Report of Geoenvironmental Services Remedial Action and Supplemental Subsurface Contamination Study unocal Bulk Plant 0138 Coupeville, Washington

March 18, 1992

For
Unocal

contaminated soil was excavated.

UNOCAL BULK PLANT 0138
Coupeville, IS.

TCP

REMEDIAL ACTION AND SUPPLEMENTAL SUBSURFACE CONTAMINATION STUDY
March 1992

UNOCAL BULK PLANT # 0138
Coupeville, IS. Alexander & ~~Love~~ LOVELAND

8/13/92

GeoEngineers

March 18, 1992

Geotechnical,
Geoenvironmental and
Geologic Services

Unocal
P.O. Box 76
Seattle, Washington 98111

Attention: Mr. Gary Gunderson

We are submitting five copies of our remedial action and supplemental subsurface contamination study at the site of former Unocal Bulk Plant 0138 in Coupeville, Washington. Our services were authorized verbally by Mr. Gary Gunderson of Unocal on August 31, 1989. Contractual terms for our services are included in blanket contract number B1982E.

We appreciate the opportunity to be of continued service to Unocal. Please call if you have any questions regarding this report.

Yours very truly,

GeoEngineers, Inc.

James A. Miller

James A. Miller, P.E.
Principal

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UNOCAL BULK PLANT 0138
COUPEVILLE, WASHINGTON
FOR
UNOCAL

INTRODUCTION

The results of GeoEngineers' supplemental subsurface contamination study at the site of former Unocal Bulk Plant 0138 are presented in this report. The former bulk plant is located southwest of the intersection between Coveland and Alexander Streets in Coupeville, Washington. The site location relative to surrounding physical features is shown on the Vicinity Map, Figure 1. On-site and off-site monitor well and exploratory boring locations are shown on the Location Map, Figure 2. The general layout of the site, including on-site monitor wells and exploratory borings, is shown on the Site Plan, Figure 3. The limits of remedial excavations completed during this phase of work and soil sampling locations are shown in Figure 4.

PREVIOUS REMEDIAL/SITE ASSESSMENT ACTIVITIES

Quality Petroleum Construction removed one semi-buried 6,000-gallon diesel storage tank from the southern portion of the bulk plant site in September 1989 (Figure 3). A representative from GeoEngineers was present to observe the tank removal activities and to obtain soil samples from the limits of the resulting excavation. Petroleum-related contaminants either were not detected or were detected at concentrations less than MTCA (Model Toxics Control Act) Method A cleanup levels in the soil samples obtained from the limits of the excavation. The results of our activities during tank removal operations are presented in our report dated October 6, 1989.

GeoEngineers observed the drilling of six exploratory borings (MW-1 through MW-6) and the excavation of three test pits at the site in November 1989. Ground water monitor wells were completed in each boring (Figure 3). A representative from our company obtained soil samples from the borings and test pits and water samples from the monitor wells for chemical analyses. Subsurface soil contamination was detected at concentrations greater than MTCA cleanup levels at a shallow depth in MW-3 (3.0 feet) and at deeper depths in MW-4 (20.5 feet) and MW-5 (23.0 feet). Petroleum-related compounds were detected at concentrations greater than MTCA cleanup levels in ground water samples obtained from MW-1, MW-4 and MW-5. EDC (1,2-dichloroethane) was detected at a concentration greater than MTCA cleanup levels in the ground water sample obtained from MW-4. The results of our site assessment are presented in our report dated January 30, 1990. A copy of this report was provided to Ecology.

B&C Equipment Inc., removed one 550-gallon heating oil tank (Figure 3), excavated soil from the former drum storage area and former buried fuel lines, and completed five test pits at the site between August and October 1990. A representative from our company observed the tank removal and soil excavation activities, and obtained soil samples from the limits of the resulting excavations and test pits. Remedial activities during this phase of work necessitated the abandonment of MW-1. Petroleum-related contaminants at concentrations greater than MTCA cleanup levels were detected in soil samples obtained from depths ranging between 10 and 28 feet in test pits completed along the east side of the office and north of the aboveground fuel storage tanks (Figure 3). TPH (total petroleum hydrocarbons) and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in soil samples obtained from a depth of approximately 4 feet in the oil drum storage and fuel line excavations (samples T-1 through T-8). Approximately 100 yd^3 (cubic yards) of petroleum-stained soil were removed from the drum storage and fuel line excavations and stockpiled on-site. Approximately 500 yd^3 (field estimate) of soil were removed from the test pits and excavations and stockpiled on-site, separate from the contaminated soil stockpile. Actions to remediate the petroleum-stained soil and overburden soil are described in this report. The results of our activities during the tank removal and excavation operations are presented in our project status report dated November 2, 1990. Laboratory data sheets for soil samples T-1 through T-8 were not included in the report issued on November 2, 1990. The laboratory data sheets for these samples are presented in Appendix A of this report.

As a result of the previous remedial/site assessment activities, several areas with soil contamination at concentrations greater than MTCA cleanup levels were identified at the bulk plant site. The areas of apparently shallow contamination include the area underneath the warehouse, the warehouse loading platform and the loading rack. Deeper soil contamination was identified in the vicinity of MW-4, MW-5 and along the east side of the office building.

SCOPE

The purpose of our most recent services was to (1) explore and remediate shallow subsurface soil conditions in the vicinity of the loading rack and beneath the warehouse, (2) explore and evaluate possible off-site soil and ground water contamination, and (3) remediate contaminated soil stockpiled on-site during previous excavation activities. GeoEngineers' scope of services completed for this project is listed below.

1. Monitor the excavation and treatment of contaminated soil removed from beneath the loading rack slab, the warehouse platform areas and along the east side of the office building.
2. Drill six on-site and two off-site exploratory borings using truck-mounted, hollow-stem auger drilling equipment.
3. Obtain soil samples at 5-foot intervals from each boring and at selected locations from the limits of the remedial excavations.

4. Test soil samples from the borings and excavations for one or more of the following: BETX (benzene, ethylbenzene, toluene and xylenes) by EPA Method 8020, fuel hydrocarbons (gasoline and diesel) by modified EPA Method 8015 and TPH (total petroleum hydrocarbons) by EPA Method 418.1.
5. Install a 2-inch-diameter PVC (polyvinyl chloride) monitor well casing in seven of the borings, and protect the well casings within flush-grade, locking surface monuments.
6. Develop the monitor well screens by hand-bailing with disposable plastic bailers.
7. Measure the depth to the water table in the monitor wells and sample the water table interface for free (floating) product.
8. Obtain one ground water sample from each monitor well for laboratory analysis of BETX and fuel hydrocarbons.
9. Measure the airspace in the monitor well casings for hydrocarbon vapors using a Bacharach TLV Sniffer calibrated to hexane.
10. Evaluate the field and laboratory data with regard to current regulatory criteria.

SOIL AND GROUND WATER CLEANUP CRITERIA

Ecology (Washington State Department of Ecology) has adopted cleanup levels for underground storage tank sites under the MTCA regulations. The Method A cleanup levels were developed to provide conservative cleanup levels for sites undergoing routine cleanup actions or for sites with relatively few hazardous substances. Ecology MTCA Method A soil and ground water cleanup levels are as follows:

MTCA Method A

	Cleanup Limits	
Compound	Soil	Ground water
TPH (gasoline)	100 mg/kg	1 mg/l
TPH (diesel)	200 mg/kg	1 mg/l
TPH (other)	200 mg/kg	1 mg/l
Benzene	0.5 mg/kg	5 µg/l
Ethylbenzene	20 mg/kg	30 µg/l
Toluene	40 mg/kg	40 µg/l
Xylenes	20 mg/kg	20 µg/l
Lead	250 mg/kg	5 µg/l

Notes: mg/kg = milligrams per kilogram
mg/l = milligrams per liter
µg/l = micrograms per liter

SITE CONDITIONS

GENERAL

The site of former Unocal Bulk Plant 0138 is located on Whidbey Island in the town of Coupeville, Washington. Topographically, the former bulk plant is located on a hillside that slopes gently to the north, toward Penn Cove. The site is surrounded on the west by an existing cardlock facility, and to the south and east by residences. An open undeveloped field lies north of the site (across Coveland Street).

Existing facilities on the site include five aboveground product storage tanks and associated piping. The five aboveground tanks are partially enclosed within an earthen dike on the downslope side. A shallow drainage ditch extends from east to west between the aboveground tanks and the former truck loading slab as shown in Figure 3.

SUBSURFACE SOIL CONDITIONS

Subsurface soil conditions beneath the bulk plant were explored by drilling six supplemental on-site and two off-site exploratory borings at the locations shown in Figures 2 and 3, and by examining soil exposed in the base and walls of the remedial excavations. Details of the field exploration program and the boring logs are shown in Appendix B.

Two of the on-site exploratory borings (B-1 and MW-9) encountered medium stiff to hard silt to the total depths explored. MW-7, MW-10 and MW-11 encountered approximately 5 to 27 feet of medium stiff to hard silt over interbedded sand and silt to the completion depths of the borings. MW-8 encountered very loose to very dense sand and silty sand to the total depth of the boring. One off-site exploratory boring (MW-13) encountered approximately 30 feet of stiff to hard silt overlying very dense silty sands to the completion depth of the boring. MW-12 encountered approximately 6 feet of very dense silty sand over approximately 15 feet of stiff silt. The silt was underlain by very dense sand and silty sand to the total depth explored. Soil observed in the base and walls of the remedial excavations consisted of 1 to 3 feet of sandy fill material overlying interbedded stiff silt with sand and dense sand with silt to the total depths excavated.

GROUND WATER CONDITIONS

Ground water conditions at the site were explored by constructing monitor wells in seven of the exploratory borings. Construction details for the monitor wells are included with the boring logs in Appendix B.

Water levels were measured in the on-site and off-site monitor wells on April 25, May 17 and July 2, 1991. Depth to ground water in MW-2 and MW-5 through MW-13 ranged from 10.53 to 30.06 feet below existing grade. Ground water was encountered in the excavations at a depth of approximately 8 feet.

Ground water elevations beneath the site are variable because of perched ground water conditions. Based on topography and ground water elevations, it appears that ground water flows northward, toward Penn Cove.

SUBSURFACE CONTAMINATION

Potential on-site and off-site subsurface fuel-related contamination was evaluated by the following:

1. Field screening the soil samples obtained from the borings and from the limits of the remedial excavations. The field screening methods used include visual examination, water sheen screening and headspace vapor screening. The field screening methods are described in Appendix B.
2. Submitting selected soil samples from the exploratory borings and from the limits of the remedial excavations for chemical analysis of one or more of the following: BETX, fuel hydrocarbons or TPH.
3. Sampling the water table interface in each monitor well for free (floating) product.
4. Submitting ground water samples from each monitor well for chemical analysis of BETX and fuel hydrocarbons.
5. Measuring the airspace in the monitor wells for hydrocarbon vapors using a Bacharach TLV Sniffer calibrated to hexane.

The subsurface soil contamination data and field screening results for soil samples obtained from the exploratory borings are summarized in Table 1. Hydrocarbon vapor concentrations measured in the well casings and ground water analytical data are summarized in Table 2. The subsurface soil contamination data and field screening results for soil samples obtained from the remedial excavations are summarized in Table 3. Tables 4 and 5 summarize chemical analytical data for soil samples from on-site stockpiled soil. Laboratory reports for the soil and water samples are presented in Appendix C. Laboratory reports are included in Appendix A for composite samples obtained from stockpiled soil removed from the drum storage area during previous remedial activities at the site.

SOIL CONTAMINATION

Field screening tests indicated the possible presence of fuel-related contamination in soil samples obtained from depths of 18 feet (sample MW-11-4), 23 feet (sample MW-11-5), and 28 feet (sample MW-11-6) in boring MW-11. Headspace vapor concentrations ranging from 500 to 600 ppm (parts per million) were detected in these samples during field screening. No water sheen was observed during field screening of the samples. Field screening results did not indicate the presence of petroleum-related contaminants in soil samples obtained from the remaining borings.

Selected soil samples obtained from the exploratory borings were submitted to ATI (Analytical Technologies, Inc.) for chemical analysis of TPH and fuel hydrocarbons. Two soil samples obtained from MW-12 and MW-13 were also analyzed for BETX. The soil samples were selected primarily on the basis of field screening results and sample location. TPH, fuel hydrocarbons and BETX either were not detected or were detected at concentrations less than MTCA cleanup levels in the soil samples obtained from the supplemental exploratory borings (MW-7 through MW-13 and B-1).

GROUND WATER CONTAMINATION

Free (floating) product was not observed on the water surface in the monitor wells. A heavy sheen was detected on the water surface of MW-5. One or more components of BETX were detected at concentrations exceeding MTCA cleanup levels in ground water samples obtained from MW-5, MW-8, MW-9, MW-10, and MW-11. Benzene was detected at concentrations ranging from 11 μg/l to 85 μg/l in the ground water samples obtained from MW-5, MW-8, MW-9 and MW-10. Fuel hydrocarbons were detected at concentrations of 63 mg/l (quantified as gasoline) and 59 mg/l (quantified as diesel) in the ground water sample obtained from MW-5. Fuel hydrocarbons were detected at a concentration of 2 mg/l (quantified as gasoline) in the ground water sample obtained from MW-11. The concentrations of fuel hydrocarbons detected in ground water samples from MW-5 and MW-11 exceed the corresponding MTCA cleanup levels. BETX and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in ground water samples obtained from the remaining monitor wells.

HYDROCARBON VAPOR CONCENTRATIONS

The concentrations of hydrocarbon vapors in the monitor well casings were measured on April 23, 24, 25 and May 17, 1991 using a Bacharach TLV Sniffer calibrated to hexane. Hydrocarbon vapors were measured at concentrations of 9,000 ppm (parts per million) in MW-7 on April 23, 1991 and 400 ppm in MW-11 on April 25, 1991. Hydrocarbon vapors were detected at insignificant concentrations in the remaining monitor well casings (Table 2).

REMEDIAL ACTIVITIES

GENERAL

A.L. Sleister & Sons Construction, Inc. demolished and removed the loading rack slab, the warehouse loading platform, the warehouse and office building, and excavated approximately 850 cubic yards of soil at the site between March 4 and July 8, 1991. Remedial activities in the vicinity of the loading rack slab necessitated the abandonment of MW-3 and MW-4. Details of the monitor well abandonment procedure are presented in Appendix B.

A representative from our staff was present to observe excavation activities and to obtain soil samples. Field screening and chemical analytical results were used to delineate the limits of the excavations. Field screening results indicated that subsurface soil contamination was concentrated in discontinuous lenses and pockets of sandy soil ranging in depth from near the surface to approximately 28 feet below existing grade. Field screening was used to segregate apparently clean overburden soil from the interbedded contaminated soil. Noncontaminated overburden soil and soil contaminated with petroleum hydrocarbons were temporarily stockpiled separately on-site pending results of chemical analytical testing.

EXCAVATIONS

Five soil samples (910306-1 through 910306-5) obtained from the limits of the loading rack slab excavation were submitted to ATI for chemical analysis of TPH (Table 3). Two of the soil samples (910306-2 and 910306-5) also were analyzed for fuel hydrocarbons. TPH was detected at a concentration greater than the MTCA cleanup levels for petroleum-contaminated soil in soil sample 910306-4 obtained from a depth of 10 feet in the north wall of the loading rack slab excavation (Figure 4). Additional soil was not removed from this area because excessive ground water was encountered in the excavation. TPH and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in the remaining soil samples obtained from the loading rack slab excavation.

Six soil samples (910306-6, 910419-1 through 910419-3, 910422-1, and 910702-1 through 910702-10) were obtained from the limits of the excavation located west of the warehouse building between March 6 and April 22, 1991 (Figure 4). The soil samples were submitted to ATI for chemical analyses of TPH, BETX or fuel hydrocarbons. TPH and/or fuel hydrocarbons were detected at concentrations greater than MTCA cleanup levels in the soil samples obtained from the base (910419-1), south wall (910419-2) and north wall (910422-1) of the excavation (Table 3). Additional soil was removed from these areas and confirmatory soil samples were obtained from the new limits of the excavation on July 2, 1991 (Figure 4). TPH and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in the soil samples collected on July 2, 1991.

Approximately 2 yd^3 of petroleum stained soil was removed from a small excavation located adjacent to the east side of the warehouse/office building on April 19, 1991 (Figure 4). One soil sample was obtained from the base of the excavation (910419-4) for chemical analysis of TPH. TPH was detected at a concentration (1,700 mg/kg) greater than the applicable MTCA cleanup level in the soil sample. Additional soil was removed from the excavation and five confirmatory soil samples (910702-11 through 910702-14 and 910702-16) were obtained from the new limits of the excavation on July 2, 1991. TPH and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in the five confirmatory soil samples (Table 3).

Soil removed from the remedial excavations was temporarily stockpiled on-site.

SOIL AERATION

Approximately 600 yd^3 of contaminated soil excavated during the August through October 1990 remedial activities were aerated on-site in two separate soil stockpiles. Approximately 500 yd^3 of overburden soil was aerated in one stockpile. Approximately 100 yd^3 of visually contaminated soil was aerated in the second soil stockpile.

Five composite soil samples (910305-1, -3, -5, -7 and 910305-9) were obtained from the overburden soil stockpile on March 5 and March 7, 1991. The soil samples were submitted for chemical analysis of TPH and fuel hydrocarbons. TPH and fuel hydrocarbons either were not detected or were detected at concentrations less than MTCA cleanup levels in the remaining soil samples (Table 4). Two additional soil samples 910424-7 and 910424-8 were obtained from the overburden soil stockpile on April 24, 1991 and submitted for chemical analysis of TPH. TPH was detected at concentrations less than MTCA cleanup levels in soil samples 910424-7 and 910424-8 (Table 4). The soil in the overburden soil stockpile was used to backfill the excavations and grade the site in June and July 1991. Laboratory data for the composite soil samples are presented in Appendix C of this report.

One composite soil sample (910307-1) was obtained from the visually contaminated soil stockpile on March 7, 1991 and submitted for chemical analysis of TPH and fuel hydrocarbons. TPH was detected at a concentration exceeding MTCA cleanup levels in soil sample 910307-1. A total of nine additional soil samples (910418-1 through 910418-3 and 910424-1 through 910424-6) were obtained from the contaminated soil stockpile on April 18 and 24, 1991 and submitted for chemical analysis of TPH and/or fuel hydrocarbons. TPH was detected at concentrations greater than MTCA cleanup levels in five (910418-1, 910418-2, 910418-3, 9104240-3 and 910424-4) of the composite soil samples. Fuel hydrocarbons quantified as diesel were detected in one soil sample (910418-3) at a concentration greater than the MTCA cleanup level. TPH and/or fuel hydrocarbons were less than MTCA cleanup levels in the remaining four composite soil samples (Table 5).

Approximately 400 yd^3 of contaminated soil excavated during remedial activities at the site between April and June 1991 was added to the contaminated soil stockpile. The 500 total yd^3 of contaminated soil were spread on-site in a single lift approximately 2 feet thick on June 25, 1991 to facilitate soil aeration. An additional 200 yd^3 of contaminated soil were added to the aeration area during July remedial activities at the site. The soil is currently being tilled on a weekly basis to enhance soil aeration. The soil will be used to grade the site when chemical analytical data indicate that the concentrations of petroleum-related contaminants are less than applicable MTCA Method A cleanup levels.

CONCLUSIONS

BETX and/or fuel hydrocarbons were detected at concentrations greater than the MTCA compliance cleanup levels in ground water samples obtained from on-site monitor wells MW-5, MW-8, MW-9, MW-10, and MW-11 in April and May 1991. Petroleum-related contamination either was not detected or was detected at concentrations less than MTCA cleanup levels in soil and ground water samples obtained from the two off-site monitor wells (MW-12 and MW-13). Free product was not found in on-site or off-site monitor wells. The shallow ground water in the area does not appear to be suitable for use as drinking water.

As stated in our November 2, 1990 project status report, soil contamination exists at depth in the areas of MW-4, MW-5, north of the aboveground storage tanks, and east of the former office building. Additional deep subsurface soil contamination was detected at concentrations greater than MTCA cleanup levels in the north wall of the loading rack excavation during our recent remedial action. It appears that most of the shallow subsurface soil contamination has been removed during excavation procedures at the site.

RECOMMENDATIONS

Based on our findings, shallow petroleum-contaminated ground water probably extends beneath Coveland Street but has not migrated to property north of Coveland Street. The removal of petroleum-contaminated soil during remedial activities at the site between September 1989 and July 1991 has eliminated most of the source of the ground water contamination. This should facilitate the natural degradation of most of the residual BETX and TPH in the on-site water. Therefore, Unocal may consider monitoring ground water quality to observe this expected natural degradation of residual petroleum hydrocarbons. Remedial actions may need to be implemented if the ground water conditions change significantly during the course of monitoring ground water quality.

We recommend monitoring ground water quality in the vicinity of the site on a quarterly basis. Ground water monitoring should include the following: (a) measure water levels and hydrocarbon vapor concentrations in the monitor wells, (b) check for free product in wells, (c) collect ground water samples from monitor wells for chemical analyses of BETX, fuel hydrocarbons and total lead, and (d) evaluate the field and laboratory data with regard to current regulatory criteria. The results of quarterly ground water monitoring should be evaluated to assess whether additional remedial measures are necessary to improve water quality.

LIMITATIONS

We have prepared this report for use by Unocal. This report may be made available to regulatory agencies and to potential buyers of the property. This report is not intended for use by others and the information contained herein is not applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced borings, excavations and our previous experiences at the site. It is always possible that areas with contamination may exist in areas of the site that were not explored.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No other conditions, express or implied, should be understood.

Please call if you have questions concerning our report.

Respectfully submitted,

GeoEngineers, Inc.

Barbara J. Sherupski
Staff Geologist

Charles S. Lindsay
Project Hydrogeologist

James A. Miller, P.E.
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BJS:CSL:JAM:cs
DOCUMENT ID: 0161205.R

TABLE 1
SUMMARY OF SOIL FIELD SCREENING RESULTS AND CHEMICAL ANALYTICAL DATA
EXPLORATORY BORINGS[1]

Boring/ Monitor Well Number	Date Sampled	Sample Depth (feet)	Field Screening Results[2]		Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/kg)		TPH[4] (EPA Method 418.1) (mg/kg)
			Headspace Vapors (ppm)	Sheen	Gasoline	Diesel	
MW-7	04/23/91	27.0	<100	NS	<5	<5	55
MW-8	04/23/91	22.5	<100	SS	<5	<5	68
	04/23/91	27.5	<100	NS	<5	<5	56
MW-9	04/23/91	27.5	--	NS	<5	<5	66
MW-10	04/24/91	29.5	<100	NS	<5	<5	46
MW-11	04/25/91	18.0	600	NS	23	<5	110
	04/25/91	28.0	500	NS	27	<5	130
B-1	04/24/91	18.0	<100	NS	<5	<5	63
MW-12[5]	05/16/91	19.0	<100	NS	<5	<5	<5
	05/16/91	29.0	<100	NS	<5	<5	<5
MW-13[5]	05/17/91	18.0	<100	NS	<5	<5	<5
	05/17/91	33.0	<100	NS	<5	<5	<5

Notes:

[1]Chemical analyses were conducted by Analytical Technologies, Inc. Laboratory reports are presented in Appendix C.

[2]Vapor measurements were obtained using a Bacharach TLV Sniffer calibrated to hexane. NS = no sheen, SS = slight sheen

[3]Fuel hydrocarbons are quantified relative to a gasoline or diesel standard.

[4]TPH = total petroleum hydrocarbons. TPH is quantified relative to a gasoline or diesel standard.

[5]MW-12 and MW-13 were also analyzed for BETX by EPA Method 8020. BETX was detected at concentrations less than MTCA cleanup levels in the soil samples.

ppm = parts per million

mg/kg = milligrams per kilogram

"<" = less than

"-" = not tested

TABLE 2
SUMMARY OF GROUND WATER CHEMICAL ANALYTICAL DATA FROM MONITOR WELLS[1]

Sample Number	Date Sampled	Volatile Aromatic Hydrocarbons[2] (EPA Method 8020) (µg/l)				Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/l)		Hydrocarbon Vapor Concentrations[4] (ppm)
		B	E	T	X	Gasoline	Diesel	
MW-2	04/23/91	<0.5	<0.5	<0.5	<0.5	<1	<1	<400
MW-5	04/23/91	11	29	370	690	63	59	<400
MW-6	04/23/91	<0.5	<0.5	<0.5	<0.5	<1	<1	<400
MW-7	04/23/91	<0.5	<0.5	<0.5	<0.5	<1	<1	9,000
MW-8	04/23/91	52	38	10	130	<1	<1	<400
MW-9	04/23/91	57	43	11	140	<1	<1	<400
MW-10	04/24/91	85	1.9	<0.5	3.1	<1	<1	<400
MW-11	04/25/91	<0.5	53	36	32	2	<1	400
MW-12	05/17/91	<0.5	4.0	1.1	5.9	<1	<1	<400
MW-13	05/17/91	<0.5	<0.5	<0.5	<0.5	<1	<1	<400

Notes:

[1]Chemical analyses were conducted by Analytical Technologies, Inc. Laboratory reports are presented in Appendix C.

[2]B = benzene, E = ethylbenzene, T = toluene, X = total xylenes

[3]Fuel hydrocarbons are quantified relative to a gasoline or diesel standard.

[4]Hydrocarbon vapors measured in monitor well casings using a Bacharach TLV Sniffer calibrated to hexane.

µg/l = micrograms per liter; mg/l = milligrams per liter; ppm = parts per million

'--' = not tested

'<' = less than

TABLE 3 (Page 1 of 2)
SUMMARY OF SOIL FIELD SCREENING RESULTS AND CHEMICAL ANALYTICAL DATA
EXCAVATIONS[1]

Soil Sample Number	Date Sampled	General Location	Depth of Sample (feet)	Field Screening Results[2]		Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/kg)		TPH[4] (EPA Method 418.1)	Volatile Aromatic Hydrocarbons[5] (EPA Method 8020) (mg/kg)			
				Headspace Vapors								
				(ppm)	Sheen	Gasoline	Diesel	(mg/kg)	B	E	T	X
910306-1	03/06/91	Loading rack, west wall	6.0	100	MS	--	--	100	--	--	--	--
910306-2	03/06/91	Loading rack, south wall	10.0	<10	NS	<5	7	130	--	--	--	--
910306-3	03/06/91	Loading rack, east wall	10.0	40	HS	--	--	140	--	--	--	--
910306-4	03/06/91	Loading rack, north wall	10.0	220	HS	--	--	330	--	--	--	--
910306-5	03/06/91	Loading rack, base	10.0	25	SS	<5	<5	24	--	--	--	--
910306-6	03/06/91	Warehouse, north wall	6.0	<10	NS	<5	<5	39	--	--	--	--
910419-1	04/19/91	Warehouse, base	3.0	800	HS	--	--	2,000	<0.025	1.7	0.23	2.3
910419-2	04/19/91	Warehouse, south wall	3.0	400	MS	--	--	250	<0.025	0.53	0.54	1.7
910419-3	04/19/91	Warehouse, base	10.0	0	NS	--	--	33	<0.025	<0.025	<0.025	<0.025
910422-1	04/22/91	Warehouse, north wall	3.0	2,000	HS	63	420	2,400	<0.13	6.0	0.45	2.8
910307-3	03/07/91	Warehouse, east wall	9.0	<25	NS	<5	<5	74	--	--	--	--
910702-1	07/02/91	Warehouse, north wall	4.0	45	SS	<5	<5	14	--	--	--	--
910702-2	07/02/91	Warehouse, north wall	4.0	15	NS	--	--	33	--	--	--	--
910702-3	07/02/91	Warehouse, base	7.0	25	NS	<5	35	190	--	--	--	--

TABLE 3 (Page 2 of 2)

Soil Sample Number	Date Sampled	General Location	Depth of Sample (feet)	Field Screening Results[2]		Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/kg)		TPH[4] (EPA Method 418.1) (mg/kg)	Volatile Aromatic Hydrocarbons[5] (EPA Method 8020) (mg/kg)			
				Headspace Vapors (ppm)	Sheen	Gasoline	Diesel		B	E	T	X
910702-4	07/02/91	Warehouse, northeast	4.0	20	SS	--	--	68	--	--	--	--
910702-5	07/02/91	Warehouse, central	6.0	25	SS	<5	12	190	--	--	--	--
910702-6	07/02/91	Warehouse, south wall	7.0	50	SS	--	--	98	--	--	--	--
910702-7	07/02/91	Warehouse, north wall	5.0	<10	NS	<5	<5	40	--	--	--	--
910702-8	07/02/91	Warehouse, south wall	4.5	15	SS	--	--	33	--	--	--	--
910702-9	07/02/91	Warehouse, west leg, west wall	3.0	40	SS	<5	6	75	--	--	--	--
910702-10	07/02/91	Warehouse, west leg, base	4.5	80	SS	--	--	40	--	--	--	--
910419-4	04/19/91	East of office building, west wall	2.0	300	MS	--	--	1,700	<0.025	0.50	0.25	1.7
910702-11	07/02/91	East of office building, south wall	8.0	<10	NS	<5	<5	14	--	--	--	--
910702-12	07/02/91	East of office building, west wall	7.0	15	NS	--	--	27	--	--	--	--
910702-13	07/02/91	East of office building, north wall	7.0	<10	NS	<5	<5	14	--	--	--	--
910702-14	07/02/91	East of office building, east wall	5.5	55	SS	--	--	80	--	--	--	--
910702-16	07/02/91	East of office building, base	8.0	20	SS	--	--	23	--	--	--	--

Notes:

[1]Chemical analyses were conducted by Analytical Technologies, Inc. Laboratory reports are presented in Appendix B.

[2]Vapor measurements were obtained using a Bacharach TLV Sniffer calibrated to hexane. NS = no sheen, SS = slight sheen, MS = moderate sheen, HS = heavy sheen

[3]Fuel hydrocarbons are quantified relative to a gasoline or diesel standard.

[4]TPH = total petroleum hydrocarbons. TPH is quantified relative to a gasoline or diesel standard.

[5]B = benzene, E = ethylbenzene, T = toluene, X = sum of m, p and o-xylenes.

ppm = parts per million

"<" = less than

"--" = not tested

mg/kg = milligrams per kilogram

TABLE 4
SUMMARY OF SOIL FIELD SCREENING RESULTS AND CHEMICAL ANALYTICAL DATA OVERBURDEN SOIL STOCKPILE[1]

Soil Sample Number	Date Sampled	Field Screening Results[2]		Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/kg)		Total Petroleum Hydrocarbons[4] (EPA Method 418.1) (mg/kg)
		Headspace Vapors (ppm)	Sheen	Gasoline	Diesel	
910305-1	03/05/91	<10	SS	<5	11	34
910305-3	03/05/91	<10	MS	–	–	160
910305-5	03/05/91	<10	NS	<5	14	110
910305-7	03/05/91	<10	SS	–	–	120
910305-9	03/05/91	<10	MS	<5	14	<5
910424-7	04/24/91	<10	NS	<5	<5	91
910424-8	04/24/91	<10	NS	–	–	79

Notes:

[1]Chemical analyses were conducted by Analytical Technologies, Inc. Laboratory reports are presented in Appendix C.

[2]Vapor measurements were obtained using a Bacharach TLV Sniffer calibrated to hexane. NS = no sheen, SS = slight sheen, MS = moderate sheen

[3]Fuel hydrocarbons are quantified relative to a gasoline or diesel standard.

[4]Total petroleum hydrocarbons are quantified relative to a gasoline or diesel standard.

ppm = parts per million

mg/kg = milligrams per kilogram

"–" = not tested

"<" = less than

TABLE 5
SUMMARY OF SOIL FIELD SCREENING RESULTS AND CHEMICAL ANALYTICAL DATA SOIL AERATION STOCKPILES[1]

Soil Sample Number	Date Sampled	Field Screening Results[2]		Fuel Hydrocarbons[3] (Modified EPA Method 8015) (mg/kg)		Total Petroleum Hydrocarbons[4] (EPA Method 418.1) (mg/kg)
		Headspace Vapors (ppm)	Sheen	Gasoline	Diesel	
910307-1	03/07/91	50	HS	11	150	270
910418-1	04/18/91	25	SS	7	68	320
910418-2	04/18/91	25	SS	12	140	230
910418-3	04/18/91	25	SS	<5	240	390
910424-1	04/24/91	400	MS	<5	<5	190
910424-2	04/24/91	900	HS	–	–	180
910424-3	04/24/91	500	MS	<5	<5	1,200
910424-4	04/24/91	400	MS	–	–	260
910424-5	04/24/91	350	MS	<5	11	83
910424-6	04/24/91	800	HS	–	–	140

Notes:

[1]Chemical analyses were conducted by Analytical Technologies, Inc. Laboratory reports are presented in Appendix C.

[2]Vapor measurements were obtained using a Bacharach TLV Sniffer calibrated to hexane. SS = slight sheen, MS = moderate sheen, HS = heavy sheen

[3]Fuel hydrocarbons are quantified relative to a gasoline or diesel standard.

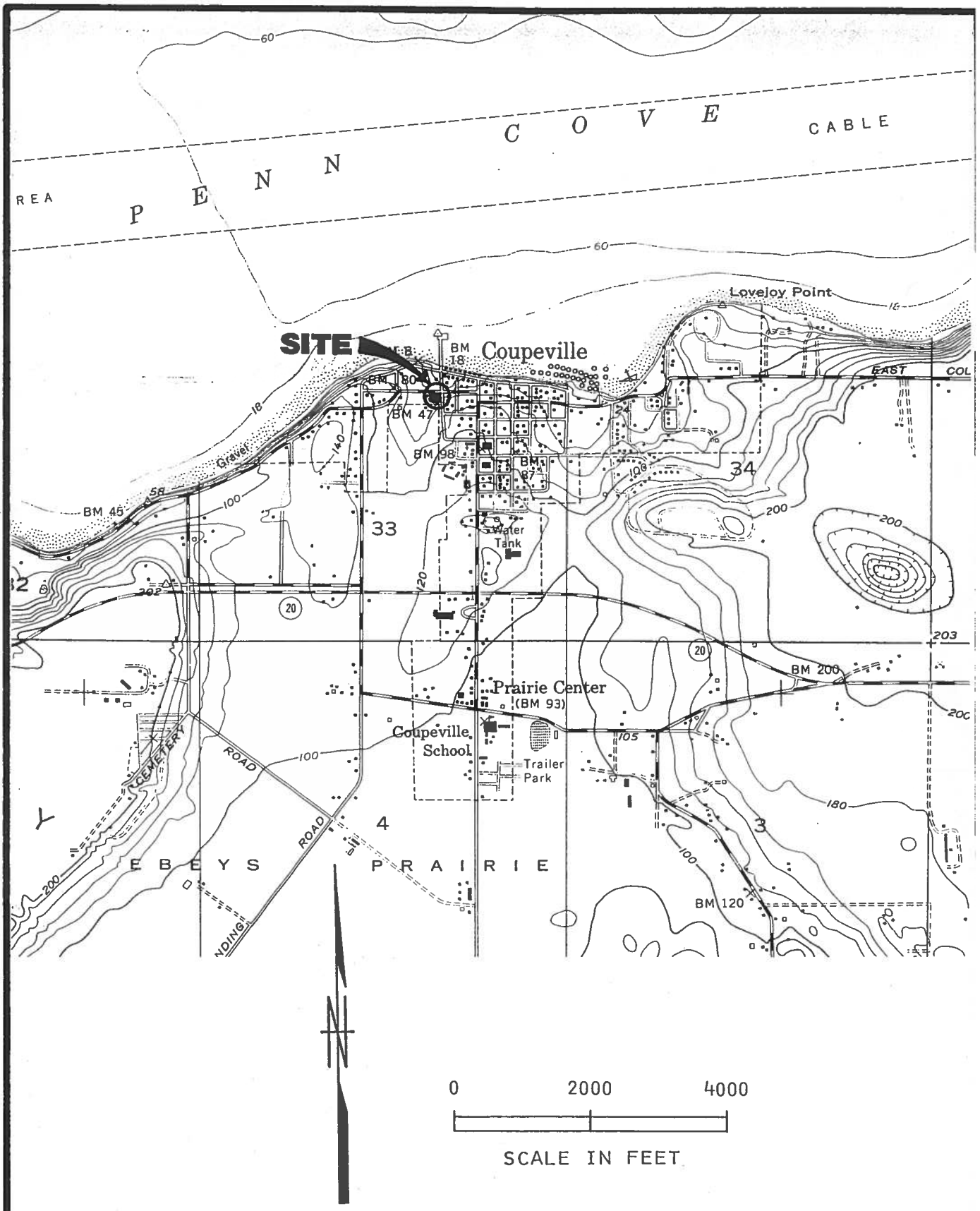
[4]Total petroleum hydrocarbons are quantified relative to a gasoline or diesel standard.

ppm = parts per million

mg/kg = milligrams per kilogram

"–" = not tested

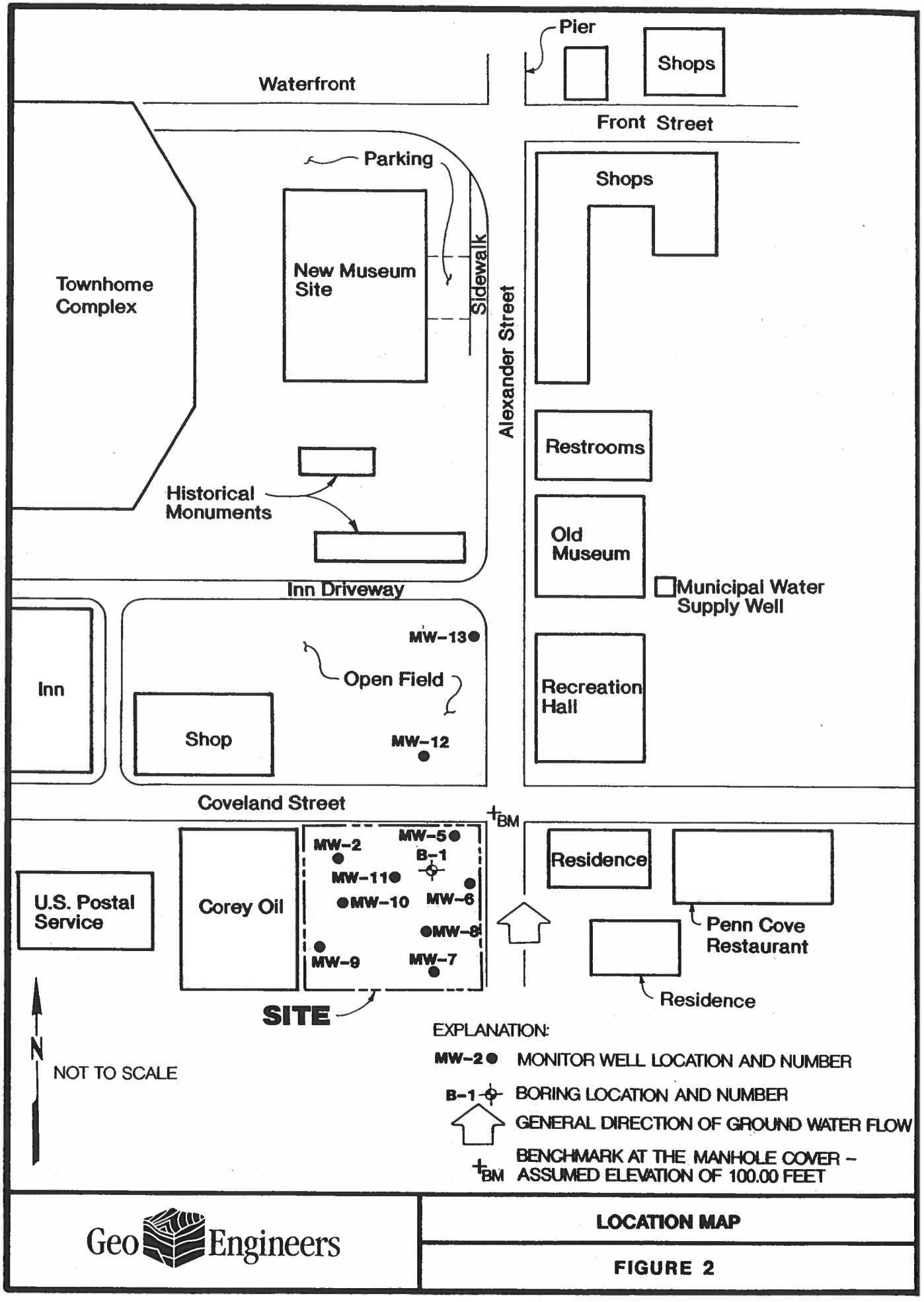
"<" = less than



REFERENCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP "COUPEVILLE, WASH."

Geo Engineers	**VICINITY MAP**
	FIGURE 1

0161-205-804 CLH:KKT 9-11-89



Geo Engineers

LOCATION MAP

FIGURE 2

0161-205-B04 BJS:LJD 5/13/91

APPENDIX A

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9012-010

GeoEngineers

DEC 27 1990

Routing .....
.....
File .....

December 26, 1990

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Lynne Miller

Project Number : 0161-205-B04

Project Name : Unocal/Coupeville

On December 3, 1990, Analytical Technologies, Inc., received 11 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Mary C. Silva
Senior Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/elf

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9012-010-1	T-1	11/30/90	SOIL
9012-010-2	T-2	11/30/90	SOIL
9012-010-3	T-3	11/30/90	SOIL
9012-010-4	T-4	11/30/90	SOIL
9012-010-5	T-5	11/30/90	SOIL
9012-010-6	T-6	11/30/90	SOIL
9012-010-7	T-7	11/30/90	SOIL
9012-010-8	T-8	11/30/90	SOIL
9012-010-9	S-1	11/30/90	SOIL
9012-010-10	S-2	11/30/90	SOIL
9012-010-11	S-3	11/30/90	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	11

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ANALYSIS	TECHNIQUE	REFERENCE	LAB
PURGEABLE HALOCARBONS	GC/ELCD	EPA 8010	R
PURGEABLE AROMATICS	GC/PID	EPA 8020	R
POLYCHLORINATED BIPHENYLS (PCBs)	GC/ECD	EPA 8080	R
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
ARSENIC	AA/GF	EPA 7060	R
BARIUM	AA/F	EPA 7080	R
CADMIUM	AA/F	EPA 7130	R
CHROMIUM	AA/F	EPA 7190	R
LEAD	AA/F	EPA 7420	R
MERCURY	AA/COLD VAPOR	EPA 7470	R
SELENIUM	AA/GF	EPA 7740	R
SILVER	AA/F	EPA 7760	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/03/90
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 12/10/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.10
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	76
BROMOFLUOROBENZENE	119

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/03/90
CLIENT I.D.	: S-1	DATE ANALYZED	: 12/13/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.10
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	76
BROMOFLUOROBENZENE	93

VOLATILE ORGANIC
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 9011-217-16
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 11/30/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 12/17/90
EPA METHOD	: 8010/8020	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.60	0.63	105	0.62	103	2
CHLOROBENZENE	<0.025	0.60	0.62	103	0.61	102	2
1,1-DICHLOROETHENE	<0.010	0.20	0.18	90	0.15	75	18
TETRACHLOROETHENE	<0.010	0.20	0.19	95	0.18	90	5
TOLUENE	<0.025	0.60	0.63	105	0.62	103	2
TRICHLOROETHENE	<0.010	0.20	0.20	100	0.19	95	5
TOTAL XYLENES	<0.025	0.83	0.89	107	1.22	147*	31*

* Out of limits due to matrix interference.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 12/16/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.033
PCB 1221	<0.033
PCB 1232	<0.033
PCB 1242	<0.033
PCB 1248	<0.033
PCB 1254	<0.033
PCB 1260	<0.033

SURROGATE PERCENT RECOVERY

DECACHLOROBIPHENYL	94
DIBUTYLCHLORENDATE	77

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: S-1	DATE ANALYZED	: 12/17/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.033
PCB 1221	<0.033
PCB 1232	<0.033
PCB 1242	<0.033
PCB 1248	<0.033
PCB 1254	<0.033
PCB 1260	<0.033

SURROGATE PERCENT RECOVERY

DECACHLOROBIPHENYL	78
DIBUTYLCHLORENDATE	46

POLYCHLORINATED BIPHENYLS (PCB)
QUALITY CONTROL

CLIENT	: GEOENGINEERS, INC.	SAMPLE ID	: BLANK SPIKE
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 11/29/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 12/12/90
EPA METHOD	: 8080 (PCB)	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
PCB 1260	<0.033	0.33	0.327	99	0.321	97	2

$$\% \text{ Recovery} = \frac{(\text{Spike Sample result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

POLYCHLORINATED BIPHENYLS (PCB)
QUALITY CONTROL

CLIENT	: GEOENGINEERS, INC.	SAMPLE ID	: BLANK SPIKE
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 12/04/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 12/16/90
EPA METHOD	: 8080 (PCB)	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
PCB 1260	<0.033	0.33	0.331	100	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-1	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-2	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-3	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-4	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-5	DATE ANALYZED	: 12/04/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-6	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-7	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	74
HYDROCARBON RANGE	C10 - C20
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: T-8	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: S-1	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: S-2	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/30/90
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 12/03/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 12/04/90
CLIENT I.D.	: S-3	DATE ANALYZED	: 12/05/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	72
HYDROCARBON RANGE	C10 - C20
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 9012-010-5
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 12/04/90
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 12/04/90
EPA METHOD	: 8015 MODIFIED	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	531	106	522	104	2

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

EP TOX
METALS RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

MATRIX : EP EXTRACT
UNITS : mg/L

PARAMETER	S-1 -9
ARSENIC	<0.005
BARIUM	0.05
CADMIUM	<0.01
CHROMIUM	0.04
LEAD	<0.1
MERCURY	<0.0005
SELENIUM	<0.005
SILVER	<0.02

EP TOX
METALS QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. MATRIX : EP EXTRACT
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE UNITS : mg/L

COMPOUND	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
ARSENIC	9012-010-9	<0.005	<0.005	0	0.051	0.050	102
BARIUM	9012-010-9	0.05	0.05	0	2.59	2.50	102
CADMIUM	9012-010-9	<0.01	<0.01	0	0.53	0.50	105
CHROMIUM	9012-010-9	0.04	0.04	0	2.09	2.50	82
LEAD	9012-010-9	<0.1	<0.1	0	11	10	110
MERCURY	9012-100-8	<0.0005	<0.0005	0	0.0028	0.0020	140
SELENIUM	9012-010-9	<0.005	<0.005	0	0.052	0.050	104
SILVER	9012-010-9	<0.02	<0.02	0	0.96	1.00	96

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. MATRIX : SOIL
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
9012-010-1	T-1	<5
9012-010-2	T-2	<5
9012-010-3	T-3	150
9012-010-9	S-1	570

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. MATRIX : SOIL
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9012-010-9	S-1	16

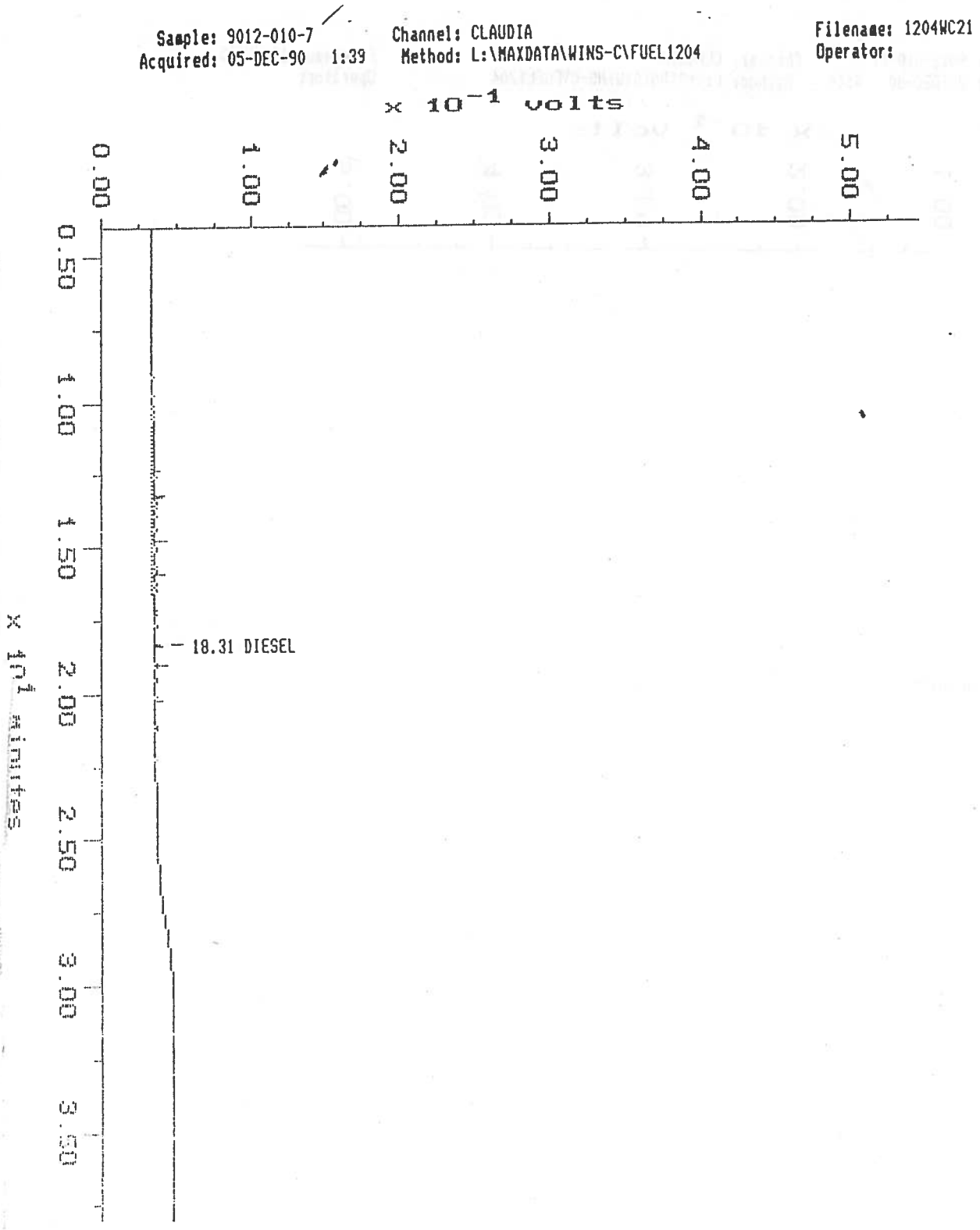
GENERAL CHEMISTRY QUALITY CONTROL

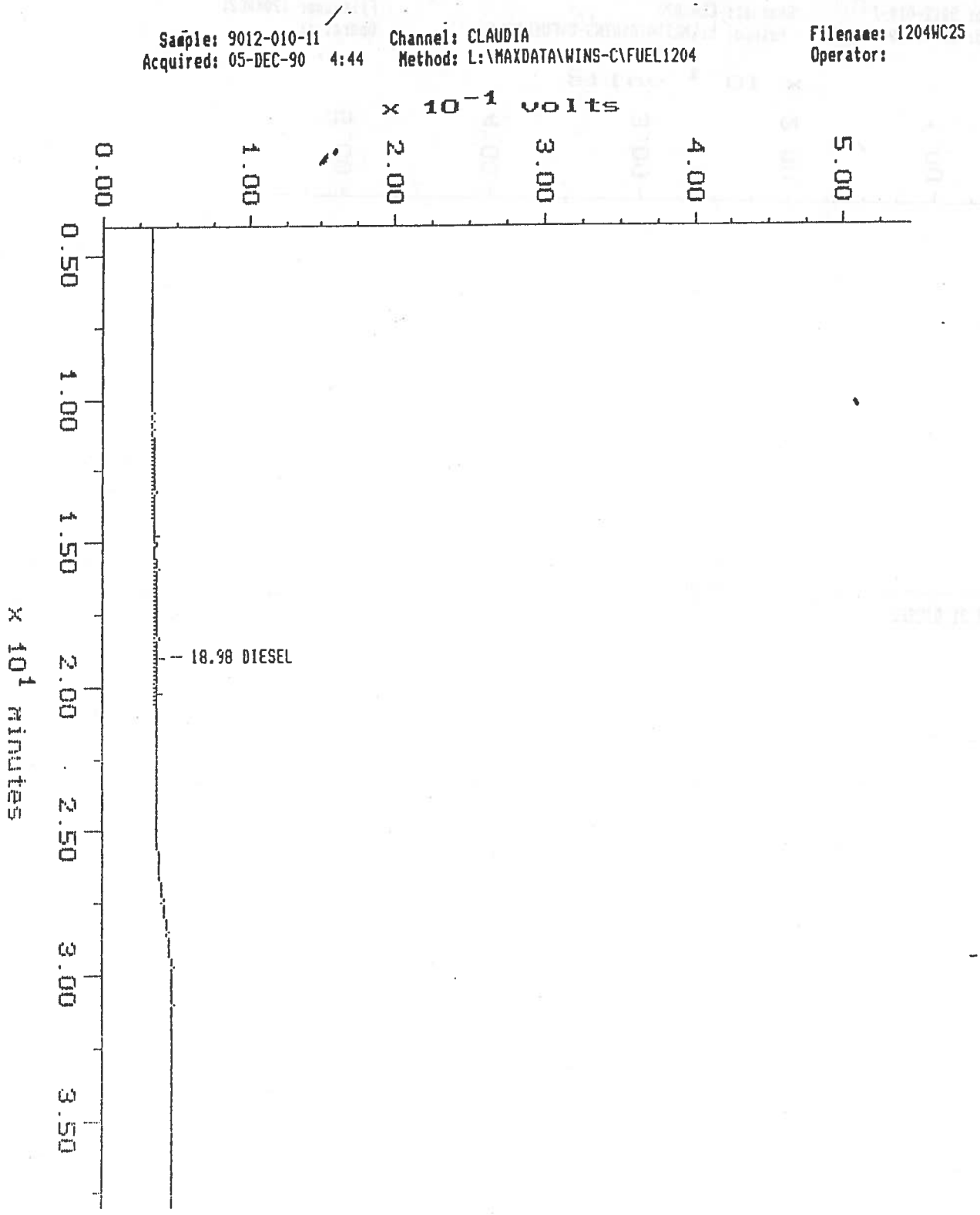
CLIENT : GEOENGINEERS, INC. MATRIX : SOIL
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	9011-201-1	<5	<5	0	272	256	106
MOISTURE	%	9012-046-6	4.0	3.9	2	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$


Sample: 9012-010-7
Acquired: 05-DEC-90 1:39
Channel: CLAUDIA
Method: L:\MAXDATA\WINS-C\FUEL1204
Filename: 1204WC21
Operator:
x 10⁻¹ volts
0.00
1.00
2.00
3.00
4.00
5.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
18.31 DIESEL
x 10¹ minutes


Sample: 9012-010-11
Acquired: 05-DEC-90 4:44
Channel: CLAUDIA
Method: L:\MAXDATA\WINS-C\FUEL1204
Filename: 1204HC25
Operator:
x 10⁻¹ volts
0.00
1.00
2.00
3.00
4.00
5.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
18.98 DIESEL
x 10¹ minutes

AnalyticalTechnologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 12/3/90 PAGE 1 OF 1

LABORATORY NUMBER: 4012-010

PROJECT MANAGER: Lynn Miller
COMPANY: GeoEngineers
ADDRESS: 2405 140th Ave NE, Suite 105
Bellevue, WA 98005
PHONE: 746-5200 SAMPLED BY: KPB

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
T-1	11/30/90	1130	SOIL	-1												X		X													1
T-2	"	1135	"	2												X		X													1
T-3	"	1140	"	3												X		X													1
T-4	"	1150	"	4														X													1
T-5	"	1200	"	5														X													1
T-6	"	1215	"	6														X													1
T-7	"	1220	"	7														X													1
T-8	"	1230	"	8														X													1
S-1	"	1320	"	9	X	X						X				X		X				X									1
S-2	"	1330	"	10														X													1
S-3	↓	1340	↓	11														X													1

PROJECT INFORMATION

PROJECT NUMBER: 0161-205-B04
PROJECT NAME: Unocal / Coupeville
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☐ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	11
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA: Courier	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

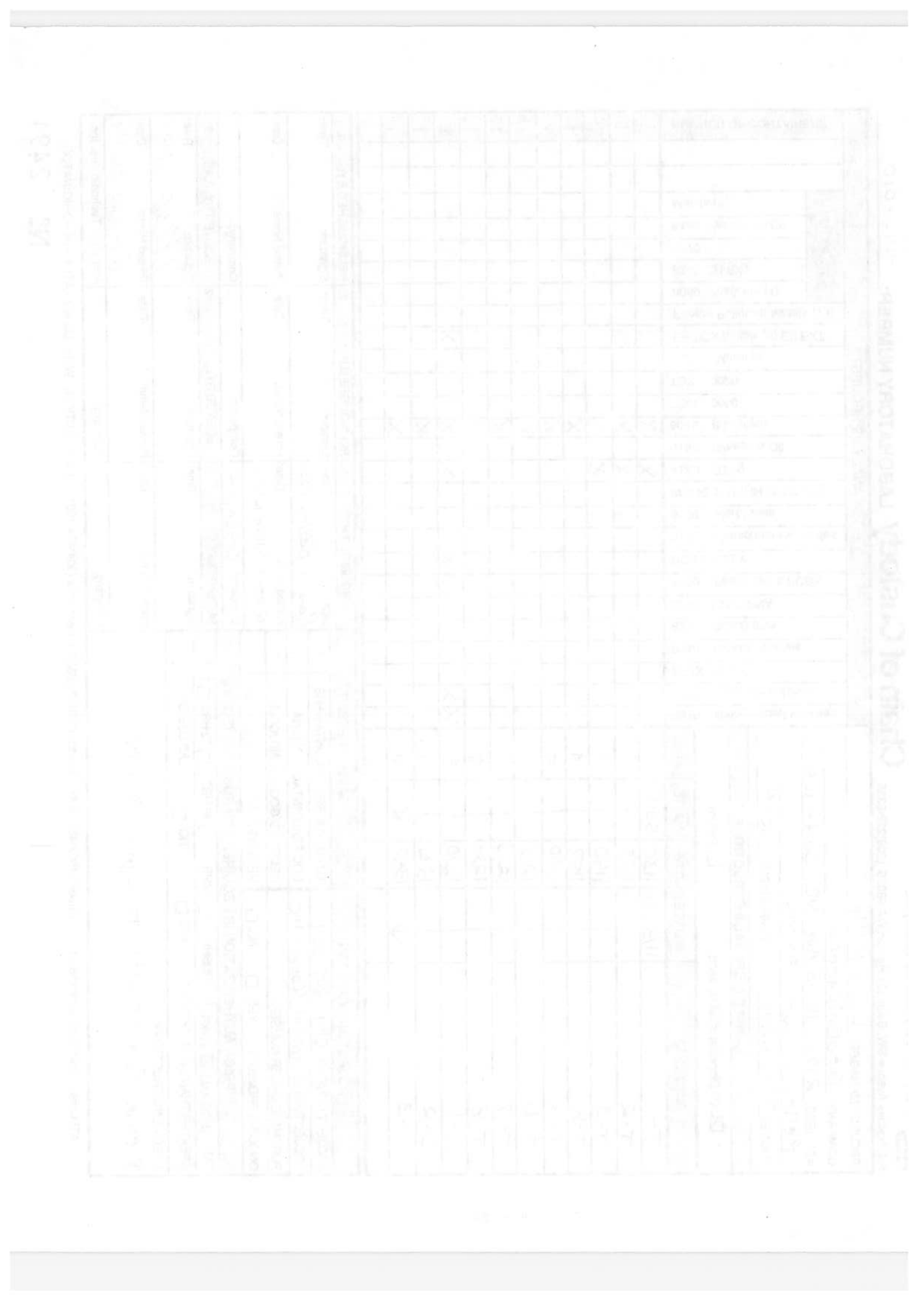
TAT: (NORMAL) ☒ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:
Please fax results to Lynn Miller

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: Karen P. Billica 0800	Signature: Time:	Signature: Time:
Printed Name: Date: Karen P. Billica 12/3/90	Printed Name: Date:	Printed Name: Date:
Company: GeoEngineers	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 900
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: V. FENNICK 12/3/90
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR



APPENDIX B

APPENDIX B

APPENDIX B

FIELD EXPLORATIONS

EXPLORATORY DRILLING AND SAMPLING PROGRAM

Subsurface conditions at former Unocal Bulk Plant 0138 were explored during this phase of site study by drilling six on-site and two off-site borings at the locations shown in Figure 2 using truck-mounted, hollow-stem auger drilling equipment. The on-site borings were drilled on April 22 through April 25, 1991 to depths ranging between 32.5 and 47.5 feet using drilling equipment owned and operated by GeoBoring and Development Inc. The off-site borings were drilled on May 16 and 17, 1991 to depths of 35.0 and 39.0 feet using drilling equipment owned and operated by Hayes Drilling Inc. The drilling and soil sampling equipment was cleaned with a hot-water pressure washer prior to drilling each boring.

A geologist from our staff determined the boring and soil sampling locations, examined and classified the soils encountered, and prepared a detailed log of each boring. Soils encountered were classified visually in general accordance with ASTM D-2488-84, which is described in Figure B-1. An explanation of the boring log symbols is presented in Figure B-2. The boring logs are given in Figures B-3 through B-10.

Soil samples were obtained from the on-site borings using an Acker split-barrel sampler (2.4-inch ID). The sampler was driven 18 inches by a 140-pound weight falling a vertical distance of approximately 30 inches. Soil samples were obtained from the off-site borings using a Dames & Moore split-barrel sampler (2.4-inch ID). The sampler was driven 18 inches by a 300-pound weight falling a vertical distance of approximately 30 inches. The number of blows needed to advance the samplers the final 12 inches or other specified intervals is indicated to the left of the corresponding sample notations on the boring logs. The sampler was cleaned with a TSP (trisodium phosphate) wash and a distilled water rinse before each sampling attempt.

Immediately after collection, the soil samples selected for chemical analysis were placed in clean glass jars supplied by the analytical laboratory and kept cool during transport to the laboratory. Information noted on the jar labels included the job number, boring number, sample number, sampling date and requested analyses. Samples from the borings that were tested are denoted in our boring logs with a "CA." Chain-of-custody procedures were observed during transport of the samples to the laboratory.

Analytical results for the soil samples collected from the borings are summarized in Table 1. The laboratory reports are summarized in Appendix C.

SOIL EXCAVATION AND SAMPLING PROGRAM

Three excavations were completed at the site between March 4 and July 8, 1991 using excavation equipment owned and operated by A. L. Sleister. The soil removed from the excavation was stockpiled on-site. Soil samples obtained from the walls and base of the deeper excavations were collected using the excavator bucket. The samples were collected from the

central portion of the bucket using a plastic bag that was inverted. Soil samples obtained from the walls and base of the shallow excavations were collected by hand, using a plastic bag that was inverted. The plastic bags were used for only one sample and were discarded after the sample was obtained.

Approximately one discrete soil sample per 25 cubic yards of soil was obtained from the soil stockpiles. The samples were collected with a hand shovel. The shovel was decontaminated with a TSP wash and distilled water rinse prior to collecting each sample.

Immediately after collection, the soil samples obtained from the excavations and soil stockpiles were placed in clean glass jars supplied by the analytical laboratory and kept cool during transport to the laboratory. Information noted on the jar labels included the job number, sample number, sampling date and requested analyses. The discrete soil samples obtained from the soil stockpiles were combined by the analytical laboratory into one composite soil sample per 50 cubic yards of soil prior to testing. Chain-of-custody procedures were observed during transport of the samples to the laboratory.

MONITOR WELL ABANDONMENT PROGRAM

Monitor well MW-1 was sealed and abandoned during excavation procedures in September 1990. Monitor wells MW-3 and MW-4 were excavated and abandoned during remedial activities in March 1991. Well abandonment procedures were conducted in accordance with Washington State Administration Code (chapter 173-160-415). A representative of GeoEngineers was present to observe the MW-1 and MW-3 well abandonment procedures.

FIELD SCREENING OF SOIL SAMPLES

Soil samples obtained from the excavations, soil stockpiles and borings were split into two portions. One portion of the sample was retained for soil classification and laboratory analysis. The second portion was screened in the field for fuel-related contamination using (1) visual examination, (2) water sheen screening, and (3) headspace vapor screening using the Bacharach TLV Sniffer calibrated to hexane. The results of headspace and sheen screening are included in Tables 1 and 3 through 5.

Visual screening consists of inspecting the soil for stains indicative of fuel-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Sheen screening and headspace vapor screening are more sensitive screening methods that have been effective in detecting contamination at concentrations less than regulatory cleanup levels.

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

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

Headspace vapor screening involves placing a soil sample in a plastic sample bag. Air is captured in the bag and the bag is shaken to expose the soil to the air trapped in the bag. The probe of a Bacharach TLV Sniffer is inserted in the bag and the TLV Sniffer measures the concentration of combustible vapor in the sample bag headspace. The TLV Sniffer measures combustible vapor concentrations in ppm (parts per million) and is calibrated to hexane. The TLV Sniffer is designed to quantify combustible vapors in the concentration range of 100 ppm to 10,000 ppm.

Field screening results are site-specific. The results vary with temperature, moisture content, soil type, organic content, and type of contaminant.

MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC (polyvinyl chloride) pipe was installed in borings MW-7 through MW-13 at the completion of drilling. The lower portion of the PVC pipe is machine-slotted (0.02-inch slot width) to allow entry of hydrocarbon vapors and ground water into the well casings. Medium sand was placed in the borehole annulus surrounding the slotted portion of the wells. Monitor well construction is shown in Figures B-4 through B-10.

The monitor well screens were developed by removing at least five well volumes of ground water from each well with a disposable plastic bailer. The elevations of the well casings were measured to the nearest 0.01 foot with an engineer's level on May 17, 1991. An elevation datum of 100 feet was assumed at the manhole cover located in the intersection of Coveland and Alexander Streets (Figure 2). Elevations referenced to this datum are included on the monitor well logs.

GROUND WATER SAMPLING PROGRAM

Ground water samples were collected from the monitor wells on April 23, 24 and 25, 1991 and May 17, 1991 after at least three well volumes of water were removed from each well casing with a disposable plastic bailer. The water samples were transferred to glass septum vials (VOAs) and bottles in the field. Information noted on the jar labels included the job number, sample number, sampling date and requested analyses. The water samples were kept cool and

standard chain-of-custody procedures were observed during transport of the samples to the testing laboratory.

The plastic bailers were disposed of after each sampling attempt. The rope used to lower the bailers into the monitor wells was discarded after obtaining each sample.

HYDROCARBON VAPOR CONCENTRATIONS

Hydrocarbon vapor concentrations were measured in each monitor well during each sampling event. Combustible vapor concentrations in ppm were measured with a Bacharach TLV Sniffer calibrated to hexane. The lower threshold of significance for the TLV Sniffer in this application is 100 ppm, or 1 percent of the LEL (lower explosive limit) of hexane. The field data are presented in Tables 1 through 5 of this report.

CHEMICAL ANALYTICAL PROGRAM

Forty-four soil samples and 10 ground water samples were analyzed by Analytical Technologies, Inc. Gas chromatography was used to quantify volatile aromatic hydrocarbons (BETX) in the soil and water samples using EPA Method 8020. Gas chromatography methods were also used to quantify fuel hydrocarbons (gasoline and diesel) in the soil samples by modified EPA Method 8015. The ground water samples were analyzed for TPH using freon extraction/infrared spectroscopy in accordance with EPA Method 418.1. Analytical results are summarized in Tables 1 through 5. The laboratory reports are summarized in Appendix C.

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

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
2. Soil classification using laboratory tests is based on ASTM D2487-83.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water

Wet - Visible free water or saturated, usually soil is obtained from below water table

GeoEngineers

SOIL CLASSIFICATION SYSTEM

FIGURE B-1

GEI 85-88

LABORATORY TESTS:

CA Chemical Analysis

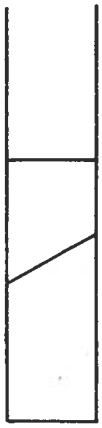
FIELD SCREENING TESTS:

Headspace vapor concentration data given in parts per million

Sheen classification system:

NS No Visible Sheen
SS Slight Sheen
MS Moderate Sheen
HS Heavy Sheen
NT Not Tested

SOIL GRAPH:



SM Soil Group Symbol (See Note 2)

Distinct Contact Between Soil Strata

Gradual or Approximate Location of Change Between Soil Strata

Water Level

Bottom of Boring

BLOW-COUNT/SAMPLE DATA:

Blows required to drive a 2.4-inch I.D. split-barrel sampler 12 inches or other indicated distances using a 140-pound hammer falling 30 inches unless otherwise noted.

22 Location of relatively undisturbed sample

12 Location of disturbed sample

17 Location of sampling attempt with no recovery

Blows required to drive a 1.5-inch I.D. (SPT) split-barrel sampler 12 inches or other indicated distances using 140-pound hammer falling 30 inches.

10 Location of sample obtained in general accordance with Standard Penetration Test (ASTM D-1586) procedures

26 Location of SPT sampling attempt with no recovery

Location of grab sample

"P" indicates sampler pushed with weight of hammer or against weight of drill rig.

NOTES:

1. The reader must refer to the discussion in the report text, the Key to Boring Log Symbols and the exploration logs for a proper understanding of subsurface conditions.

2. Soil classification system is summarized in Figure A-1.

3. A 300-pound hammer falling 30 inches was used during soil sampling for MW-12 and MW-13.

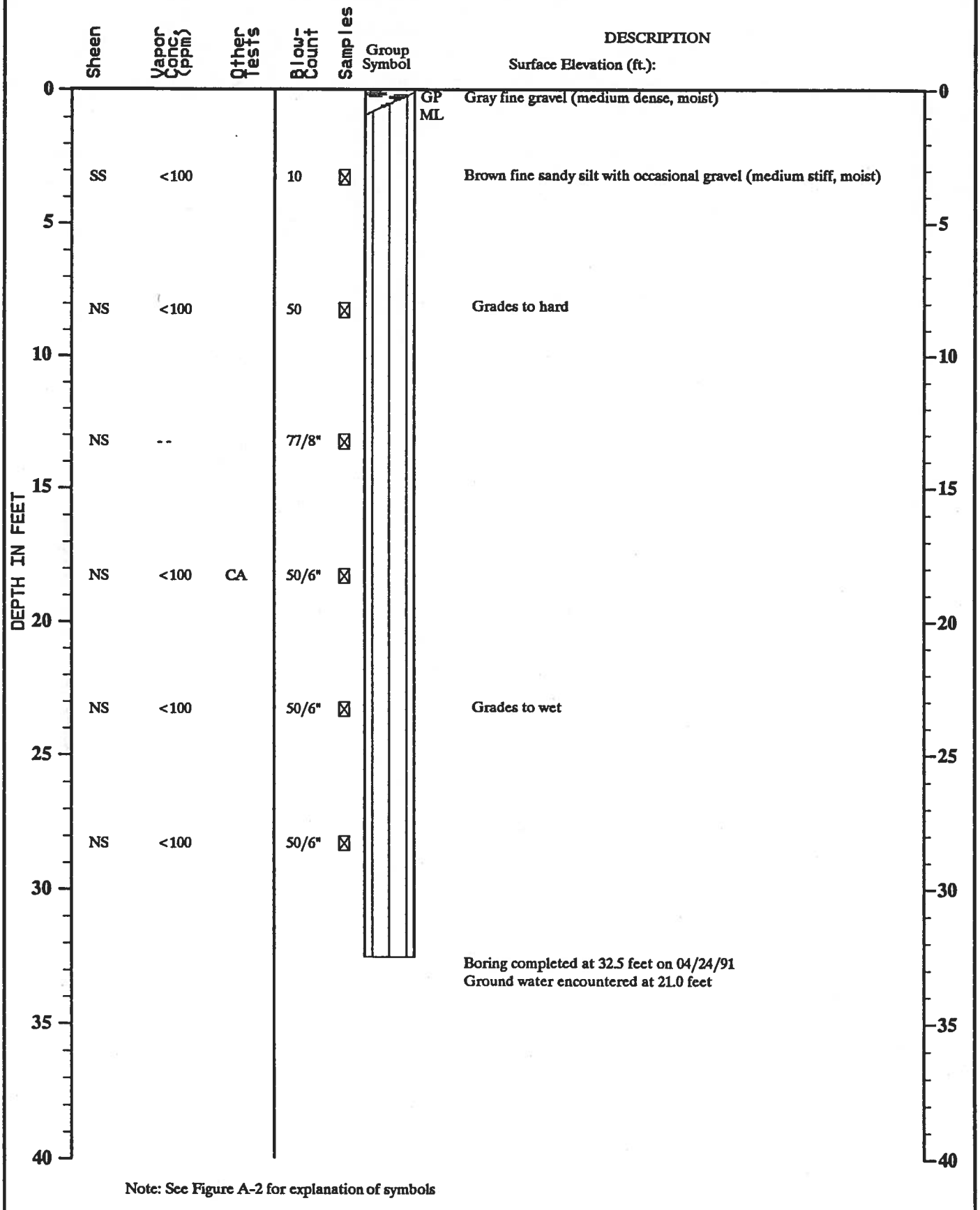
GEI 121-90

Geo Engineers

KEY TO BORING LOG SYMBOLS

FIGURE B-2

BORING B-1



Note: See Figure A-2 for explanation of symbols

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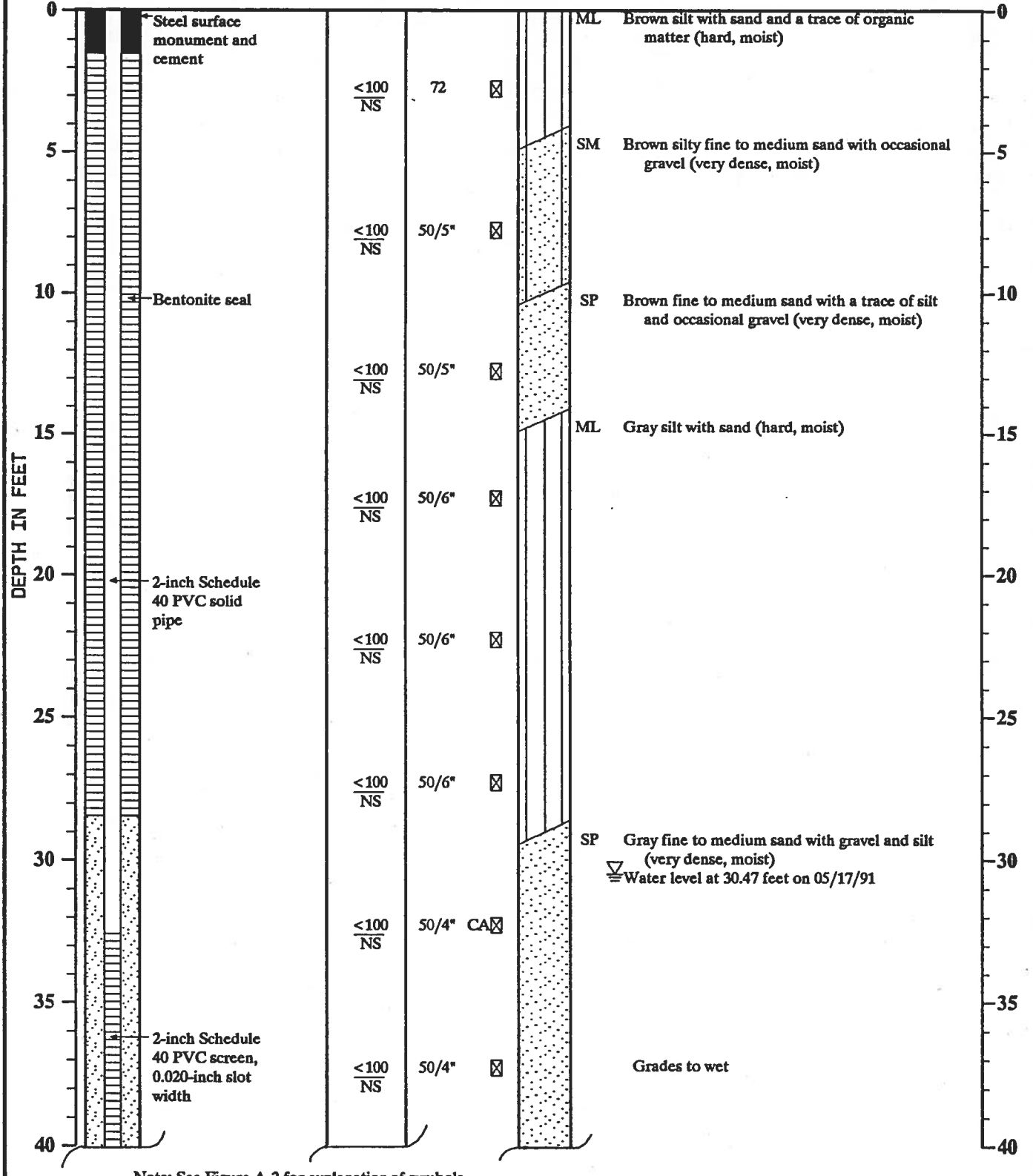
Log of Boring

Figure B-3

:BJS:CMS 5/23/91

0161-205-B04

MONITOR WELL NO. MW-7



Note: See Figure A-2 for explanation of symbols

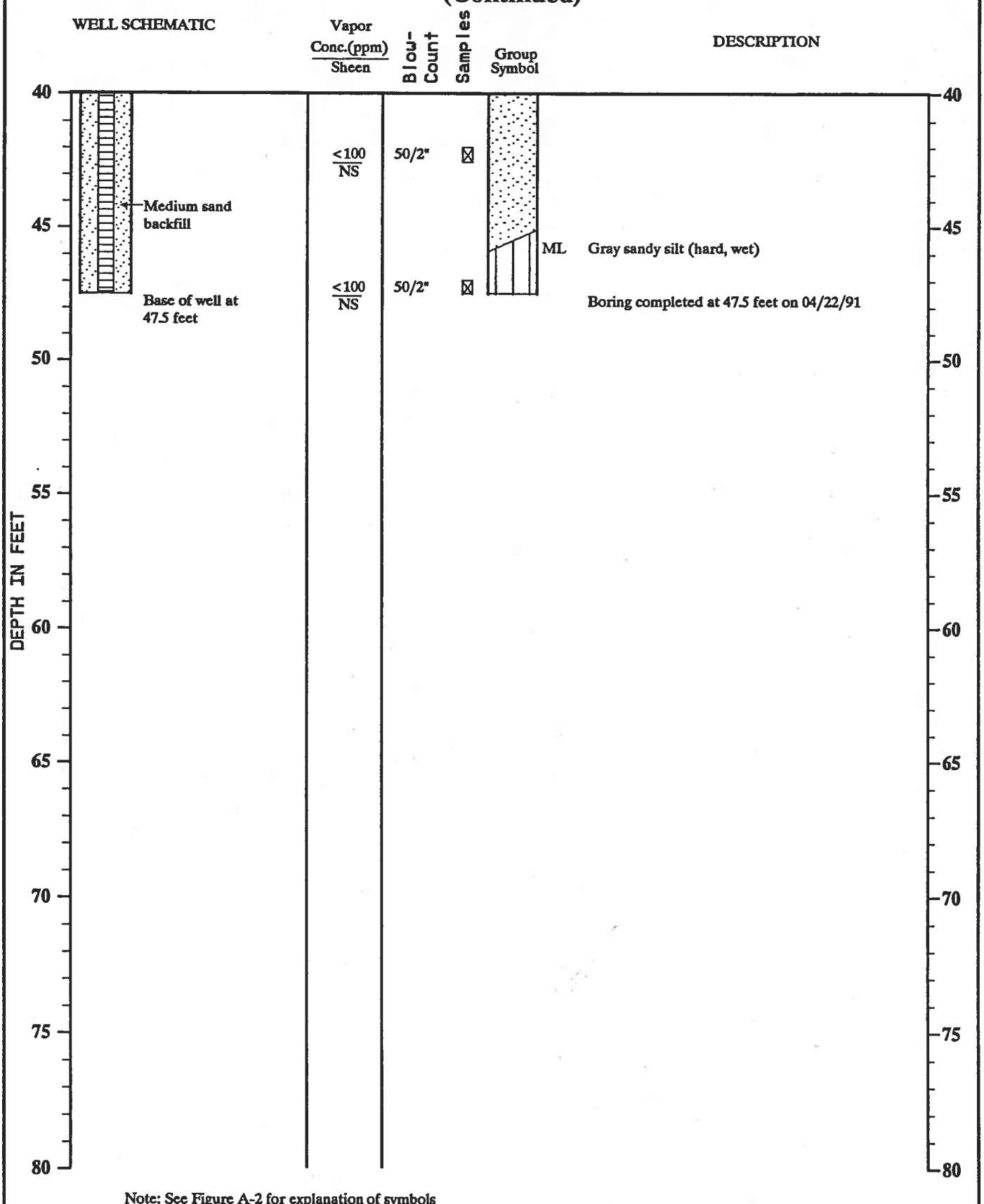
0181-205-B04 :BJS:CMS 5/29/91

Geo Engineers

Log of Monitor Well

Figure B-4

MONITOR WELL NO. MW-7
(Continued)



Note: See Figure A-2 for explanation of symbols

Geo Engineers

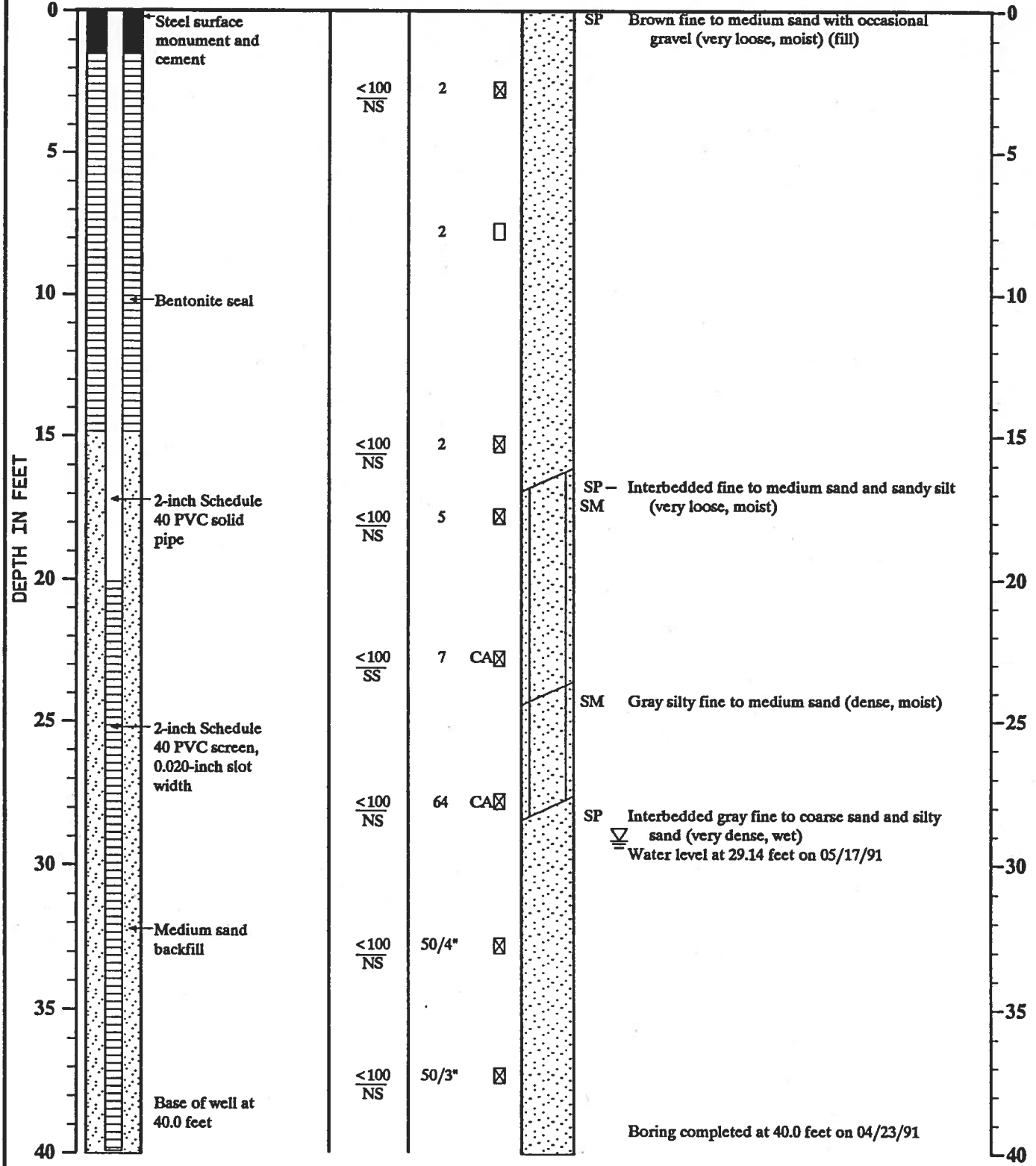
Log of Monitor Well

Figure B-4

:BJS:CMS 5/29/91

0161-205-B04

MONITOR WELL NO. MW-8



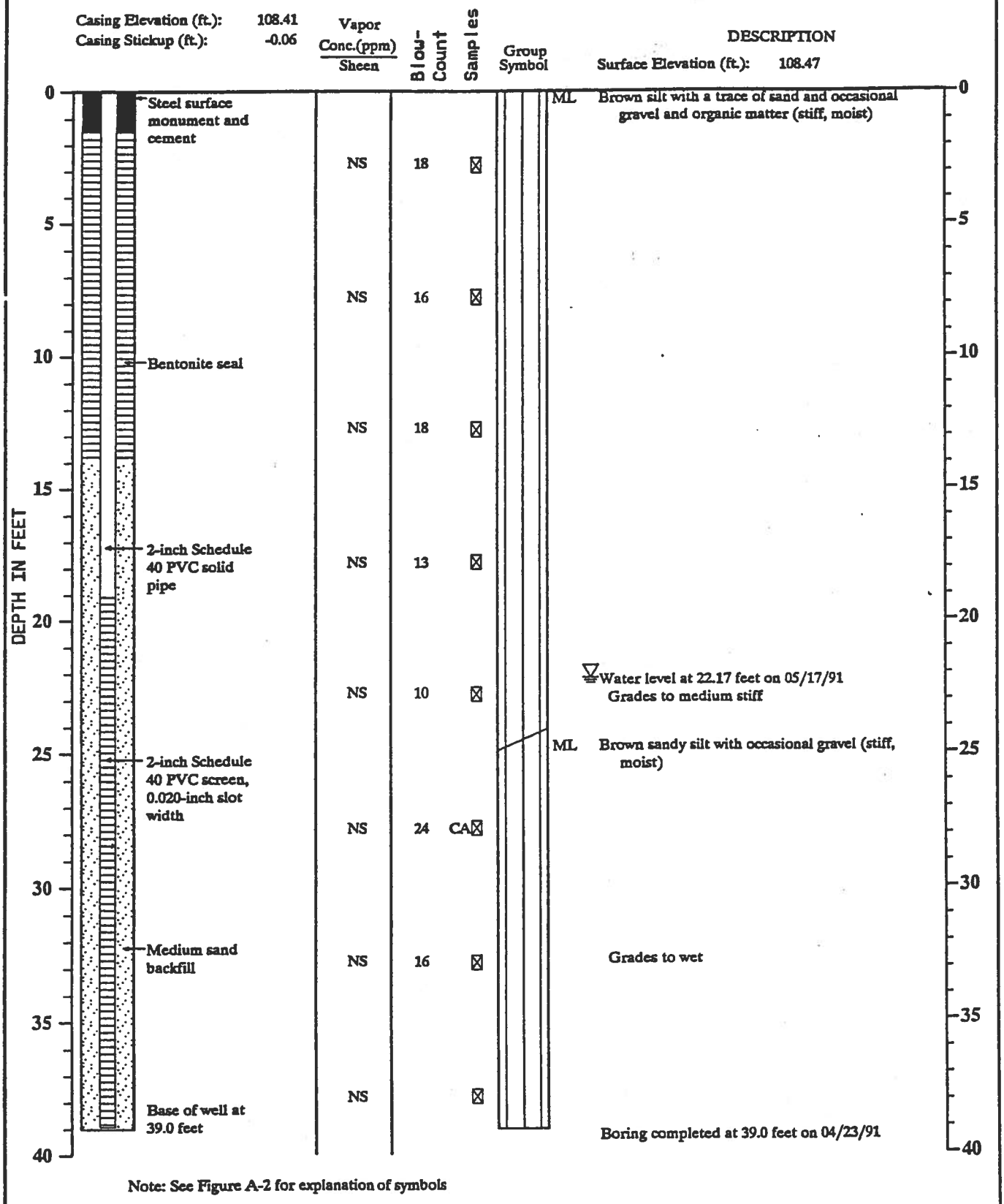
Note: See Figure A-2 for explanation of symbols

Geo Engineers

Log of Monitor Well

Figure B-5

MONITOR WELL NO. MW-9



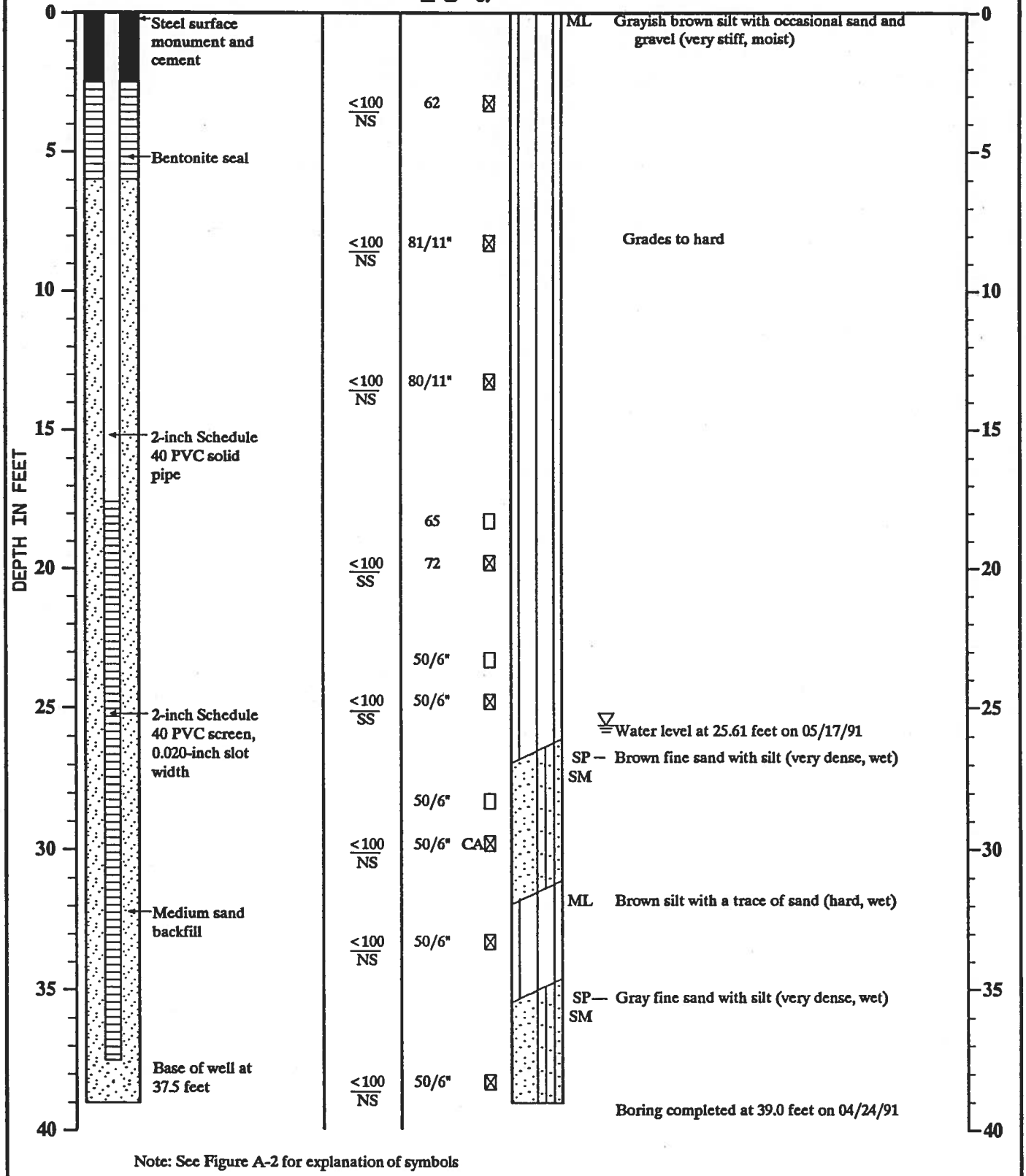
Note: See Figure A-2 for explanation of symbols

GeoEngineers

Log of Monitor Well

Figure B-6

MONITOR WELL NO. MW-10



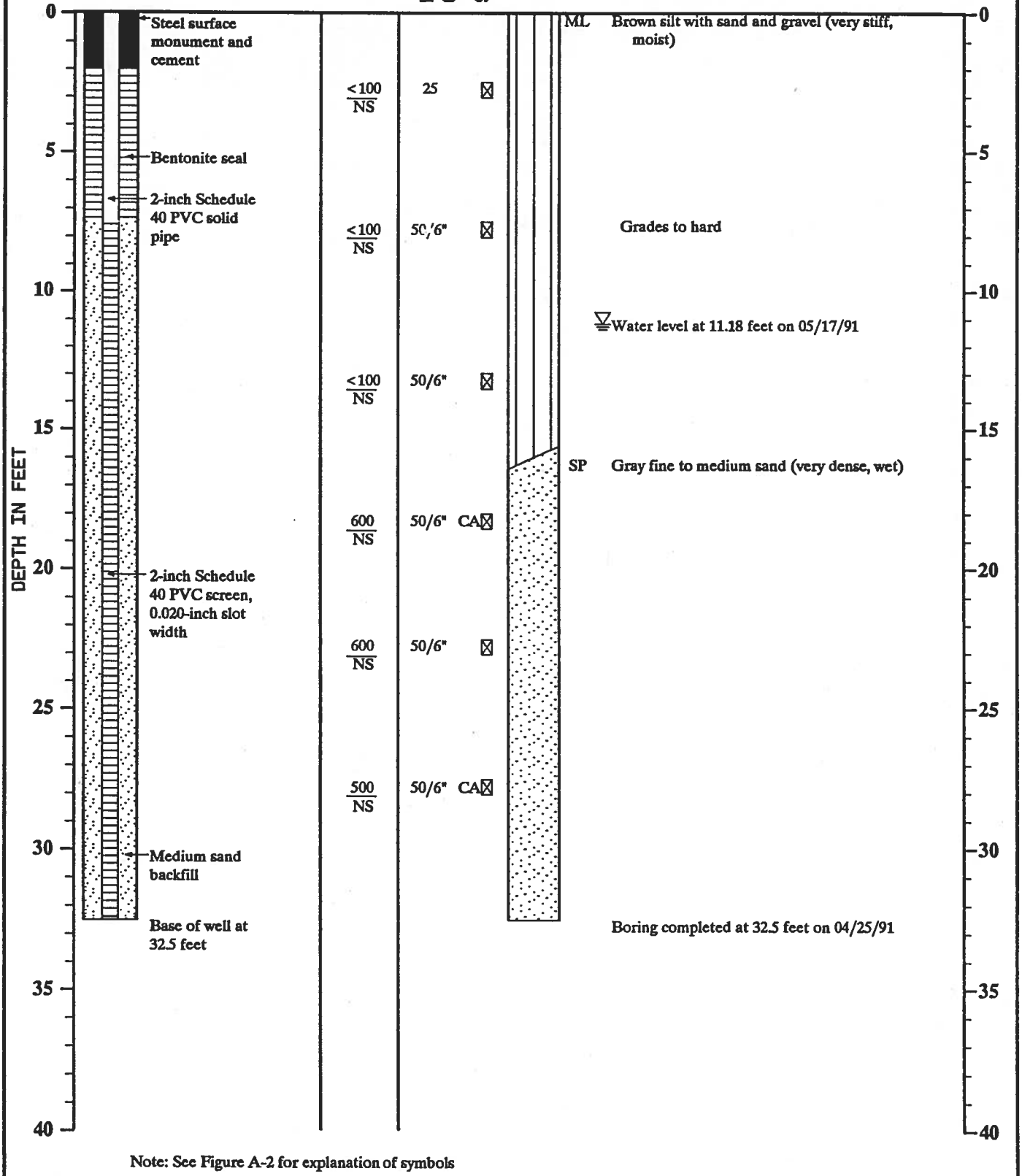
Note: See Figure A-2 for explanation of symbols

Geo Engineers

Log of Monitor Well

Figure B-7

MONITOR WELL NO. MW-11



Note: See Figure A-2 for explanation of symbols

Geo Engineers

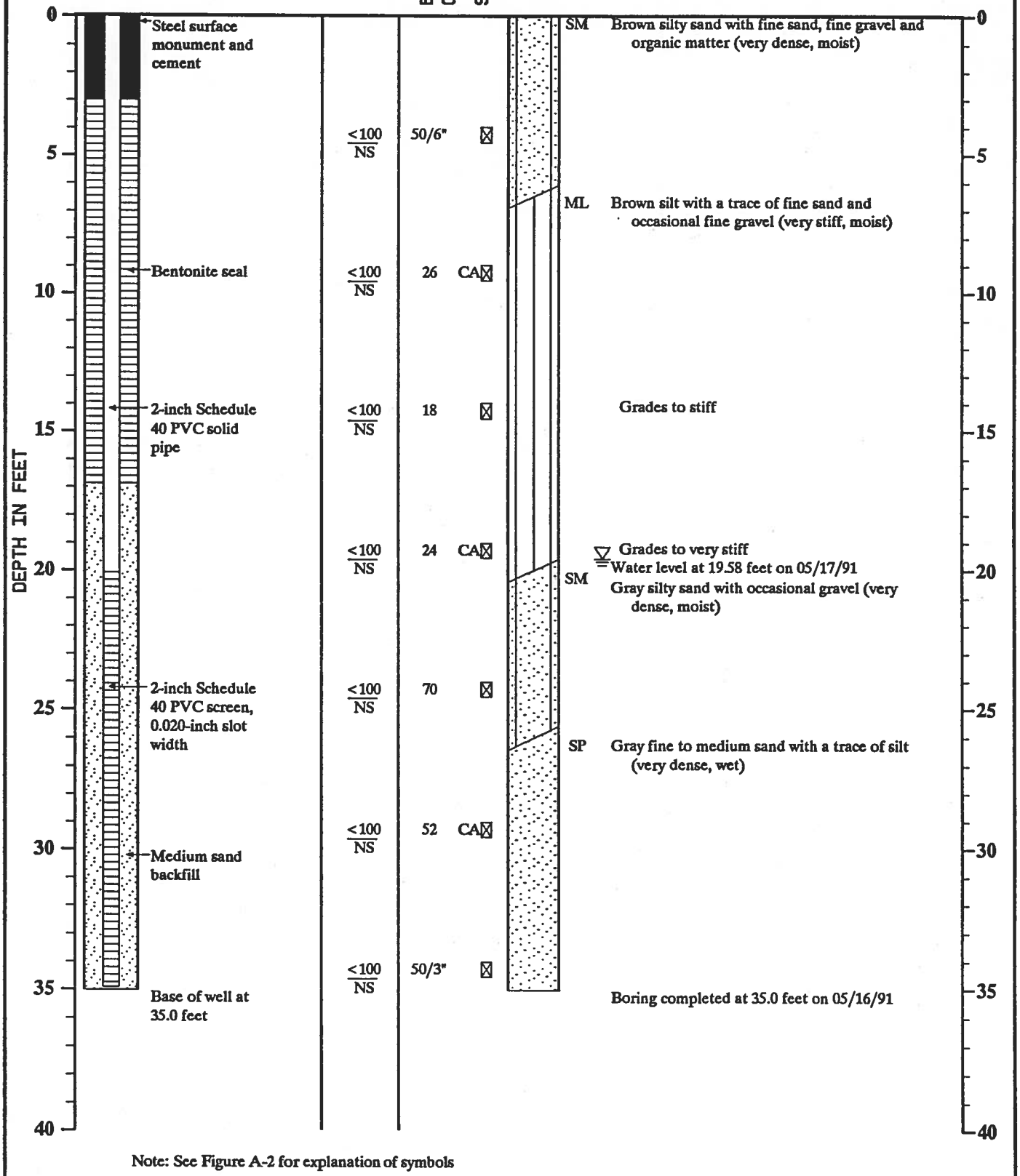
Log of Monitor Well

Figure B-8

:BJS:CMS 5/29/91

0161-205-B04

MONITOR WELL NO. MW-12



Note: See Figure A-2 for explanation of symbols

Geo Engineers

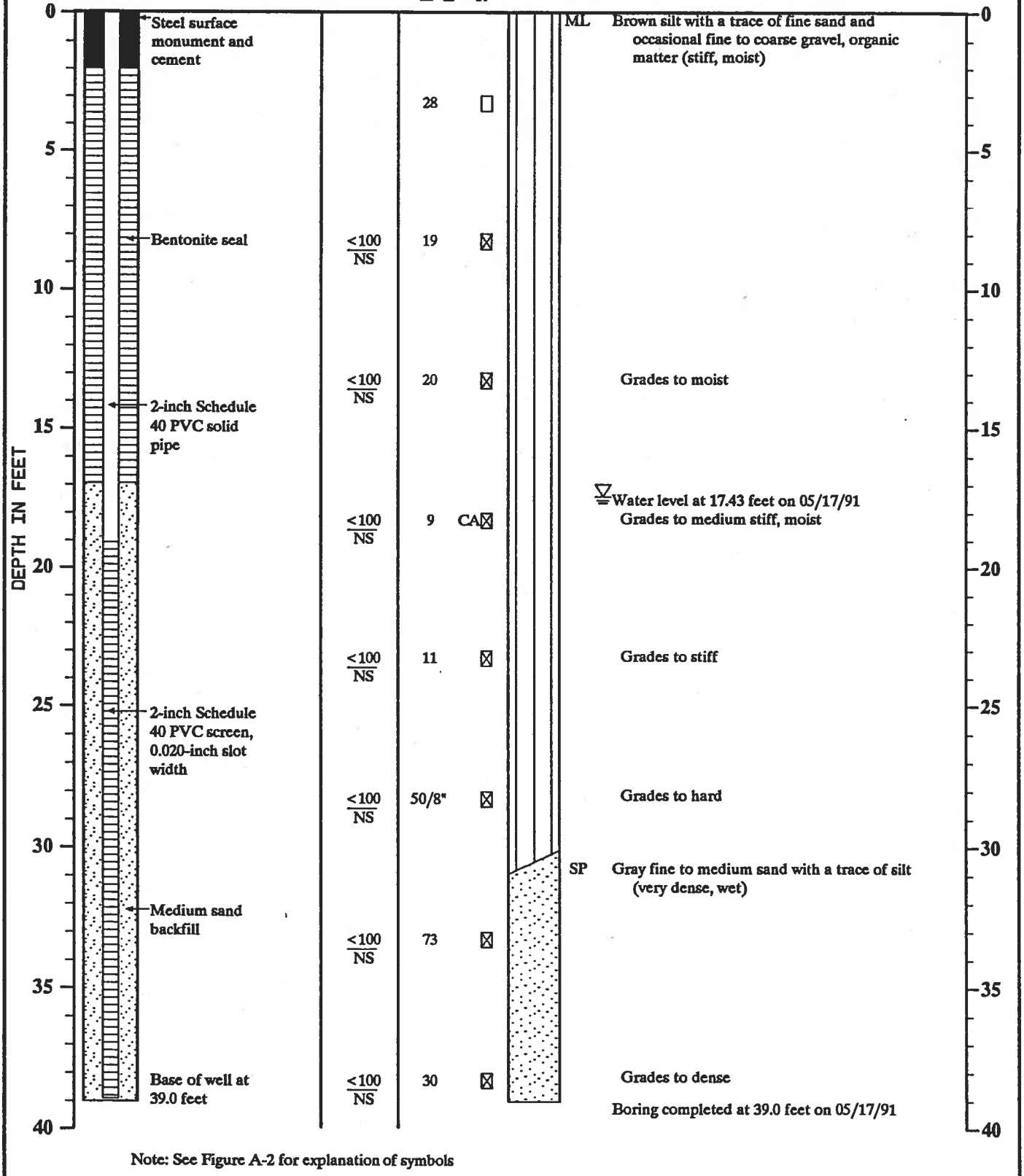
Log of Monitor Well

Figure B-9

:BJS:CMS 5/29/91

0161-205-B04

MONITOR WELL NO. MW-13



Note: See Figure A-2 for explanation of symbols

GeoEngineers

Log of Monitor Well

Figure B-10

:BJS:CMS 5/29/91

0161-205-B04

APPENDIX C

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9103-034

GeoEngineers

March 18, 1991

MAR 19 1991

Routing CSL

File

GeoEngineers, Inc.
8410-154th Ave. N.E.
Redmond, WA 98052

Attention : Charles S. Lindsay

Project Number : 0161-205-B04

Project Name : Unocal/Coupeville

On March 6, 1991, Analytical Technologies, Inc., received 10 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Bob A. Olsiewski
Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/hal/cen

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9103-034-1	910305-1	03/05/91	SOIL
9103-034-2	910305-2	03/05/91	SOIL
9103-034-3	910305-3	03/05/91	SOIL
9103-034-4	910305-4	03/05/91	SOIL
9103-034-5	910305-5	03/05/91	SOIL
9103-034-6	910305-6	03/05/91	SOIL
9103-034-7	910305-7	03/05/91	SOIL
9103-034-8	910305-8	03/05/91	SOIL
9103-034-9	910305-9	03/05/91	SOIL
9103-034-10	910305-10	03/05/91	SOIL
9103-034-11	A-1 COMPOSITE	N/A	SOIL
9103-034-12	A-2 COMPOSITE	N/A	SOIL
9103-034-13	A-3 COMPOSITE	N/A	SOIL
9103-034-14	A-4 COMPOSITE	N/A	SOIL
9103-034-15	A-5 COMPOSITE	N/A	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	15

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. # 9103-034

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ANALYSIS	TECHNIQUE	REFERENCE	LAB
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

ATI I.D. # 9103-034

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 03/06/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 03/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

ATI I.D. # 9103-034-11

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 03/06/91
CLIENT I.D.	: A-1 COMPOSITE	DATE ANALYZED	: 03/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	11
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

ATI I.D. # 9103-034-13

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 03/06/91
CLIENT I.D.	: A-3 COMPOSITE	DATE ANALYZED	: 03/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	14
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

ATI I.D. # 9103-034-15

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 03/06/91
CLIENT I.D.	: A-5 COMPOSITE	DATE ANALYZED	: 03/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	14
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

ATI I.D. # 9103-034

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D. #	: 9103-034-15
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 03/06/91
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 03/06/91
EPA METHOD	: 8015 MODIFIED	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (GASOLINE)	<5	500	388	78	391	78	1

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE
EPA METHOD : 418.1

MATRIX : SOIL
UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS	DATE EXTRACTED	DATE ANALYZED
9103-034	REAGENT BLANK	<5	03/06/91	03/06/91
9103-034-11	A-1 COMPOSITE	34	03/06/91	03/06/91
9103-034-12	A-2 COMPOSITE	160	03/06/91	03/06/91
9103-034-13	A-3 COMPOSITE	110	03/06/91	03/06/91
9103-034-14	A-4 COMPOSITE	120	03/06/91	03/06/91
9103-034-15	A-5 COMPOSITE	<5	03/06/91	03/06/91

ATI I.D. # 9103-034

GENERAL CHEMISTRY QUALITY CONTROL

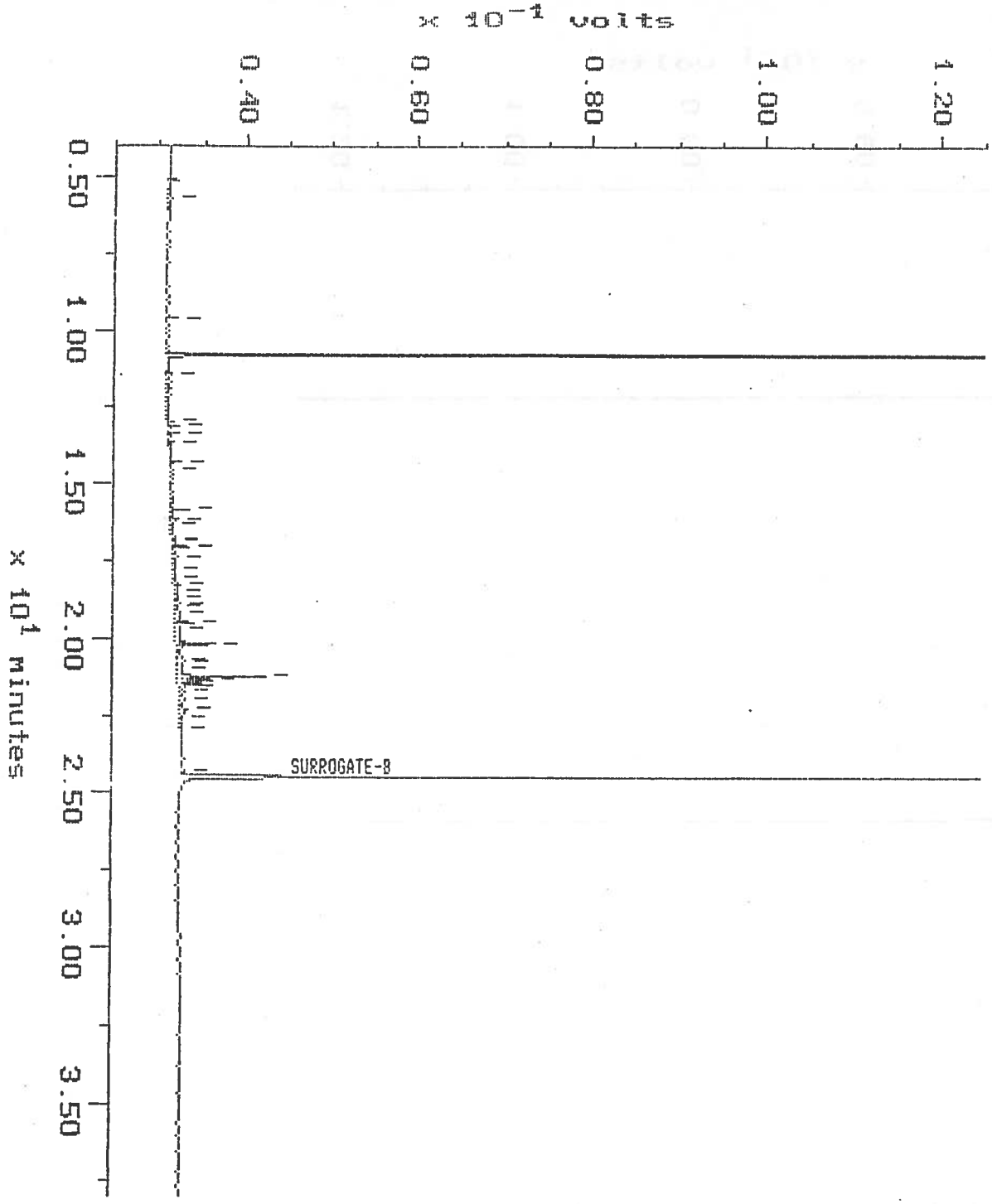
CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE
EPA METHOD : 418.1

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	9103-039-3	137	112	20	372	261	90

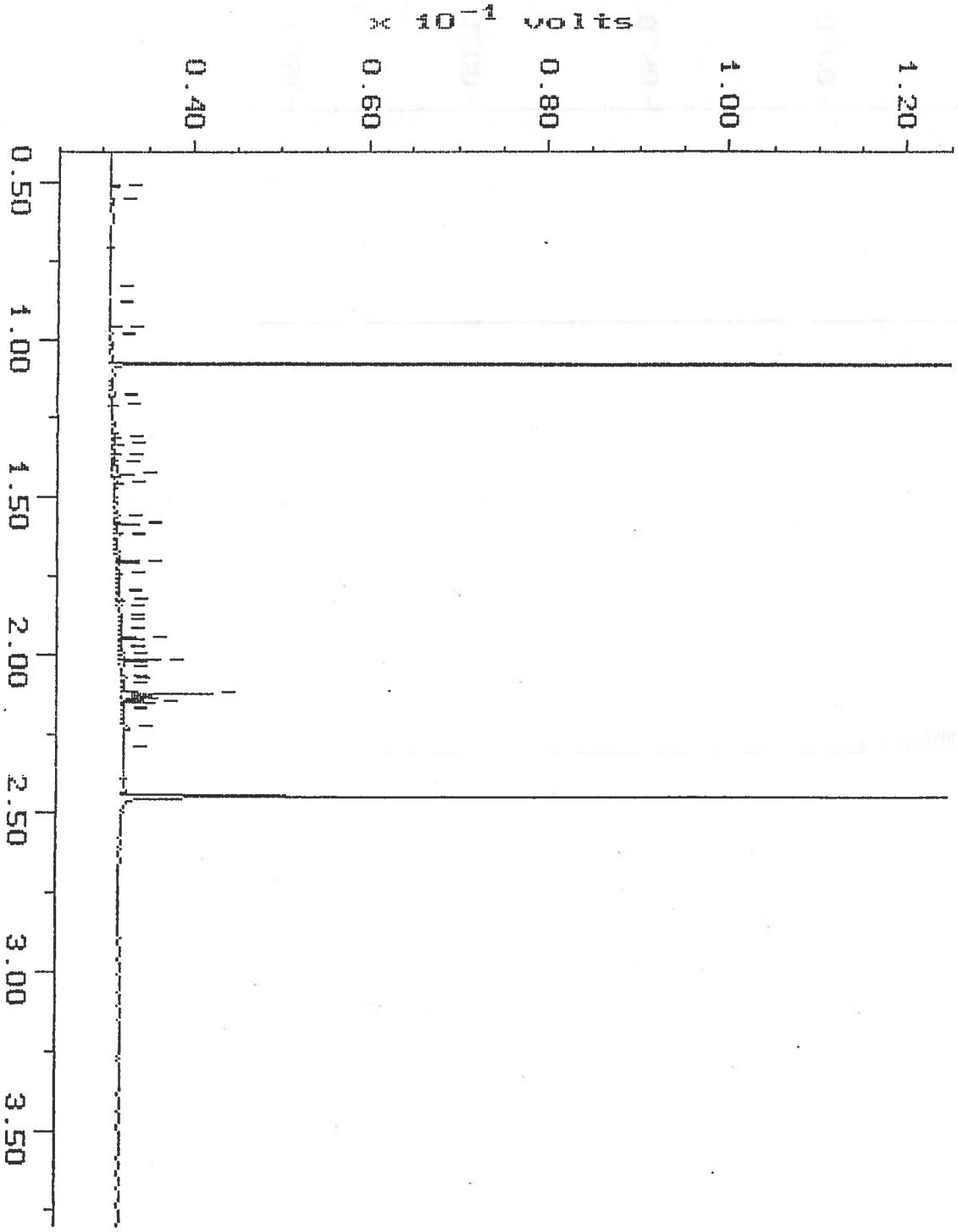
$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

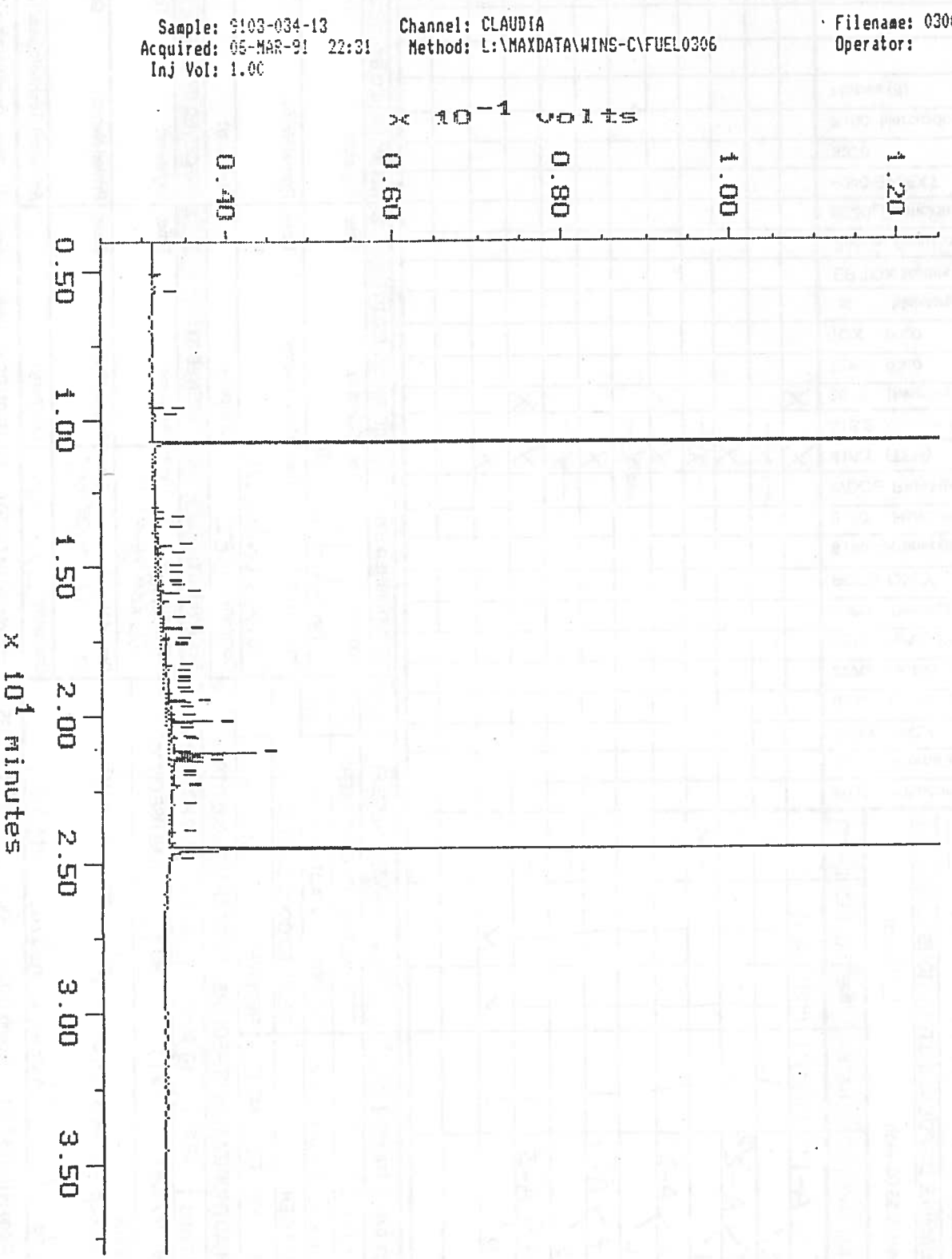
$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Sample: 9103-034-15 Channel: CLAUDIA Filename: 0306WC05
Acquired: 06-MAR-91 18:38 Method: L:\MAXDATA\WINS-C\FUEL0306 Operator:
Inj Vol: 1.00



Sample: 9103-034-11 Channel: CLAUDIA Filename: 0306WC09
Acquired: 06-MAR-91 21:45 Method: L:\MAXDATA\WINS-C\FUEL0306 Operator:
Inj Vol: 1.00




Sample: 9103-034-13
Acquired: 06-MAR-91 22:31
Inj Vol: 1.00
Channel: CLAUDIA
Method: L:\MAXDATA\WINS-C\FUEL0306
Filename: 0306WC10
Operator:
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes

Analytical Technologies, Inc.
560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

LABORATORY NUMBER: 9103-034

PROJECT MANAGER: Charles S. Lindsay
COMPANY: GeoEngineers
ADDRESS: 8410 154th Ave NE
Redmond, WA
PHONE: 861-6000 SAMPLED BY: BJS

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

SAMPLE ID / Composite	DATE	TIME	MATRIX	LAB ID
910305-1 > A-1	03/05/91	1400	Soil	-1
910305-2				-2
910305-3 > A-2				-3
910305-4				-4
910305-5 > A-3				-5
910305-6				-6
910305-7 > A-4				-7
910305-8				-8
910305-9 > A-5				-9
910305-10				-10

ANALYSIS REQUEST

	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
910305-1 > A-1												X		X													
910305-2												X															
910305-3 > A-2												X															
910305-4												X															
910305-5 > A-3												X		X													
910305-6												X															
910305-7 > A-4												X															
910305-8												X															
910305-9 > A-5												X		X													
910305-10												X															

PROJECT INFORMATION

PROJECT NUMBER: 0161-205-804
PROJECT NAME: Unocal/Coupeville
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☒ / NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	10
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	Courier

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☒ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:
Composite samples as shown prior to analysis
Fax results to Chuck Lindsay ASAP

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: Charles S. Lindsay 0800	Signature: Time:	Signature: Time:
Printed Name: Date: Charles S. Lindsay 3/6	Printed Name: Date:	Printed Name: Date:
Company: GEI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time: Michelle Long 11:00	Signature: Time:	Signature: Time:
Printed Name: Date: D. McCarthy 3/6/91	Printed Name: Date:	Printed Name: Date:
Company: ATI-NW	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

C - 14

Analytical Technologies, Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9103-060

April 4, 1991

GeoEngineers, Inc.
8410-154th Ave. N.E.
Redmond, WA 98052

Attention : Chuck Lindsay

Project Number : 161-205-B04

Project Name : Unocal Coupeville

On March 8, 1991, Analytical Technologies, Inc., received 9 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Bob Olsiewski

Bob A. Olsiewski
Project Manager

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager

FWG/hal/cen

Analytical Technologies, Inc.

ATI I.D. # 9103-060

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9103-060-1	910307-1	03/07/91	SOIL
9103-060-2	910307-2	03/07/91	SOIL
9103-060-3	910307-3	03/07/91	SOIL
9103-060-4	910306-1	03/06/91	SOIL
9103-060-5	910306-2	03/06/91	SOIL
9103-060-6	910306-3	03/06/91	SOIL
9103-060-7	910306-4	03/06/91	SOIL
9103-060-8	910306-5	03/06/91	SOIL
9103-060-9	910306-6	03/06/91	SOIL
9103-060-10	A-6 COMP	N/A	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	10

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9103-060

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE

ANALYSIS	TECHNIQUE	REFERENCE	LAB
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9103-060

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 03/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9103-060-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 03/07/91
PROJECT #	: 161-205-B04	DATE RECEIVED	: 03/08/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: 910307-3	DATE ANALYZED	: 03/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9103-060-5

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 03/06/91
PROJECT #	: 161-205-B04	DATE RECEIVED	: 03/08/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: 910306-2	DATE ANALYZED	: 03/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	7
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9103-060-8

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 03/06/91
PROJECT #	: 161-205-B04	DATE RECEIVED	: 03/08/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: 910306-5	DATE ANALYZED	: 03/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9103-060-9

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 03/06/91
PROJECT #	: 161-205-B04	DATE RECEIVED	: 03/08/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: 910306-6	DATE ANALYZED	: 03/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9103-060-10

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 03/08/91
CLIENT I.D.	: A-6 COMP	DATE ANALYZED	: 03/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	11 *
HYDROCARBON RANGE	C7 to C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	150
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

BEST ESTIMATE OF FUEL TYPE: 1 PART(S) GASOLINE : 14 PART(S) DIESEL

* Sample chromatogram indicates a diesel-like contamination.

Analytical Technologies, Inc.

ATI I.D. # 9103-060

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC.
PROJECT # : 161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE
EPA METHOD : 8015 MODIFIED

SAMPLE I.D. # : 9103-059-1
DATE EXTRACTED : 03/08/91
DATE ANALYZED : 03/08/91
MATRIX : SOIL
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (GASOLINE)	10	500	393	76	386	75	2

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9103-060

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE
EPA METHOD : 418.1

MATRIX : SOIL
UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS	DATE EXTRACTED	DATE ANALYZED
9103-060	REAGENT BLANK	<5	03/08/91	03/08/91
9103-060-3	910307-3	74	03/08/91	03/08/91
9103-060-4	910306-1	100	03/08/91	03/08/91
9103-060-5	910306-2	130	03/08/91	03/08/91
9103-060-6	910306-3	140	03/08/91	03/08/91
9103-060-7	910306-4	330	03/08/91	03/08/91
9103-060-8	910306-5	24	03/08/91	03/08/91
9103-060-9	910306-6	39	03/08/91	03/08/91
9103-060-10	A-6 COMP	270	03/08/91	03/08/91

Analytical Technologies, Inc.

ATI I.D. # 9103-060

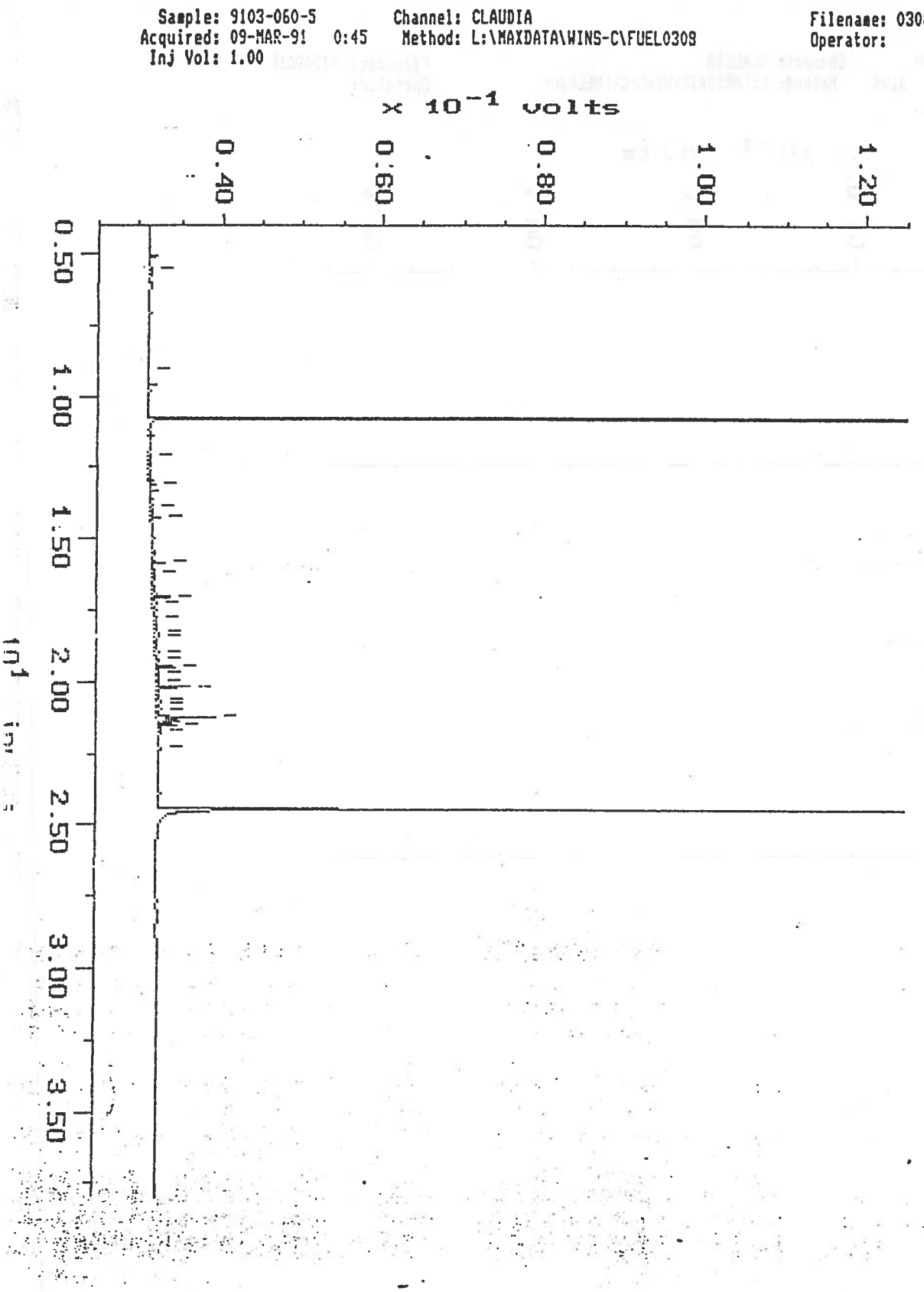
GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE
EPA METHOD : 418.1

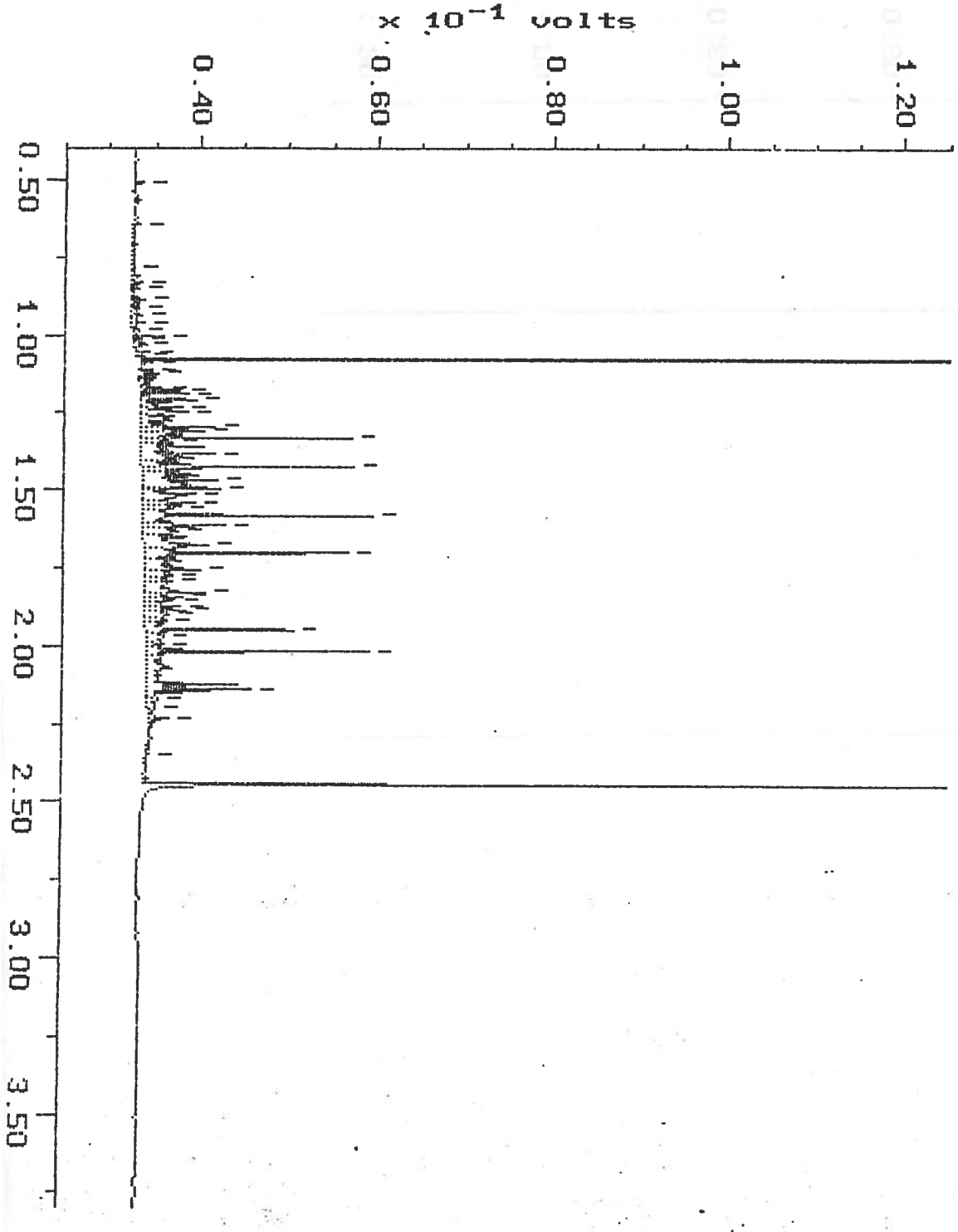
PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	9103-058-4	21.5	21.6	0	284	259	102

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$


Sample: 9103-060-5
Acquired: 09-MAR-91 0:45
Inj Vol: 1.00
Channel: CLAUDIA
Method: L:\MAXDATA\WINS-C\FUEL0309
Filename: 0308WC13
Operator:
x 10⁻¹ Volts
0.40
0.60
0.80
1.00
1.20
0.50
1.00
1.50
2.00
2.50
3.00
3.50

Sample: 9103-060-10 Channel: CLAUDIA Filename: 0308WC16
Acquired: 09-MAR-91 3:04 Method: L:\MAXDATA\WINS-C\FUEL0308 Operator:
Inj Vol: 1.00



AnalyticalTechnologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 3-7-91 PAGE 1 OF 1

LABORATORY NUMBER: 910306-0

PROJECT MANAGER: Chuck Lindsay
COMPANY: GeoEngineers, Inc.
ADDRESS: 8410 154th Ave. N.E.
Redmond, WA 98052
PHONE: 861-6000 SAMPLED BY: BJS

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

	SAMPLE ID	DATE	TIME	MATRIX	LAB ID
-1	910307-1 > A-6	03/01/91	1400	Soil	-10
-2	910307-2	03/07/91			
-3	910307-3	03/07/91			
-4	910306-1	03/06/91	1300	Soil	
-5	910306-2				
-6	910306-3				
-7	910306-4				
-8	910306-5				
-9	910306-6				

ANALYSIS REQUEST

	3010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	8240 ZH-EXT	8270	8150 Herbicides (2)	Metals (8)			NUMBER OF CONTAINERS
-1												X															1
-2												X		X													1
-3												X		X													1
-4												X															1
-5												X		X													1
-6												X															1
-7												X															1
-8												X		X													1
-9												X		X													1

PROJECT INFORMATION

PROJECT NUMBER: 161-105 Proj
PROJECT NAME: INTRAL Courterville
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☒ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	9
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA: Courier	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☑ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☒ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: Condense 910307-1 & 910307-2 into one sample A-6.

Fax Results to CSL, please.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Barbara Thensh Time: 1750	Signature: Time:	Signature: Time:
Printed Name: Barbara Shipinski Date: 3-7-91	Printed Name: Date:	Printed Name: Date:
Company: GEI	Company:	Company:
RECEIVED BY: 1	**RECEIVED BY: 2**	**RECEIVED BY: (LAB) 3.**
Signature: Time: 11:25	Signature: Time:	Signature: Time:
Printed Name: Date: 3/8/91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

C - 29

N° 3551

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9104-238

GeoEngineers

MAY 0 8 1991

Routing

File

May 6, 1991

GeoEngineers, Inc.
8410-154th Ave. N.E.
Redmond, WA 98052

Attention : Chuck Lindsay

Project Number : 0161-205-B04

Project Name : Coupeville Unocal

On April 19, 1991, Analytical Technologies, Inc., received 3 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Bob A. Olsiewski
Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/hal/cen

Analytical Technologies, Inc.

ATI I.D. # 9104-238

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : COUPEVILLE UNOCAL

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9104-238-1	910418-1	04/18/91	SOIL
9104-238-2	910418-2	04/18/91	SOIL
9104-238-3	910418-3	04/18/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9104-238

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : COUPEVILLE UNOCAL

ANALYSIS	TECHNIQUE	REFERENCE	LAB
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9104-238

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: COUPEVILLE UNOCAL	DATE EXTRACTED	: 04/22/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/22/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-238-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/18/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/19/91
PROJECT NAME	: COUPEVILLE UNOCAL	DATE EXTRACTED	: 04/22/91
CLIENT I.D.	: 910418-1	DATE ANALYZED	: 04/23/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	7
HYDROCARBON RANGE	C7 to C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	68
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

BEST ESTIMATE OF FUEL TYPE: 1 PART(S) GASOLINE : 10 PART(S) DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-238-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/18/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/19/91
PROJECT NAME	: COUPEVILLE UNOCAL	DATE EXTRACTED	: 04/22/91
CLIENT I.D.	: 910418-2	DATE ANALYZED	: 04/23/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	12
HYDROCARBON RANGE	C7 to C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	140
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

BEST ESTIMATE OF FUEL TYPE: 1 PART(S) GASOLINE : 12 PART(S) DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-238-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/18/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/19/91
PROJECT NAME	: COUPEVILLE UNOCAL	DATE EXTRACTED	: 04/22/91
CLIENT I.D.	: 910418-3	DATE ANALYZED	: 04/23/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	240
HYDROCARBON RANGE	C12 to C24
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-238

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D. #	: 9104-236-2
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 04/22/91
PROJECT NAME	: COUPEVILLE UNOCAL	DATE ANALYZED	: 04/22/91
EPA METHOD	: 8015 MODIFIED	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (GASOLINE)	<5	500	443	89	470	94	6

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-238

GENERAL CHEMISTRY RESULTS

LIENT	: GEOENGINEERS, INC.	DATE EXTRACTED	: 04/22/91
ROJECT #	: 0161-205-B04	DATE ANALYZED	: 04/22/91
ROJECT NAME	: COUPEVILLE UNOCAL	MATRIX	: SOIL
		UNITS	: mg/Kg

TI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
.04-238	REAGENT BLANK	<5
.04-238-1	910418-1	320
.04-238-2	910418-2	230
.04-238-3	910418-3	390

Analytical Technologies, Inc.

ATI I.D. # 9104-238

GENERAL CHEMISTRY QUALITY CONTROL

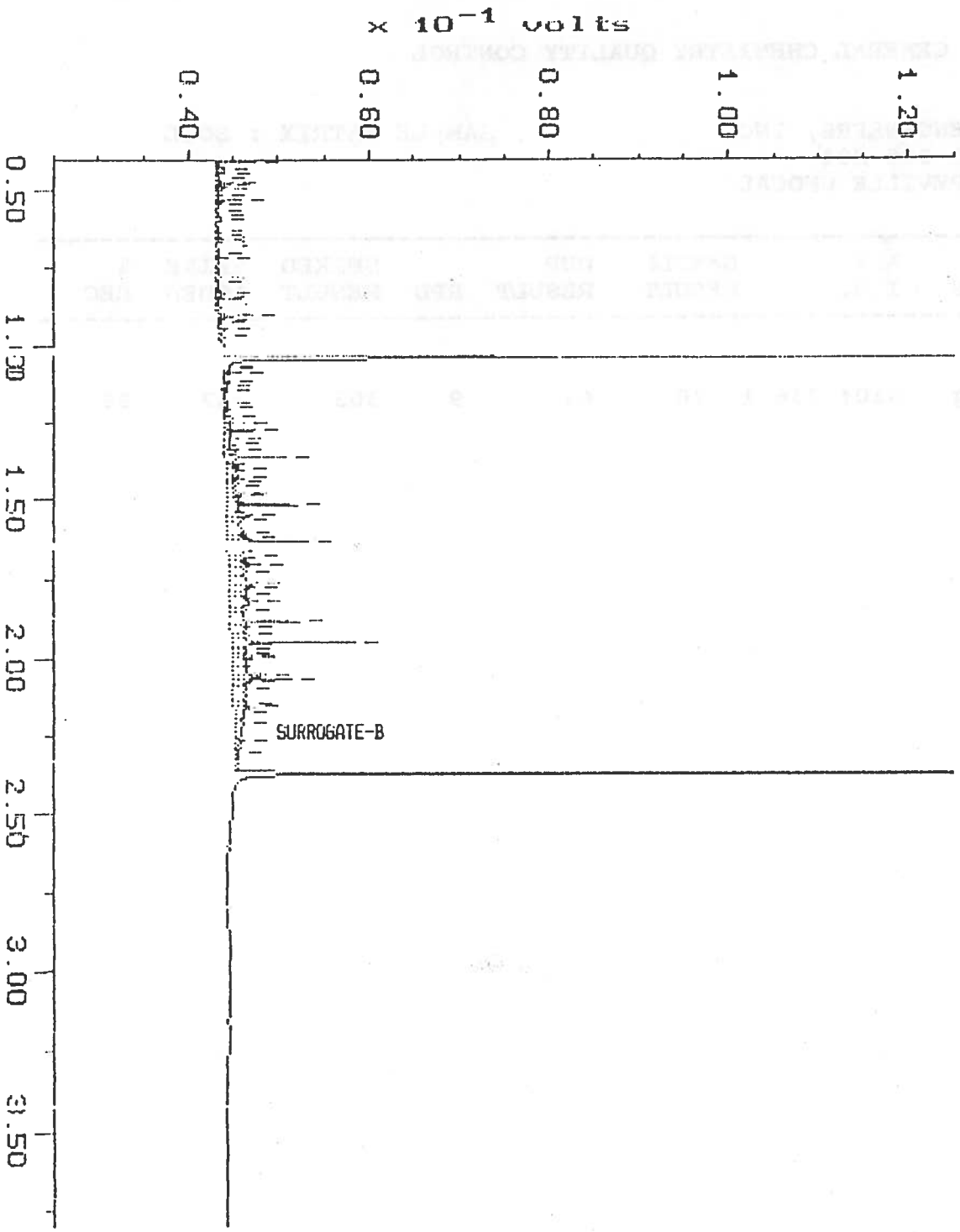
CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 0161-205-B04
PROECT NAME : COUPEVILLE UNOCAL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	9104-236-1	70	64	9	303	237	98

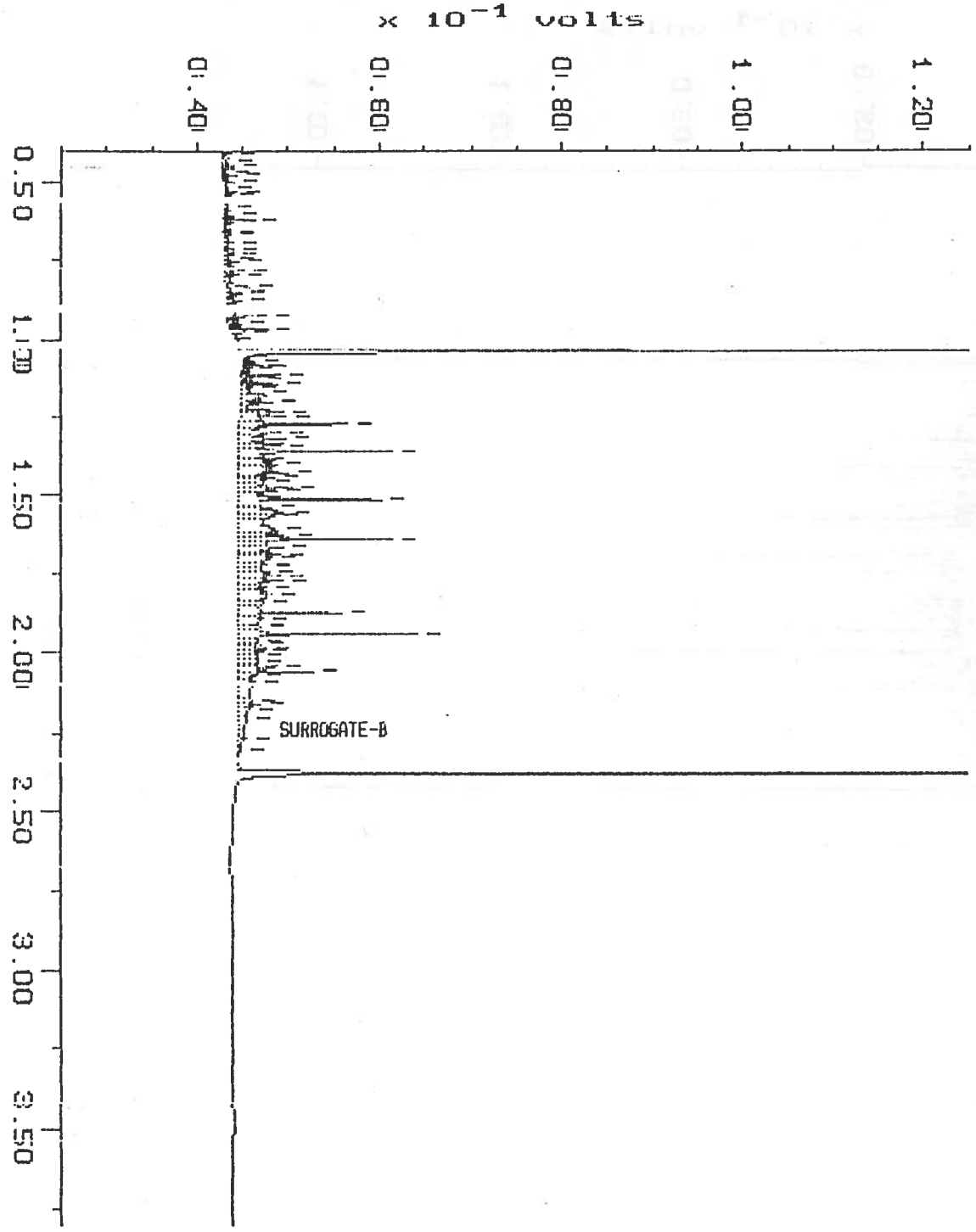
$$\% \text{ Recoverry} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

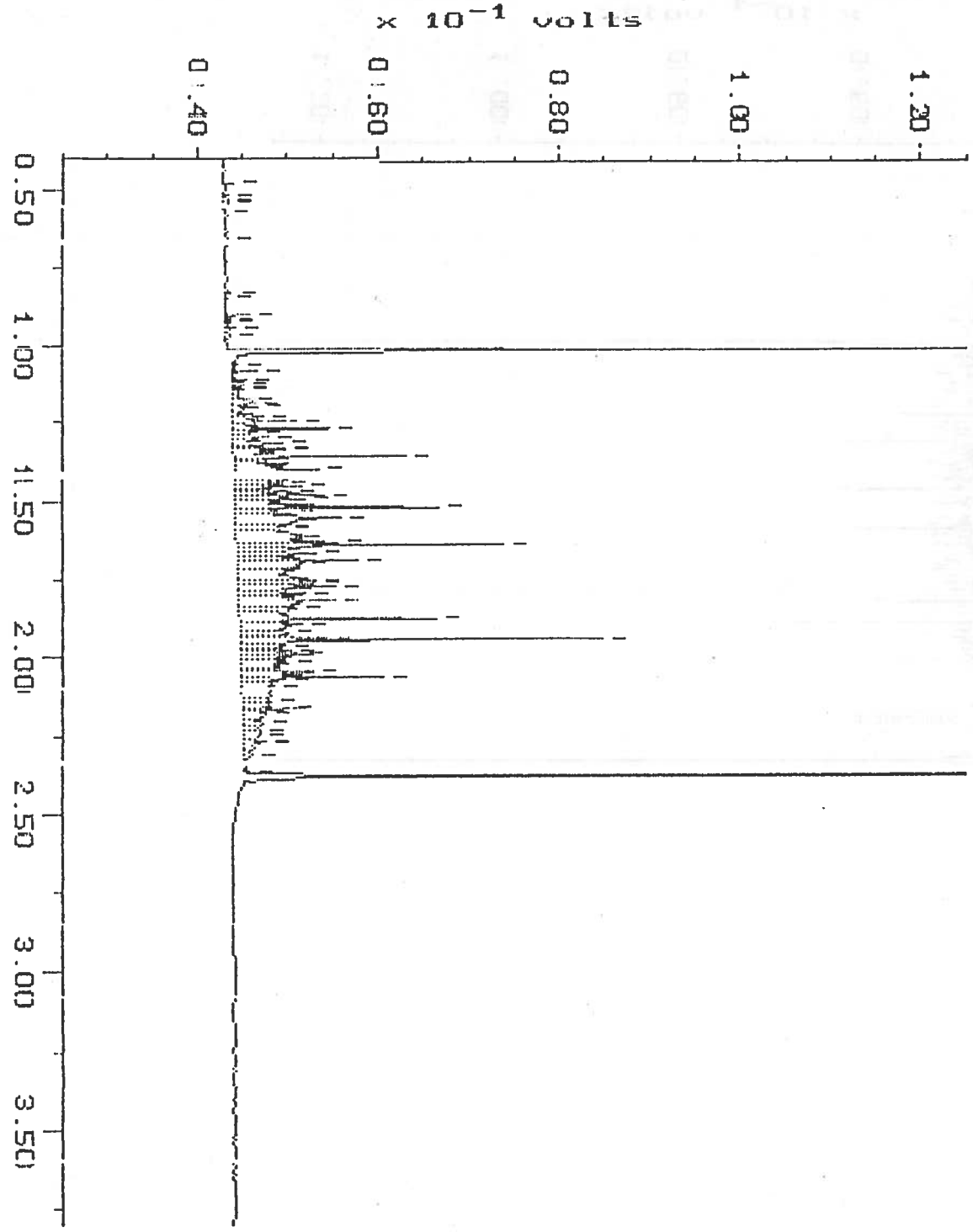
Sample: 9104-238-1 Channel: DEMITRI Filename: 0423SD09
Acquired: 23-APR-91 16:39 Method: M:\MAXDATA\SERGE-D\FUEL0423 Operator: BRE
Inj Vol: 1.00



Sample: 9104-238-2 Channel: DEMITRI Filename: 0423SD10
Acquired: 23-APR-91 17:28 Method: M:\MAXDATA\SERGE-D\FUEL0423 Operator: BRE
Inj Vol: 1.00



Sample: 9104-238-3 Channel: DEMITRI Filename: 0423SD11
Acquired: 23-APR-91 18:17 Method: M:\MAXDATA\SERGE-D\FUEL0423 Operator: BRE
Inj Vol: 1.00



Analytical Technologies, Inc.
560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 4/18/91 PAGE 1 OF ___

LABORATORY NUMBER: 9104-238

PROJECT MANAGER: Chuck Lindsay
COMPANY: GeoEngineers, Inc.
ADDRESS: 8410 154th Ave NE
Redmond, WA
PHONE: 861-6000 SAMPLED BY: BJS

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
910418-1	04/18	1000	Soil	-1
910418-2	"	1015	Soil	-2
910418-3	"	1030	Soil	-3
~~Duplicate~~	"	~~1015~~	Soil	

ANALYSIS REQUEST

8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)		Arsenic	NUMBER OF CONTAINERS
											X		X													<	2
											X		X													<	2
											X		X													<	2
											X	—	X	—												<	2

PROJECT INFORMATION

PROJECT NUMBER: 0161-205-R&X
PROJECT NAME: Coupeville Mineral
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☒ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	8
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	Courier

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS | (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☒ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: Results to CSL.
Composite like-numbered samples in the lab for testing, please. Thanx

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Barbara Ferretti Time:	Signature: Time:	Signature: Time:
Printed Name: Barbara Ferretti Date:	Printed Name: Date:	Printed Name: Date:
Company: GEI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: DW Thomas Time: 10:35	Signature: Time:	Signature: Time:
Printed Name: DW Thomas Date: 4-19-91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-[illegible] • Seattle (206)228-833[illegible] Pensacola (904)474-10[illegible] DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

C - 43

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9104-289

May 6, 1991

GeoEngineers
MAY 09 1991
Routing CSL
File

GeoEngineers, Inc.
8410-154th Ave. N.E.
Redmond, WA 98052

Attention : Chuck S. Lindsay

Project Number : 0161-205-B04

Project Name : Unocal Coupeville

On April 24, 1991, Analytical Technologies, Inc., received 4 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Bob A. Olsiewski
Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/hal/cn

Analytical Technologies, Inc.

ATI I.D. # 9104-289

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9104-289-1	MW-7 27.5	04/23/91	SOIL
9104-289-2	MW-8 22.5	04/23/91	SOIL
9104-289-3	MW-8 27.5	04/23/91	SOIL
9104-289-4	MW-9 27.5	04/23/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-289

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE

ANALYSIS	TECHNIQUE	REFERENCE	LAB
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9104-289

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 04/25/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/25/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-289-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 04/25/91
CLIENT I.D.	: MW-7 27.5	DATE ANALYZED	: 04/25/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-289-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 04/25/91
CLIENT I.D.	: MW-8 22.5	DATE ANALYZED	: 04/25/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-289-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 04/25/91
CLIENT I.D.	: MW-8 27.5	DATE ANALYZED	: 04/25/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9104-289-4

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE EXTRACTED	: 04/25/91
CLIENT I.D.	: MW-9 27.5	DATE ANALYZED	: 04/25/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-289

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D. #	: 9104-065-8
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: 04/25/91
PROJECT NAME	: UNOCAL COUPEVILLE	DATE ANALYZED	: 04/25/91
EPA METHOD	: 8015 MODIFIED	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (DIESEL)	<5	500	531	106	526	105	1

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9104-289

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL COUPEVILLE

DATE EXTRACTED : 04/23/91
DATE ANALYZED : 04/23/91
MATRIX : SOIL
UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
9104-289	REAGENT BLANK	<5
9104-289-1	MW-7 27.5	55
9104-289-2	MW-8 22.5	68
9104-289-3	MW-8 27.5	56
9104-289-4	MW-9 27.5	66

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-289

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 0161-205-B04
PROECT NAME : UNOCAL COUPEVILLE

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	9104-289-2	68	54	23	309	255	95
PETROLEUM HYDROCARBONS	mg/Kg	9104-287-6	49	32	42	330	263	107

$$\% \text{ Recoverry} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody LABORATORY NUMBER: 9104-284. RI

PROJECT MANAGER: Chuck & Lindsay
COMPANY: GeoEngineers, Inc
ADDRESS: 2410 164th Ave SE
Redmond, WA
PHONE: 861 6000 SAMPLED BY: CAH

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY 8080 Pesticide (4)	TCLP ONLY 8240 ZH-EXT	TCLP ONLY 8270	TCLP ONLY 8150 Herbicides (2)	TCLP ONLY Metals (8)			NUMBER OF CONTAINERS
MW-7 27.5	4/23		Soil	-1												X		X													1
MW-8 22.5	↓	1000	↓	-2												X		X													1
MW-8 27.5	↓	1030	↓	-3												X		X													1
MW-9 27.5	↓	1530	↓	-4												X		X													1

PROJECT INFORMATION

PROJECT NUMBER: 0161-21-R-B04
PROJECT NAME: Unocal [illegible]
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☒ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS: 4
COC SEALS/INTACT? Y/N/NA: Y
RECEIVED GOOD COND./COLD: Y
RECEIVED VIA: Courier

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☒ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☒ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: Results to CS Lyphart.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1600	Signature: Time:	Signature: Time:
Printed Name: Barbara [illegible] Date: 4/23	Printed Name: Date:	Printed Name: Date:
Company: GEI	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: P. Nicholls Time: 10:00	Signature: Time:	Signature: Time:
Printed Name: P. Nicholls Date: 4/24/91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

№ 4813

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9104-290

GeoEngineers

MAY 15 1991

Routing CSL

File

May 8, 1991

GeoEngineers, Inc.
8410-154th Ave. N.E.
Redmond, WA 98052

Attention : Charles S. Lindsay

Project Number : 0161-205-B04

Project Name : Unocal/Coupeville

On April 24, 1991, Analytical Technologies, Inc., received 3 water and one soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Bob Olsiewski

Bob A. Olsiewski
Project Manager

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager

FWG/hal/cn

Analytical Technologies, Inc.

ATI I.D. # 9104-290

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9104-290-1	MW-2	04/23/91	WATER
9104-290-2	MW-5	04/23/91	WATER
9104-290-3	MW-6	04/23/91	WATER
9104-290-4	910422-1	04/22/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1
WATER	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9104-290

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0161-205-B04
PROJECT NAME : UNOCAL/COUPEVILLE

ANALYSIS	TECHNIQUE	REFERENCE	LAB
BETX	GC/PID	EPA 8020	R
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9104-290

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/26/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	94

AnalyticalTechnologies,Inc.

ATI I.D. # 9104-290

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 05/01/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	89

Analytical Technologies, Inc.

ATI I.D. # 9104-290-1

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 04/26/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	96

Analytical Technologies, Inc.

ATI I.D. # 9104-290-2

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-5	DATE ANALYZED	: 05/01/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 100

COMPOUNDS	RESULTS
BENZENE	11
TOLUENE	29
ETHYLBENZENE	370
TOTAL XYLENES	690 *

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	117

* Value from diluted sample; 100x dilution.

Analytical Technologies, Inc.

ATI I.D. # 9104-290-3

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/23/91
PROJECT #	: 0161-205-B04	DATE RECEIVED	: 04/24/91
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-6	DATE ANALYZED	: 04/26/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
ETHYLBENZENE	<0.5
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	97

Analytical Technologies, Inc.

ATI I.D. # 9104-290

VOLATILE ORGANIC COMPOUNDS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D. #	: 9104-257-7
PROJECT #	: 0161-205-B04	DATE EXTRACTED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE ANALYZED	: 04/25/91
EPA METHOD	: 8020 (BETX)	UNITS	: ug/L
SAMPLE MATRIX	: WATER	DILUTION	: 1

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.5	20.0	18.4	92	18.1	91	2
TOLUENE	<0.5	20.0	18.2	91	18.4	92	1
TOTAL XYLENES	0.6	40.0	37.6	93	37.8	93	1

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9104-290

VOLATILE ORGANIC COMPOUNDS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0161-205-B04	DATE RECEIVED	: N/A
PROJECT NAME	: UNOCAL/COUPEVILLE	DATE EXTRACTED	: 04/24/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/30/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
ETHYLBENZENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERIES

BROMOFLUOROBENZENE	103