010/6010	1.0	0.01	ND	0.94	94	75-125

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Sheldon Date 7/11/91

00022

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/27/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/30/91
Sample Matrix:	Soil	**Date Analyzed:**	07/04/91
		Work Order #:	B913568

QA/QC Report
Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
U/D-SS-1 Comp	K3568-6	116
Method Blank	K3568-MB	113
	CAS Acceptance Criteria	30-127

Approved by Dave Edwards Date 7/11/91

00023

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Sweet-Edwards/EMCON, Inc.
Project: UNOCAL #4511 - Bellevue
Sample Matrix: Soil

Date Received: 06/27/91
Date Analyzed: 07/02/91
Work Order #: B913568

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240 (Low Level)

Sample Name	Lab Code	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
TP-1A	K3568-1	105	96.8	99.2
TP-1B	K3568-2	107	93.2	106
TP-2A	K3568-3	112	102	102
U/D-SS-1 Comp	K3568-6	106	92.9	104
Method Blank	K3568-MB	102	97.8	101
EPA Acceptance Criteria		70-121	81-117	74-121

Approved by Dave Edwards Date 7/11/91

00024

APPENDIX B

CHAIN OF CUSTODY INFORMATION

317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

Chain of Custody

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Laboratory Analysis Request

DATE 6/27/91 PAGE 1 OF 1

PROJECT Unocal 4571, Bellevue # 240802
CLIENT INFO. CONTACT John North / Jeff Kirtland
ADDRESS SE/E Bothell
TELEPHONE# 485-5000
SAMPLERS NAME [illegible] PHONE# 485-5000
SAMPLERS SIGNATURE [illegible]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	GENERAL CHEMISTRY (Specify) pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	OTHER (Specify) 8020/8015m Gas	418.1	PID	NUMBER OF CONTAINERS
1. SS-1	6/27/91	1330		Soil	composite report as SS-1C								Lead only							156	2
2. SS-2		1335																		543	2
3. SS-3		1340																		541	2
4. SS-4		1345			composite report as SS-2C															635	2
5. SS-5		1350																		66	2
6. SS-6		1355																		216	2
7.																					
8.																					

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature [illegible]	Signature	Signature	Hand Delivered	
Printed Name Jeff Kirtland	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm SE/E	Firm	Firm	VIA	Chain of Custody Seals
Date/Time 6/27/91 1546	Date/Time	Date/Time	Project	Received in good condition
Received By Stan Spurgeon	Received By Ruth Allison	Received By		LAB NO.
Signature Stan Spurgeon	Signature Ruth Allison	Signature		
Printed Name CAS	Printed Name CAS	Printed Name		
Firm 062791 1540	Firm 6/28/91 1600	Firm		
Date/Time	Date/Time	Date/Time		

SPECIAL INSTRUCTIONS/COMMENTS
48 hour turnaround

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

92100

Chain of Custody / Laboratory Analysis Request

Sweet-Edwards/EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

DATE 6/27/91 PAGE 1 OF

PROJECT UNOCAL 4511 Bellevue, WA # 92 0240802
CLIENT INFO. CONTACT John North / Jeff Kirtland
ADDRESS SE/E Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kirtland PHONE# 485-5000
SAMPLERS SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) Lead only (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8020/BTEX Gas BTEX	8015m 5 mg/l HO	TCLP 8 metals	418.1	8080 PCB	PID PPM	NUMBER OF CONTAINERS
1. TP-1A	6/26	1030		Soil		X													X		X		110	3
2. TP-1B		1040				X													X		X		62	3
3. TP-2A		1050				X													X		X		11	3
4. U/D-SS-A		1110				X	composite; reported as U/D-SS1											S	X	X	X	X	242	3
5. U/D-SS-B		1115				X												C	X	X	X	X	—	3
6. TP-3A		1145																X			X		19	2
7. TP-3B		1155																X			X		<1	2
8. TP-4A		1200																X			X		864	2

Relinquished By	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Sweet, Edwards & Assoc.			Hand Delivered	
Signature Jeffrey A. Kirtland	Signature	Signature	Shipping I.D. No.	Total No. of Containers
Printed Name SE/E 920	Printed Name	Printed Name	VIA	Chain of Custody Seals
Firm 6/27/91	Firm	Firm		Received in good condition
Date/Time	Date/Time	Date/Time	Project	LAB NO.
Received By	Received By Ruth Allison	Received By	SPECIAL INSTRUCTIONS/COMMENTS	
Signature John L. Zwible	Signature Ruth Allison	Signature	Rapid Turnaround Requested	
Printed Name CAS	Printed Name CAS	Printed Name	**48 hour Rush*	
Firm Same	Firm 6/28/91 1000	Firm	72 hour TCLP Analysis.	
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

Chain of Custody / Laboratory Analysis Request

et-[illegible]arc[illegible] EM[illegible]d, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

DATE 6/27/91 PAGE 2 OF

PROJECT UNOCAL 4511, Bellevue, WA # 12468.02
CLIENT INFO. CONTACT John North/Jeff Kurtland
ADDRESS SE/E Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kurtland PHONE# 485-5000
SAMPLERS SIGNATURE Jeff Kurtland

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) Lead only (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8020/602/5m Gas/BTEX	418.1				PID	NUMBER OF CONTAINERS
1. TP-5A	6/26	1245		Soil														X	X				5	2
2. TP-5B	"	1255		"														X	X				<1	2
3. GTW-B2A	"	1300		"														X	X				115	2
4. GTW-B2B	"	1310		"														X	X				93	2
5. TP-6A	"	1320		"														X	X				735	2
6. TP-6B	"	1330		"														X	X				116	2
7.	/	/	/	/				/				/					/			/			/	
8.	/	/	/	/																				

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature Jeff Kurtland	Signature	Signature	Hand Delivered	
Printed Name SE/E	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm 6/27/91 920	Firm	Firm	VIA	Chain of Custody Seals
Date/Time	Date/Time	Date/Time	Project	Received in good condition
Received By	Received By Ruth Allison	Received By		LAB NO.
Signature John L. Zabel	Signature Ruth Allison	Signature	SPECIAL INSTRUCTIONS/COMMENTS	
Printed Name CAS	Printed Name CAS	Printed Name	Turnaround - See Page #1	
Firm Sound	Firm 6/28/91 1000	Firm		
Date/Time	Date/Time	Date/Time		

JJ12288

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

UNOCAL 4511 Bellevue

Columbia Analytical Services, Inc.

ORIGINAL IS IN PROJECT FILING

July 11, 1991

RECEIVED
JUL 15 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the samples submitted to our lab on June 20, 1991. Preliminary results were transmitted via facsimile on July 8 and 9, 1991. For your reference, our service request number for this work is B913421.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin Elliott

Colin B. Elliott
Senior Project Chemist

CBE/das

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/24/91
Sample Matrix:	Soil	**Date Analyzed:**	06/28/91
		Work Order #:	B913421

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other*
DW-1	B3421-1	10	**1,940	ND	ND
DW-2	B3421-2	10	**2,050	ND	ND
Method Blank	B3421-MB	10	ND	ND	ND

MRL Method Reporting Limit
* Quantitated using hydraulic oil as a standard, the MRL for this product is four times the listed MRL.
** Reported as gasoline but pattern resembles mineral spirits.
ND None Detected at or above the method reporting limit

Approved by Glen Elliott Date 7/11/91

00001

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Date Analyzed:**	06/22/91
		Work Order #:	B913421

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
DW-1	B3421-1	25	1,260
DW-2	B3421-2	25	1,690
Method Blank	B3421-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glenn Elliott Date 7/11/91

00002

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913421

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

				Sample Name:	DW-1	DW-2	Method Blank
				Lab Code:	K3421-1	K3421-2	K3421-MB
Analyte	**Method**	**MRL**	Regulatory Limit*				
Arsenic	3010/6010	0.1	5.0		ND	ND	ND
Barium	3010/6010	0.1	100		0.6	0.6	ND
Cadmium	3010/6010	0.01	1.0		ND	ND	ND
Chromium	3010/6010	0.01	5.0		ND	ND	ND
Lead	3010/6010	0.05	5.0		ND	ND	ND
Mercury	7470	0.001	0.2		ND	ND	ND
Selenium	3010/6010	0.1	1.0		ND	ND	ND
Silver	3010/6010	0.01	5.0		ND	ND	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 7/11/91

00003

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913421

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		DW-1	DW-2	Method Blank
Lab Code:		K3421-1	K3421-2	K3421-MB
Analyte	**MRL**			
Aroclor 1016	1	ND	ND	ND
Aroclor 1221	1	ND	ND	ND
Aroclor 1232	1	ND	ND	ND
Aroclor 1242	1	ND	ND	ND
Aroclor 1248	1	ND	ND	ND
Aroclor 1254	1	ND	ND	ND
Aroclor 1260	1	ND	ND	ND
Total Aroclors	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 7/11/91

00004

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	Date Received:	06/20/91
Project:	UNOCAL #4511 - Bellevue	Date Extracted:	07/03/91
Sample Matrix:	Soil	Work Order #:	B913421

Volatile Organic Compounds
EPA Method 8240
mg/Kg (ppm) Dry Weight Basis

Sample Name:		DW-1	DW-2	Method Blank
Lab Code:		K3421-1	K3421-2	K3421-MB
Date Analyzed:		07/03/91	07/03/91	07/03/91
Analyte	MRL*			
Chloromethane	0.5	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.05	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
1,1-Dichloroethene	0.1	ND	ND	ND
Acetone	1.0	ND	ND	ND
Carbon Disulfide	0.05	ND	ND	ND
Methylene Chloride	0.5	ND	ND	ND
trans-1,2-Dichloroethene	0.05	ND	ND	ND
cis-1,2-Dichloroethene	0.05	ND	ND	ND
2-Butanone (MEK)	0.5	ND	ND	ND
1,1-Dichloroethane	0.05	ND	ND	ND
Chloroform	0.05	ND	ND	ND
1,1,1-Trichloroethane (TCA)	0.05	ND	ND	ND
Carbon Tetrachloride	0.05	ND	ND	ND
Benzene	0.05	ND	ND	ND
1,2-Dichloroethane	0.05	ND	ND	ND
Vinyl Acetate	0.5	ND	ND	ND
Trichloroethene (TCE)	0.05	ND	ND	ND
1,2-Dichloropropane	0.05	ND	ND	ND
Bromodichloromethane	0.05	ND	ND	ND
2-Chloroethyl Vinyl Ether	0.5	ND	ND	ND
trans-1,3-Dichloropropene	0.05	ND	ND	ND
2-Hexanone	0.5	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	0.5	ND	ND	ND
Toluene	0.05	ND	ND	ND
cis-1,3-Dichloropropene	0.05	ND	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND	ND
Tetrachloroethene (PCE)	0.05	ND	ND	ND
Dibromochloromethane	0.05	ND	ND	ND
Chlorobenzene	0.05	ND	ND	ND
Ethylbenzene	0.05	0.12	ND	ND
Styrene	0.05	ND	ND	ND
Total Xylenes	0.05	2.08	1.45	ND
Bromoform	0.05	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND	ND
1,3-Dichlorobenzene	0.05	ND	ND	ND
1,4-Dichlorobenzene	0.05	ND	ND	ND
1,2-Dichlorobenzene	0.05	ND	ND	ND

MRL Method Reporting Limit
* Elevated MRLs because of matrix interferences and because the sample required dilution.
ND None Detected at or above the method reporting limit

00005

Approved by Chris Elliott Date 7/11/91

APPENDIX A

LABORATORY QC RESULTS

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COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913421

QA/QC Report
Duplicate Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: DW-1
Lab Code: K3421-1

Analyte	Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Arsenic	3010/6010	0.1	ND	ND	ND	--
Barium	3010/6010	0.1	0.6	0.6	0.6	<1
Cadmium	3010/6010	0.01	ND	ND	ND	--
Chromium	3010/6010	0.01	ND	ND	ND	--
Lead	3010/6010	0.05	ND	ND	ND	--
Mercury	7470	0.001	ND	ND	ND	--
Selenium	3010/6010	0.1	ND	ND	ND	--
Silver	3010/6010	0.01	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by John Elliott Date 7/11/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913421

QA/QC Report
Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: DW-1
Lab Code: K3421-1

Analyte	Method	Spike Level	MRL	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Arsenic	3010/6010	5.0	0.1	ND	5.0	100	75-125
Barium	3010/6010	5.0	0.1	0.6	5.6	100	75-125
Cadmium	3010/6010	1.0	0.01	ND	0.97	97	75-125
Chromium	3010/6010	5.0	0.01	ND	4.92	98	75-125
Lead	3010/6010	5.0	0.05	ND	4.80	96	75-125
Mercury	7470	0.01	0.001	ND	0.010	100	75-125
Selenium	3010/6010	1.0	0.1	ND	1.1	110	75-125
Silver	3010/6010	1.0	0.01	ND	0.92	92	75-125

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Glenn Elliott Date 7/11/91

00009

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/27/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913421

QA/QC Report
Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
DW-1	K3421-1	122
DW-2	K3421-2	127
Method Blank	K3421-MB	114
	CAS Acceptance Criteria	30-127

Approved by Chris Elliott Date 7/11/91

00010

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	07/03/91
Sample Matrix:	Soil	**Work Order #:**	B913421

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240 (High Level)

Sample Name	Lab Code	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
DW-1	K3421-1	101	101	94.3
DW-2	K3421-2	87.9	117	91.0
Method Blank	K3421-MB	116	106	112
EPA Acceptance Criteria		70-121	81-117	74-121

Approved by Colin Elliott Date 7/11/91

00011

B-42

Chain of Custody / Laboratory Analysis Request

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

DATE 6/20/91 PAGE 1 OF 1

PROJECT UNOCAL 4511 / Bellevue # 42408.02
CLIENT INFO. CONTACT John North SE/E
ADDRESS Bothell
TELEPHONE# 485-5020
SAMPLERS NAME Jeff Kuhland PHONE# 485-5000
SAMPLERS SIGNATURE Jeff Kuhland

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8015 Semi	418.1	8080 PCB	TCLP 1311/6010/7000 Metals		PID	NUMBER OF CONTAINERS
1. DW-1	6/20/91	1420		Soil														X	X	X	X		350	3
2. DW-2	6/20/91	1430		Soil														X	X	X	X		400	3
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature Jeff Kuhland	Signature	Signature	Hand Delivered	Total No. of Containers
Printed Name SE/E	Printed Name	Printed Name	Shipping I.D. No.	Chain of Custody Seals
Firm 6/20/91 1610	Firm	Firm	VIA	Received in good condition
Date/Time	Date/Time	Date/Time	Project	LAB NO. 891-
Received By Stan Spurgeon	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature Stan Spurgeon	Signature	Signature		
Printed Name CAS	Printed Name	Printed Name		
Firm 6-20-91 1610	Firm	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

UNOCAL 4511 Bellevue
32432

4

Columbia Analytical Services, Inc.

ORIGINAL IS IN PROJECT FILING

July 11, 1991

RECEIVED
JUL 15 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL 4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the samples submitted to our lab on June 20, 1991. Preliminary results were telephoned on June 24, 1991, and transmitted via facsimile on July 8, 9 and 10, 1991. For your reference, our service request number for this work is B913406.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Dave Edelman for
Colin B. Elliott
Senior Project Chemist

CBE/so

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Analyzed:**	07/02/91
Sample Matrix:	Soil	**Work Order #:**	B913406

Total Lead
EPA Method 7420
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
NPI-1	K3406-1	3	ND
Method Blank	K3406-MB	3	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00001

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Date Analyzed:**	06/22/91
		Work Order #:	B913406

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
NUHOW-1	B3406-2	25	35,400
EUHOW-1	B3406-3	25	26
W/SUHOW1	B3406-6	25	90
UOF-1	B3406-7	25	ND
UOF-2	B3406-8	25	90
HOF-1	B3406-9	25	ND
Method Blank	B3406-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00002

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Date Analyzed:**	06/21/91
		Work Order #:	B913406

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other*
NUHOW-1	B3406-2	10	ND	ND	17,400
EUHOW-1	B3406-3	10	ND	ND	ND
SUHOW-1,WUHOW-1 Comp	B3406-6	10	ND	ND	ND
UOF-1	B3406-7	10	ND	ND	ND
UOF-2	B3406-8	10	ND	ND	ND
HOF-1	B3406-9	10	ND	ND	ND
Method Blank	B3406-MB	10	ND	ND	ND

MRL Method Reporting Limit
***** Quantitated using hydraulic oil as a standard, the MRL for this product is four times the listed MRL.
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00003

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	07/01/91
Sample Matrix:	Soil	**Work Order #:**	B913406

Halogenated Volatile Organic Compounds
EPA Methods 5030/8010
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Method Blank
Lab Code:		K3406-MB
Date Analyzed:		07/01/91
Analyte	**MRL**	
Dichlorodifluoromethane (Freon 12)	0.1	ND
Chloromethane	0.1	ND
Vinyl Chloride	0.05	ND
Bromomethane	0.05	ND
Chloroethane	0.05	ND
Trichlorofluoromethane (Freon 11)	0.05	ND
1,1-Dichloroethene	0.05	ND
Trichlorotrifluoroethane (Freon 113)	0.05	ND
Methylene Chloride	0.2	ND
trans-1,2-Dichloroethene	0.05	ND
cis-1,2-Dichloroethene	0.05	ND
1,1-Dichloroethane	0.05	ND
Chloroform	0.05	ND
1,1,1-Trichloroethane (TCA)	0.05	ND
Carbon Tetrachloride	0.05	ND
1,2-Dichloroethane	0.05	ND
Trichloroethene (TCE)	0.05	ND
1,2-Dichloropropane	0.05	ND
Bromodichloromethane	0.05	ND
2-Chloroethyl Vinyl Ether	0.5	ND
trans-1,3-Dichloropropene	0.05	ND
cis-1,3-Dichloropropene	0.05	ND
1,1,2-Trichloroethane	0.05	ND
Tetrachloroethene (PCE)	0.05	ND
Dibromochloromethane	0.05	ND
Chlorobenzene	0.05	ND
Bromoform	0.05	ND
1,1,2,2-Tetrachloroethane	0.05	ND
1,3-Dichlorobenzene	0.1	ND
1,4-Dichlorobenzene	0.1	ND
1,2-Dichlorobenzene	0.1	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00005

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Work Order #:**	B913406

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		NPI-1	UOF-1	UOF-2
Lab Code:		B3406-1	B3406-7	B3406-8
Date Analyzed:		06/21/91	06/21/91	06/21/91
Analyte	MRL			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.1	ND	ND	ND
TPH as Gasoline	5	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00006

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Work Order #:**	B913406

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Method Blank
Lab Code:		B3406-MB
Date Analyzed:		06/21/91
Analyte	MRL	
Benzene	0.05	ND
Toluene	0.1	ND
Ethylbenzene	0.1	ND
Total Xylenes	0.1	ND
TPH as Gasoline	5	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edelman / Date 7/12/91

00007

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/28/91
Sample Matrix:	Soil	**Date Analyzed:**	07/04/91
		Work Order #:	B913406

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UOF-1	UOF-2	Method Blank
Lab Code:		B3406-7	B3406-8	B3406-MB
Analyte	MRL			
Aroclor 1016	1	ND	ND	ND
Aroclor 1221	1	ND	ND	ND
Aroclor 1232	1	ND	ND	ND
Aroclor 1242	1	ND	ND	ND
Aroclor 1248	1	ND	ND	ND
Aroclor 1254	1	ND	ND	ND
Aroclor 1260	1	ND	ND	ND
Total Aroclors	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Shuck Date 7/12/91

00008

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913406

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

				Sample Name:	UOF-2	HOF-1	Method Blank
				Lab Code:	K3406-8	K3406-9	K3406-MB
Analyte	**Method**	**MRL**	**Regulatory Limit***				
Arsenic	3010/6010	0.1	5.0		ND	ND	ND
Barium	3010/6010	0.1	100		0.6	0.4	ND
Cadmium	3010/6010	0.01	1.0		ND	ND	ND
Chromium	3010/6010	0.01	5.0		ND	ND	ND
Lead	3010/6010	0.05	5.0		ND	ND	ND
Mercury	7470	0.001	0.2		ND	ND	ND
Selenium	3010/6010	0.1	1.0		ND	ND	ND
Silver	3010/6010	0.01	5.0		ND	ND	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by Dave Edelman, I Date 7/12/91

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Extracted:**	06/30/91
		Date Analyzed:	07/03/91
		Work Order #:	B913406

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Semivolatile Organic Compounds
mg/L (ppm) in TCLP Extract

				Sample Name:	UOF-2	HOF-1
				Lab Code:	B3406-8	B3406-9
Analyte	Method	MRL	Regulatory Limit*		
Hexachloroethane	3510/8015M	0.05	3	ND	ND
Nitrobenzene	3510/8015M	0.05	2	ND	ND
Hexachlorobutadiene	3510/8015M	0.05	0.5	ND	ND
2,4-Dinitrotoluene	3510/8015M	0.05	0.13	ND	ND
Hexachlorobenzene	3510/8015M	0.05	0.13	ND	ND
2,4,6-Trichlorophenol	3510/8040	0.05	2	ND	ND
2,4,5-Trichlorophenol	3510/8040	0.05	400	ND	ND
Pentachlorophenol	3510/8040	0.2	100	ND	ND
Pyridine	3510/8015M	0.2	5	ND	ND
o-Cresol	3510/8040	0.05	200	ND	ND
m,p-Cresols	3510/8040	0.1	200	ND	ND
Total Cresols	3510/8040	0.15	200	ND	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
M Modified Method
ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00010

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Extracted:**	06/30/91
		Date Analyzed:	07/03/91
		Work Order #:	B913406

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Semivolatile Organic Compounds
mg/L (ppm) in TCLP Extract

	Sample Name:	Method Blank
	Lab Code:	B3406-MB

Analyte	Method	MRL	Regulatory Limit*	
Hexachloroethane	3510/8015M	0.05	3	ND
Nitrobenzene	3510/8015M	0.05	2	ND
Hexachlorobutadiene	3510/8015M	0.05	0.5	ND
2,4-Dinitrotoluene	3510/8015M	0.05	0.13	ND
Hexachlorobenzene	3510/8015M	0.05	0.13	ND
2,4,6-Trichlorophenol	3510/8040	0.05	2	ND
2,4,5-Trichlorophenol	3510/8040	0.05	400	ND
Pentachlorophenol	3510/8040	0.2	100	ND
Pyridine	3510/8015M	0.2	5	ND
o-Cresol	3510/8040	0.05	200	ND
m,p-Cresols	3510/8040	0.1	200	ND
Total Cresols	3510/8040	0.15	200	ND

MRL Method Reporting Limit
* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
M Modified Method
ND None Detected at or above the method reporting limit

Approved by Dave Edelen / Date 7/12/91

00011

APPENDIX A

LABORATORY QC RESULTS

1217 fourth 12th Avenue • P.O. Box 170 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Date Analyzed:**	06/22/91
		Work Order #:	B913406

QA/QC Report
Matrix Spike Summary
Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
EUHOW-1	B3406-3MS	25	774	26	852	107	75-125
EUHOW-1	B3406-3DMS	25	741	26	821	107	75-125

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edwards Date 7/12/91

00013

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Date Analyzed:**	06/21/91
		Work Order #:	B913406

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
NUHOW-1	B3406-2	*42.3
EUHOW-1	B3406-3	99.5
SUHOW-1,WUHOW-1 Comp	B3406-6	95.2
UOF-1	B3406-7	104
UOF-2	B3406-8	99.9
HOF-1	B3406-9	102
HOF-1	B3406-9MS	98.8
HOF-1	B3406-9DMS	96.9
Method Blank	B3406-MB	103
	CAS Acceptance Criteria	64-123

* Outside acceptance limits because of matrix interferences. The gas chromatogram showed target components that interfered with the analyses. The sample was not reanalyzed.

Approved by Dave Ehlen Date 7/12/91

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Date Analyzed:**	06/21/91
		Work Order #:	B913406

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: HOF-1
Lab Code: B3406-9

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	Result	MS	DMS	MS	DMS	Criteria	Difference
Diesel	498	463	ND	463	400	93.0	86.4	45-120	7.4

ND None Detected at or above the method reporting limit

Approved by Dave Edelman Date 7/12/91

00016

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Date Analyzed:**	06/21/91
		Work Order #:	B913406

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
NPI-1	B3406-1	104
UOF-1	B3406-7	102
UOF-2	B3406-8	102
UOF-2	B3406-8MS	104
UOF-2	B3406-8DMS	102
Method Blank	B3406-MB	111
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Dave Edelman Date 7/12/91

00017

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/21/91
Sample Matrix:	Soil	**Date Analyzed:**	06/21/91
		Work Order #:	B913406

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: UOF-2
Lab Code: B3406-8

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.94	0.94	ND	0.82	0.81	87.2	86.2	39-150	1.2
Toluene	0.94	0.94	ND	0.86	0.85	91.5	90.4	46-148	1.2
Ethylbenzene	0.94	0.94	ND	0.84	0.84	89.4	89.4	32-160	<1

TPH Total Petroleum Hydrocarbons
ND None Detected at or above the method reporting limit

Approved by Dave Shelton Date 7/12/91

00018

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date Extracted:**	06/28/91
Sample Matrix:	Soil	**Date Analyzed:**	07/04/91
		Work Order #:	B913406

QA/QC Report
Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
UOF-2	K3406-8	112
UOF-1	K3406-7	109
Method Blank	K3406-MB	111
	CAS Acceptance Criteria	30-127

Approved by Dave Shelton Date 7/12/91

00019

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913406

QA/QC Report
Duplicate Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: UOF-2
Lab Code: K3406-8

Analyte	Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Arsenic	3010/6010	0.1	ND	ND	ND	--
Barium	3010/6010	0.1	0.6	0.6	0.6	<1
Cadmium	3010/6010	0.01	ND	ND	ND	--
Chromium	3010/6010	0.01	ND	ND	ND	--
Lead	3010/6010	0.05	ND	ND	ND	--
Mercury	7470	0.001	ND	ND	ND	--
Selenium	3010/6010	0.1	ND	ND	ND	--
Silver	3010/6010	0.01	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edel Date 7/12/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Analyzed:**	07/01/91
		Work Order #:	B913406

QA/QC Report
Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: UOF-2
Lab Code: K3406-8

Analyte	Method	Spike Level	MRL	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Arsenic	3010/6010	5.0	0.1	ND	4.9	98	75-125
Barium	3010/6010	5.0	0.1	0.6	5.3	94	75-125
Cadmium	3010/6010	1.0	0.01	ND	0.96	96	75-125
Chromium	3010/6010	5.0	0.01	ND	4.82	96	75-125
Lead	3010/6010	5.0	0.05	ND	4.66	93	75-125
Mercury	7470	0.01	0.001	ND	0.010	100	75-125
Selenium	3010/6010	1.0	0.1	ND	1.1	110	75-125
Silver	3010/6010	1.0	0.01	ND	0.92	92	75-125

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Dave Edwards Date 7/12/91

00021

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL 4511 - Bellevue	**Date TCLP Performed:**	06/26/91
Sample Matrix:	Soil	**Date Extracted:**	06/30/91
		Date Analyzed:	07/03/91
		Work Order #:	B913406

QA/QC Report
Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Semivolatile Organic Compounds
(EPA Methods 3510/Modified 8015/8040)
in TCLP Extract

Sample Name	Lab Code	Percent Recovery 4-Bromo-2,6-dichlorophenol
UOF-2	B3406-8	101
HOF-1	B3406-9	97.0
Method Blank	B3406-MB	92.2
	CAS Acceptance Criteria	40-115

Approved by Dave Edelman Date 7/12/91

00022

APPENDIX B

CHAIN OF CUSTODY INFORMATION

317 South 13th Avenue • P.O. Box 478 • Kelso, Washington 98626 • Telephone: 206/577-7222 • Fax: 206/636-1068

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of Custody / Laboratory Analysis Request

DATE 6/20/91 PAGE 1 OF 1

PROJECT UNOCAL 4511 Bellevue # 42468.02
CLIENT INFO.
CONTACT John North SE/E
ADDRESS Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kirkland PHONE# 485-5000
SAMPLERS SIGNATURE Jeff Kirkland

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8015 semi Vol	418.1	8080 PCB	8020/8015m	Total Lead	TCLP 13/1/600/7000 8015m	NUMBER OF CONTAINERS
1. NPF-1	6/20/91	950		Soil					composite									X	X		X	X		2
2. NUHOW-1		1010																X	X					1
3. EUHOW-1		1015					X											X	X					2
4. SUHOW-1		1020																X	X					1
5. WUHOW-1		1025																X	X					1
6. UOF-1		1030					X											X	X	X	X		X	3
7. UOF-2		1035					X											X	X	X	X		X	3
8. HOF-1		1040					~~X~~ MD DAL											X	X					1

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature Jeff Kirkland	Signature	Signature	Shipping I.D. No.	Total No. of Containers
Printed Name SE/E	Printed Name	Printed Name	VIA	Chain of Custody Seals
Firm 6/20/91 1340	Firm	Firm	Project	Received in good condition
Date/Time	Date/Time	Date/Time		LAB NO. B91-3406
Received By Stan Spurgeon	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature Stan Spurgeon	Signature	Signature	* Provide 48 24 hours analysis.	
Printed Name CAS	Printed Name	Printed Name		
Firm 6/20/91 1340	Firm	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

00024

UNOCAL 4511 Bellevue

Columbia Analytical Services Inc.

ORIGINAL IS IN PROJECT FILING

June 27, 1991

RECEIVED
JUL - 1 1991

John North
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **UNOCAL #4511 - Bellevue/Project #U24-08.02**

Dear John:

Enclosed are the results of the rush samples submitted to our lab on June 20, 1991. Preliminary results were telephoned on June 24,1991. For your reference, our service request number for this work is B913386.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin Elliott

Colin B. Elliott
Senior Project Chemist

CBE/das

4247 South 42th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Analyzed:**	06/25/91
Sample Matrix:	Soil	**Work Order #:**	B913386

Lead, Total
EPA Method 7420
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
GTW-N1 Comp	B3386-3	3	ND
GTW-W1 Comp	B3386-6	3	ND
GTF-TA	B3386-7	3	ND
GTW-TB	B3386-8	3	ND
ET-1	B3386-9	3	ND
ST-1	B3386-10	3	ND
GTW-E1 Comp	B3386-13	3	ND
GTW-S1 Comp	B3386-16	3	ND
Method Blank	B3386-MB	3	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Alan Elliot Date 6/28/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Work Order #:**	B913386

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		GTW-N1 Comp	GTW-W1 Comp	GTF-TA
Lab Code:		B3386-3	B3386-6	B3386-7
Date Analyzed:		06/20/91	06/20/91	06/20/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.1	ND	ND	ND
TPH as Gasoline	5	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 6/28/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Work Order #:**	B913386

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		GTF-TB	ET-1	ST-1
Lab Code:		B3386-8	B3386-9	B3386-10
Date Analyzed:		06/20/91	06/20/91	06/20/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	0.2	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.1	0.2	ND	ND
TPH as Gasoline	5	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 6/28/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Work Order #:**	B913386

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		GTW-E1 Comp	GTW-S1 Comp	Method Blank
Lab Code:		B3386-13	B3386-16	B3386-MB
Date Analyzed:		06/20/91	06/20/91	06/20/91
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	0.3	ND	ND
Ethylbenzene	0.1	0.5	ND	ND
Total Xylenes	0.1	4.7	0.3	ND
TPH as Gasoline	5	101	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Colin Elliott Date 6/28/91

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Date Analyzed:**	06/20/91
		Work Order #:	B913386

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
GTW-N1 Comp	B3386-3	106
GTW-W1 Comp	B3386-6	97.6
GTF-TA	B3386-7	94.0
GTF-TB	B3386-8	98.8
ET-1	B3386-9	93.2
ST-1	B3386-10	106
GTW-E1 Comp	B3386-13	103
GTW-S1 Comp	B3386-16	107
GTW-S1 Comp	B3386-16MS	94.8
GTW-S1 Comp	B3386-16DMS	98.0
Method Blank	B3386-MB	104
	CAS Acceptance Criteria	50-130

TPH Total Petroleum Hydrocarbons

Approved by Glenn Elliott Date 6/28/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/20/91
Project:	UNOCAL #4511 - Bellevue	**Date Extracted:**	06/20/91
Sample Matrix:	Soil	**Date Analyzed:**	06/20/91
		Work Order #:	B913386

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name: GTW-S1 comp
Lab Code: B3386-16

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.95	0.96	ND	0.70	0.72	73.7	75.0	39-150	1.7
Toluene	0.95	0.96	ND	0.71	0.74	74.7	77.1	46-148	3.2
Ethylbenzene	0.95	0.96	ND	0.74	0.78	77.9	81.3	32-160	4.3

TPH Total Petroleum Hydrocarbons
ND None Detected at or above the method reporting limit

Approved by Alan Elliott Date 6/28/91

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of Custody / Laboratory Analysis Request

DATE 6/20/91 PAGE 1 OF 2

PROJECT UNOCAL 4511 Bellevue # 42708.02
CLIENT INFO. CONTACT John North SE/E
ADDRESS Bothell
TELEPHONE# 485-8000
SAMPLERS NAME Jeff Kirtland PHONE# 485-8000
SAMPLERS SIGNATURE Jeff Kirtland

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE
1 GTW-NA	6/19/91	1340	1	Soil
2 GTW-NB	6/19/91	1345	2	
3 GTW-WA	6/19/91	1400	4	
4 GTW-WB	6/19/91	1405	5	
5 GTW-TA	6/19/91	1420	7	
6 GTF-TB	6/19/91	1425	8	
7 ET-1	6/19/91	1625	9	
8 ST-1	6/19/91	1715	10	

ANALYSIS REQUESTED

GENERAL CHEMISTRY (Specify) / OTHER (Specify)

	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8020/8015m Gas BTEX	Total Lead				PID	NUMBER OF CONTAINERS
1 GTW-NA						Composite; Report as GTW-N1							X	X	X				2	2
2 GTW-NB																			4	2
3 GTW-WA						Composite; Report as GTW-W1							X	X	X				5	2
4 GTW-WB																			86	2
5 GTW-TA														X	X				15	2
6 GTF-TB														X	X				351	2
7 ET-1														X	X				124	2
8 ST-1														X	X				150	2

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By
Signature Jeff Kirtland	Signature	Signature
Printed Name Jeff Kirtland	Printed Name	Printed Name
Firm SE/E Bothell	Firm	Firm
Date/Time 6/20/91	Date/Time	Date/Time

Received By	Received By	Received By
Signature Stan Spurgeon	Signature	Signature
Printed Name Stan Spurgeon	Printed Name	Printed Name
Firm CAS	Firm	Firm
Date/Time 6/20/91 740	Date/Time	Date/Time

PROJECT INFORMATION
Hand Delivered
Shipping I.D. No.
VIA
Project

SAMPLE RECEIPT
Total No. of Containers
Chain of Custody Seals
Received in good condition
LAB NO.

SPECIAL INSTRUCTIONS/COMMENTS
Request 48 hour turnaround.
Require results A.M. 6/24/91

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of Custody / Laboratory Analysis Request

DATE 6/20/91 PAGE 1 OF 1

PROJECT UNOCAL 4571 Bellevue #12408.02
CLIENT INFO. CONTACT John North SE/E
ADDRESS Bothell
TELEPHONE# 485-5000
SAMPLERS NAME Jeff Kvetland PHONE# 485-5000
SAMPLERS SIGNATURE JK

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE
1. GTW-EA	6/19/91		11 & 13	Soil
2. GTW-EB	6/19/91		12	
3. GTW-SA	6/19/91		14 & 16	
4. GTW-SB	6/19/91		15	
5.				
6.				
7.				
8.				

ANALYSIS REQUESTED

GENERAL CHEMISTRY (Specify)

OTHER (Specify)

BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8020/8015m gas/BTEX	Total Lead				PID	NUMBER OF CONTAINERS
		Composite: Report as										X	X	X				97	2
				GTW-E1								X	X	X				2	2
		Composite: Report as										X	X	X				2	2
				GTW-S1								X	X	X				13	2

Relinquished By Sweet, Edwards & Assoc.: Jeff Kvetland
Signature: JK
Printed Name: Jeff Kvetland
Firm: SE/E Bothell
Date/Time: 6/20/91

Relinquished By
Signature
Printed Name
Firm
Date/Time

Relinquished By
Signature
Printed Name
Firm
Date/Time

PROJECT INFORMATION
Hand Delivered
Shipping I.D. No.
VIA
Project

SAMPLE RECEIPT
Total No. of Containers
Chain of Custody Seals
Received in good condition
LAB NO. B91-3386

Received By: Stan Spurgeon
Signature: Stan Spurgeon
Printed Name: CAS
Firm: 6/20/91
Date/Time

Received By
Signature
Printed Name
Firm
Date/Time

Received By
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05

Appendix C

EXPLORATORY SOIL BORING LOGS

Sample Descriptions

Classification of soils in this report is based on visual field observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless stated. Visual-manual classification methods of ASTM D 2488 were used as an identification guide. Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% retained on No. 200 Sieve.	GRAVEL More than 50% of coarse fraction retained on No. 4 sieve.	CLEAN GRAVEL	GW	Well-graded gravel, fine to coarse gravel
			GP	Poorly-graded gravel
		GRAVEL WITH FINES	GM	Silty gravel
			GC	Clayey gravel
	SAND More than 50% of coarse fraction passes No. 4 sieve.	CLEAN SAND	SW	Well-graded sand, fine to coarse sand
			SP	Poorly-graded sand
		SAND WITH FINES	SM	Silty sand
			SC	Clayey sand
FINE GRAINED SOILS More than 50% passes No. 200 sieve.	SILT AND CLAY Liquid limit less than 50.	INORGANIC	ML	Silt
			CL	Clay
		ORGANIC	OL	Organic silt, organic clay
	SILT AND CLAY Liquid limit 50 or more.	INORGANIC	MH	Silt of high plasticity, elastic silt
			CH	Clay of high plasticity, fat clay
		ORGANIC	OH	Organic clay, organic silt
HIGHLY ORGANIC SOILS			PT	Peat

DENSITY/CONSISTENCY

SAND or GRAVEL		SILT or CLAY	
Density	Standard Penetration Resistance in Blows/Foot	Consistency	Standard Penetration Resistance in Blows/Foot
Very loose	0 - 4	Very soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Medium stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very dense	>50	Very stiff	15 - 30
		Hard	>30

MOISTURE

Modifier	Description
Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

MINOR CONSTITUENTS

Modifier	Estimated Percentage
Trace	< 5
Few	5 - 10
Little	10 - 25
Some	25 - 45

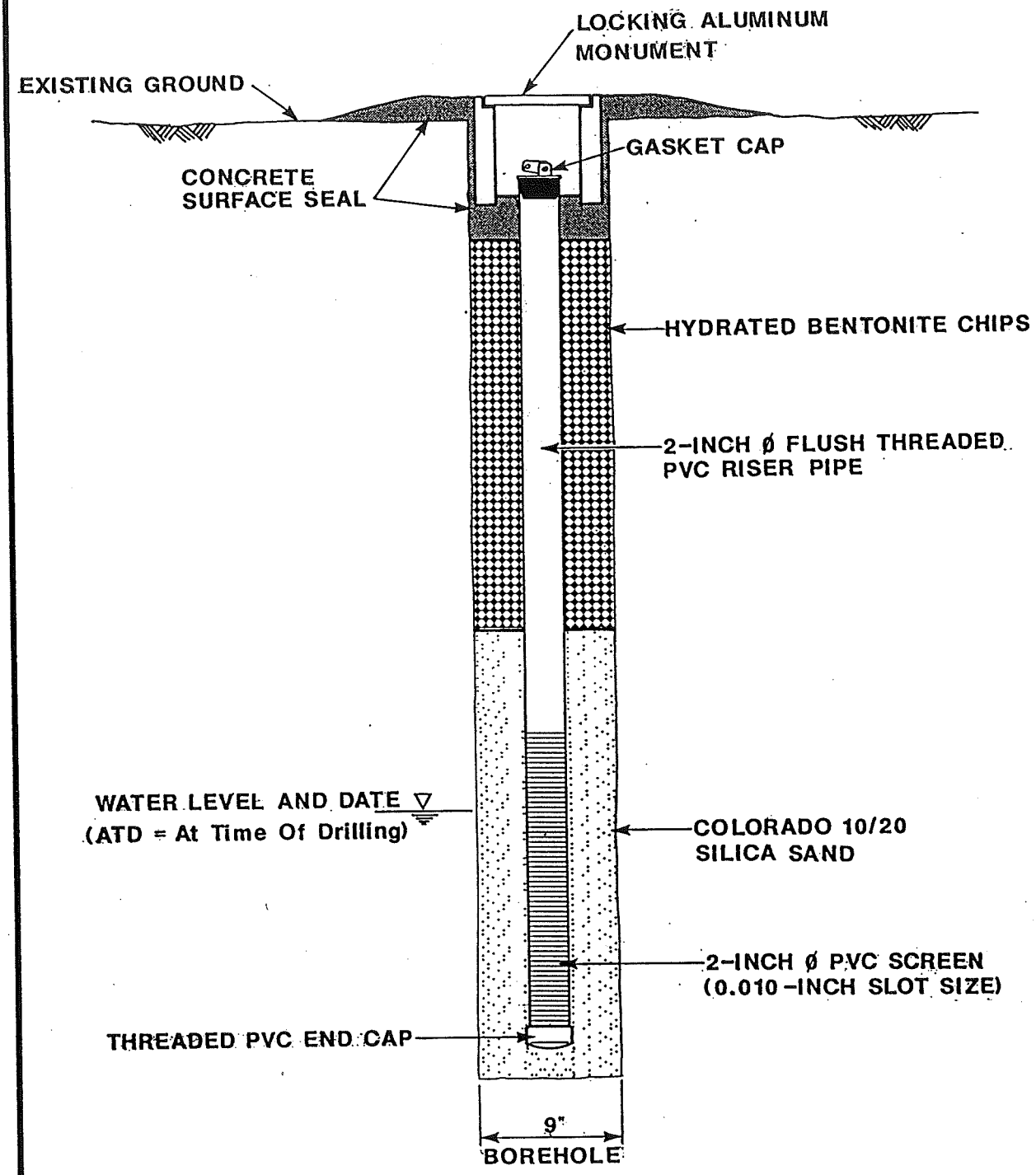
EMCON Northwest, Inc.

DATE 3-91
DWN. TB
APPR.
REVIS.
PROJECT NO. 1.00

Figure C-1

SOIL CLASSIFICATION SYSTEM

133396



EMCON Northwest, Inc.

DATE 3-91
DWN. JA
APPR.
REVIS.
PROJECT NO. 100

Figure C-2

GENERALIZED WELL INSTALLATION DETAIL

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 6
LOCATION	Bellevue, Washington	PAGE	1 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	37.90'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 - 3.0 feet: SAND with SILT and GRAVEL (SW-SM), brown, with orange mottles, few silt, fine to medium, trace coarse, some gravel (crushed), trace debris, loose, damp, slight hydrocarbon-like odor. (FILL)
DM/MW -6-2.5	31	6 14 15					**3.0 - 6.0 feet: SAND with SILT and GRAVEL (SW-SM),** gray, trace to few silt, fine to medium, little to some gravel (variable), trace debris, medium dense, damp, slightly hydrocarbon-like odor. (FILL)
				5			**6.0 - 16.0 feet: SILTY SAND with GRAVEL (SM),** brown, little silt, fine to medium, trace coarse, some gravel (rounded), medium dense, moist, slight hydrocarbon-like odor, coarse. (FILL)
DM/MW -6-7.5	143	5 8 21					
				10			
DM/MW -6-12.5	39	12 20 13					@ 12.5 feet: as above; brown to gray, odorless.
				15			**16.0 - 20.0 feet: SAND with GRAVEL (SW),** brown to gray, trace silt, fine to medium, trace coarse, few to little fine gravel (rounded), very dense, damp to moist, odorless with lenses of silty sand with gravel (SM), brown to gray, some silt, fine to medium sand, few to little gravel (rounded), moist, no odor, lenses are 4 inches apart.
DM/MW -6-17.5	5	33 27 50/6"					
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 6
LOCATION	Bellevue, Washington	PAGE	2 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	37.90'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW -6-22.5	2.4	27 50/6"		25			**20.0 - 31.0 feet: SILTY SAND (SM),** olive gray with orange mottles, some silt, fine to medium, few gravel (rounded), very dense, damp to moist, laminated beds.
DM/MW -6-32.5	NR			30			**31.0 - 35.0 feet: SAND with GRAVEL (SW),** gray to brown, trace to few silt, fine to coarse, some gravel (rounded), very dense, wet. (ALLUVIUM) @ 32.5 feet: sampler driven on a rock.
DM/MW -6-33.5	1.2	50/5"		35			**35.0 - 37.9 feet: SILTY SAND with GRAVEL (SM),** olive gray, some silt, fine to medium, trace coarse, some gravel (rounded), very dense, moist, odorless. (ALLUVIUM)
DM/MW -6-37.5	0	50/5"		40			Depth drilled to 37.5 feet below ground surface. Depth sampled to 37.9 feet below ground surface.

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 6
LOCATION	Bellevue, Washington	PAGE	3 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	37.90'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				45			**Well Abandonment Details** 0 - 37.9 feet: bentonite-cement grout.
				50			
				55			
				60			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 7
LOCATION	Bellevue, Washington	PAGE	1 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.10'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				5			**0 - 17.0 feet: NATIVE FILL. (FILL)** Note: Boring advanced through 17.0 feet of previously excavated material. First sample taken at 17.5 feet below ground surface.
				10			
				15			
DM/MW -7-17.5	8.4	50/5"					**17.0 - 28.1 feet: SILTY SAND with GRAVEL (SM),** olive brown, some silt, fine to medium, trace coarse, little gravel (rounded), very dense, moist, odorless. (WEATHERED TILL)
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = <1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 7
LOCATION	Bellevue, Washington	PAGE	2 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.10'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							@ 20 feet: hard drilling due to granules.
DM/MW -7-22.5	2.1	50/5"					@ 22.5 feet: as above; silt content varies to some silt in lenses.
				25			
DM/MW -7-27.5	3.2	41 50/2"					@ 27.5 feet: as above; olive green.
							Depth drilled to 27.5 feet below ground surface. Depth sampled to 28.1 feet below ground surface.
				30			**Abandonment Details** 0 - 28.1 feet: bentonite chips.
				35			
				40			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 8
LOCATION	Bellevue, Washington	PAGE	1 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 - 17.0 feet: NATIVE FILL. (FILL)
				5			Note: Boring advanced through 17.0 feet of previously excavated material. First sample taken at 17.5 feet below ground surface.
				10			
				15			
DM/MW -8-17.5	998	30 50/3"					**17.0- 28.3 feet: SAND with SILT and GRAVEL (SW-SM),** olive gray, few to little silt, fine to medium, little to some gravel (rounded, weathered), very dense, moist, noticable hydrocarbon-like odor.(WEATHERED TILL)
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 8
LOCATION	Bellevue, Washington	PAGE	2 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/26/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW -8-22.5	NR						@ 22.5 feet: sampler driven on a rock, no recovery (boring advanced to 23.5 feet for sample).
DM/MW -8-23.5	5.6	21 50/4"		25			@ 23.5 feet: as above; odorless.
DM/MW -8-27.5	0.4	28/50/4"					@ 27.5 feet: as above; olive brown.
				30			Depth drilled to 27.5 feet below ground surface. Depth sampled to 28.3 feet below ground surface. **Abandonment Details** 0 - 28.3 feet: bentonite chips.
				35			
				40			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

SWEET-EDWARDS/EMCON

U24-08.03.UNOBE.L32/cr:2.10/15/91

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW- 9
LOCATION	Bellevue, Washington	PAGE	1 OF 1
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	14.00'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW -9-2.5	248	3 3 5		5			**0 - 6.0 feet: SILTY SAND with GRAVEL (SM),** brown with orange mottles, few to little silt, fine to coarse, little to some gravel (rounded and crushed), trace debris, trace organic material, loose, moist, noticable hydrocarbon-like odor. (FILL)
DM/MW -9-7.5	8.4	4 4 9		10			**6.0 - 14.0 feet: SILTY SAND with GRAVEL (SM),** gray with orange mottles, some silt, fine to medium, trace coarse, few to little gravel (rounded, weathered). Medium dense, moist, slight odor (unknown). (WEATHERED TILL)
DM/MW -9-12.5	2.4	16 26 34		15			Depth drilled to 12.5 feet below ground surface. Depth sampled to 14.0 feet below ground surface. **Well Abandonment Details** 0 - 14.0 feet: bentonite chips.
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

SWEET-EDWARDS/EMCON

U24-08.03.UNOBE.L32/cr:2.10/15/91

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-10
LOCATION	Bellevue, Washington	PAGE	1 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	23.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
							0 - 17.5 feet: NATIVE FILL. (FILL)
							Note: Boring advanced through 17.0 feet of previously excavated material. First sample taken at 17.5 feet below ground surface.
				5			
				10			
				15			
DM/MW -10-17.5	203	19 36 50/5"					**17.0 - 20.0 feet: SILTY SAND with GRAVEL (SM),** bluish gray with yellow orange mottles, little silt, fine to medium, little gravel (rounded), very dense, moist, slight hydrocarbon-like odor, sample was discolored.
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-10
LOCATION	Bellevue, Washington	PAGE	2 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	23.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW -10-22.5	2.4	40 50/4"		25 30 35 40			20.0 - 23.3 feet: SILTY SAND with GRAVEL (SM), brown, trace to some silt, (variable in beds), fine to medium, little gravel (rounded), very dense, moist, odorless, "siltier" beds have laminated bedding. (ALLUVIUM) Depth drilled to 22.5 feet below ground surface. Depth sampled to 23.3 feet below ground surface.

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-11
LOCATION	Bellevue, Washington	PAGE	1 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.20'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW -11-2.5	3.2	4 4 4		5			**0 - 12.0 feet: SILTY SAND (SM),** bluish gray, little silt, fine to medium, few to little gravel (rounded) loose, slight hydrocarbon-like odor, sample discolored. (FILL)
DM/MW -11-7.5	73	3 4 4		10			@ 8.0 feet: as above; noticalbe hydrocarbon-like odor.
DM/MW -11-12.5	1159	26 35 50/6"		15			**12.0 - 15.0 feet: SILTY SAND (SM),** olive gray, few to some silt (variable in 1-inch lenses), fine to medium, trace coarse, little gravel (rounded), very dense, damp, very noticable hydrocarbon-like odor. (WEATHERED TILL) **15.0 - 23.0 feet: INTERBEDDED: SAND with GRAVEL (SP),** sandy silt (ML), beds 2-inch-thick. (ALLUVIUM) **SAND with GRAVEL (SP),** gray, trace silt, fine to medium (well sorted), few gravel (rounded), very dense, damp, very noticable hydrocarbon-like odor.
				20			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-11
LOCATION	Bellevue, Washington	PAGE	2 OF 2
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	28.20'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
DM/MW-11-22.5	12.4	27 50/4"		25			@ 22.5 feet: as above; brown, sand with gravel beds 1-inch-thick, sandy silt beds, 2 to 3 inches thick, odorless. @ 23.0 feet: wet cutting return. **23.0 - 28.3 feet: SILTY SAND with GRAVEL (SM),** olive brown, little to some silt, few coarse, some gravel (rounded), very dense, odorless, moist. (ALLUVIUM)
DM/MW-11-27.5	12.5	40 50/3"		30			Depth drilled to 27.5 feet below ground surface. Depth sampled to 28.2 feet below ground surface.
				35			
				40			

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames & Moore split barrel samples driven with a 300 lb. hammer free falling 30-inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-12
LOCATION	Bellevue, Washington	PAGE	1 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	40.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/30/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
								0 - 0.45 feet: ASPHALT. (AS)
								0.45 - 2.5 feet: SAND with GRAVEL (SW), brown, trace silt, fine to coarse, fine gravel (crushed), loose, damp, odorless. (FILL)
DM/MW -12-2.5	2.4	5 4 5		5				**2.5 - 6.5 feet: SAND with GRAVEL (SW),** gray with orange mottles, trace to few silt, fine to medium, trace coarse, some fine gravel (rounded), loose, damp, odorless. (WEATHERED TILL)
DM/MW -12-7.5	1.6	1 3 6		10				**6.5 - 8.0 feet: SANDY CLAY (CL),** yellow brown with red brown mottles in streaks, plastic fine, little silt, trace fine to coarse sand, trace gravel (very weathered, rounded), trace organic debris, stiff, damp, odorless. (WEATHERED TILL) **9.0 - 20.0 feet: SAND with SILT and GRAVEL (SW-SM),** gray, few silt, fine to coarse, some fine to coarse gravel (weathered, rounded), medium dense, moist, odorless. (WEATHERED TILL)
DM/MW -12-12.5	1.2	9 10 13		15				
DM/MW -12-17.5	2.4	31 50/6"		20				@ 17.5 feet: as above; brown.

REMARKS
(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames and Moore split barrel samples driven with a 300 lb. hammer free falling 30- inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

SWEET-EDWARDS/EMCON

U24-08.03.UNOBE.L32/cr:2.10/15/91

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-12
LOCATION	Bellevue, Washington	PAGE	2 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	40.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/30/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
DM/MW-12-22.5	0.5	36 50/6"		25				20.0 - 39.0 feet: SILTY SAND with GRAVEL (SM), olive brown, orange mottles, little silt, fine to coarse, some fine to coarse gravel (weathered, rounded), very dense, damp, odorless. (WEATHERED TILL)
DM/MW-12-27.5	0.4	50/6"		30				@ 27.5 feet: as above; olive gray, silt, variable to some, granules rounded and fractured.
DM/MW-12-32.5	1.2	50/6"		35				@ 32.0 feet: as above; olive brown with orange mottles, wet.
DM/MW-12-37.5	0.4	50/3"		40				**39.0 - 40.3 feet: SM-SP**, blue gray, few silt, fine, trace coarse, little gravel (rounded and

REMARKS

(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames and Moore split barrel samples driven with a 300 lb. hammer free falling 30- inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

LOG OF EXPLORATORY BORING

PROJECT NAME	UNOCAL 4511	BORING NO.	MW-12
LOCATION	Bellevue, Washington	PAGE	3 OF 3
DRILLED BY	Geoboring & Develop.	REFERENCE ELEV.	(a)
DRILL METHOD	H.S. Auger	TOTAL DEPTH	40.30'
LOGGED BY	Jeff Kirtland	DATE COMPLETED	08/30/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
DM/MW -12-40	1.2	50/4"		45 50 55 60				fractured), very dense, moist, odorless. (TILL) @ 40.0 feet: auger refusal. Depth drilled to 40.0 feet below ground surface. Depth sampled to 40.3 feet below ground surface.

Well Completion Details

0 - 14.69 feet: 2-inch-diameter schedule 40 PVC riser.

14.69 - 39.69 feet: 2-inch-diameter schedule 40 PVC screen with 0.010-inch machine cut slots.

39.69 - 40.25 feet: 2-inch-diameter schedule 40 PVC tapered threaded end plug.

0 - 2.0 feet: concrete.

2.0 - 8.0 feet: bentonite-cement grout.

8.0 - 11.4 feet: bentonite chips.

11.4 - 40.3 feet: 10 x 20 Colorado Silica Sand.

REMARKS

(1) Drilled with a Mobile Drill B-61, 4-inch ID hollow stem auger. DM = Dames and Moore split barrel samples driven with a 300 lb. hammer free falling 30- inches. (2) PID = Photoionization detector, background reading 1 ppm = < 1 1 ppm. (3) Boring abandoned with bentonite-cement grout. (a) Soil boring elevation not surveyed.

Appendix D

WELL ABANDONMENT LETTERS

EMCON
Northwest, Inc.

18912 North Creek Parkway • Suite 210 • Bothell, WA 98011-8016 • Office (206) 485-5000 • FAX (206) 486-9766

May 15, 1992
Project U24-08.02

Ms. Annette Petrie
Washington State Department of Ecology
7272 Cleanwater Lane
Mail Stop LU-11
Olympia, Washington 98054

Re: Abandonment of a Ground Water Monitoring Well
UNOCAL Service Station 4511
106th Avenue & NE 8th Street
Bellevue, Washington

Dear Ms. Petrie:

This letter is to inform you of the abandonment of a ground water monitoring well in accordance with WAC 173-160-560.

The well was installed by EMCON Northwest, Inc. in July, 1990. Abandonment was performed by Joe Hall Construction, Inc. The information required under the WAC 173-160-560 is as follows:

- **Project Name:** Underground Storage Tank Decommissioning, UNOCAL Service Station 4511, Bellevue, Washington
- **Date of Abandonment:** March 2, 1991
- **Location of Wells:** T25N R5E Section 29 SW 1/4 SE 1/4 SE 1/4
- **Well Numbers:** MW-1
- **Well Use:** Ground water monitoring well
- **Well Depths:** 30 feet deep

- **Method of Abandonment:** The PVC casing was first removed, and the remaining borehole was overexcavated using a trackhoe.

If you have any questions regarding this project please call me at 485-5000.

Sincerely,

EMCON Northwest, Inc.

Brian S Carl

Brian Carl
Project Geologist

cc: Leigh Carlson, UNOCAL Corporation

EMCON
Northwest, Inc.

18912 North Creek Parkway • Suite 210 • Bothell, WA 98011-8016 • Office (206) 485-5000 • FAX (206) 486-9766

May 15, 1992
Project U24-08.02

Ms. Annette Petrie
Washington State Department of Ecology
7272 Cleanwater Lane
Mail Stop LU-11
Olympia, Washington 98054

Re: Abandonment of Ground Water Monitoring Wells
UNOCAL Service Station 4511
106th Avenue & NE 8th Street
Bellevue, Washington

Dear Ms. Petrie:

This letter is to inform you of the abandonment of four ground water monitoring wells in accordance with WAC 173-160-560.

The wells were installed by EMCON Northwest, Inc. in July, 1990. Abandonment was performed by Geoboring & Development, Inc. The information required under the WAC 173-160-560 is as follows:

- **Project Name:** Underground Storage Tank Decommissioning, UNOCAL Service Station 4511, Bellevue, Washington
- **Date of Abandonment:** June 20, 1991
- **Location of Wells:** T25N R5E Section 29 SW 1/4 SE 1/4 SE 1/4
- **Well Numbers:** MW-2, MW-3, MW-4, MW-5
- **Well Use:** Ground water monitoring wells
- **Well Depths:** 33, 30, 30, and 33 feet deep, respectively

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- **Method of Abandonment:** All four wells were filled with bentonite grout and capped with cement

If you have any questions regarding this project please call me at 485-5000.

Sincerely,

EMCON Northwest, Inc.

Brian S Carl

Brian Carl
Project Geologist

cc: Leigh Carlson, UNOCAL Corporation