

Consulting Geotechnical  
Engineers and Geologists

Geo  Engineers

#4658

8/6/91  
on

REPORT OF GEOTECHNICAL SERVICES  
SUBSURFACE HYDROCARBON STUDY  
CHEVRON SERVICE STATION 0129  
SEATTLE, WASHINGTON  
FOR  
CHEVRON U.S.A.

INTERIM

SOIL

GOV

25

RECEIVED

APR 19 1961

DEPT. OF ECOLOGY

#1658

SR 6/1/91  
aw

REPORT OF GEOTECHNICAL SERVICES  
SUBSURFACE HYDROCARBON STUDY  
CHEVRON SERVICE STATION 0129  
SEATTLE, WASHINGTON  
FOR  
CHEVRON U.S.A.

December 11, 1990

Chevron U.S.A. Inc.  
P.O. Box 220  
Seattle, Washington 98111

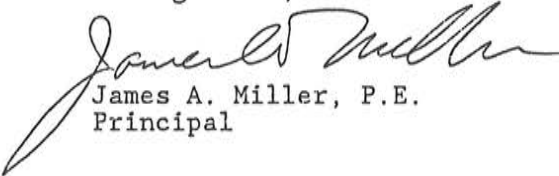
Attention: Mr. Steve Schuller

This letter transmits five copies of our report of geotechnical services for a subsurface hydrocarbon study at Chevron Service Station 0129 in Seattle, Washington. Our services were verbally authorized by Chevron on December 21, 1989, and have been performed under the terms of Contract Number M66CNW00699X.

We appreciate the opportunity to be of service to Chevron U.S.A. Please call if you have any questions regarding this report.

Yours very truly,

GeoEngineers, Inc.



James A. Miller, P.E.  
Principal

CLH:JAM:cs

File No. 0372-068-B04

T A B L E O F C O N T E N T S

	<u>Page No.</u>
INTRODUCTION	1
SCOPE	1
SITE DESCRIPTION	2
REMOVAL OF UNDERGROUND STORAGE TANKS AND RELATED FACILITIES	3
BACKFILLING OF THE EXCAVATIONS	4
SUBSURFACE SOIL CONDITIONS	5
GROUND WATER CONDITIONS	5
SUBSURFACE HYDROCARBONS AND SOIL CHEMISTRY	6
EXCAVATIONS AND SOIL STOCKPILES	7
EXPLORATORY BORING SOIL SAMPLES	8
GROUND WATER CHEMISTRY	9
HYDROCARBON VAPORS	10
SOIL STOCKPILE DISPOSAL	10
LIMITATIONS	10

List of Tables

	<u>Table No.</u>
SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS OBTAINED FROM UNDERGROUND FACILITY EXCAVATIONS	1
SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS FROM SOIL STOCKPILES	2
SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS BORING SAMPLES	3
SUMMARY OF PRODUCT SAMPLE RESULTS	4
SUMMARY OF GROUND WATER AND HYDROCARBON VAPOR RESULTS MONITOR WELLS	5

List of Figures

	<u>Figure No.</u>
VICINITY MAP	1
SITE PLAN	2
SURROUNDING PROPERTY	3
GROUND WATER CONTOUR MAP ON 2/28/90	4
GROUND WATER CONTOUR MAP ON 5/8/90	5

APPENDIX A

	<u>Page No.</u>
FIELD EXPLORATIONS	A-1
DRILLING AND SOIL SAMPLING PROGRAM	A-1
FIELD SCREENING OF SOIL SAMPLES	A-2
MONITOR WELL CONSTRUCTION	A-3
GROUND WATER SAMPLING PROGRAM	A-4
GROUND WATER ELEVATIONS	A-4
HYDROCARBON VAPOR CONCENTRATIONS	A-4
CHEMICAL ANALYTICAL PROGRAM	A-5

TABLE OF CONTENTS (CONTINUED)

List of Appendix A Figures

	<u>Figure No.</u>
SOIL CLASSIFICATION SYSTEM	A-1
KEY TO BORING LOG SYMBOLS	A-2
LOGS OF MONITOR WELLS	A-3 thru A-16
LOG OF RECOVERY WELL	1-17

APPENDIX B

	<u>Page No.</u>
CHEMICAL ANALYTICAL DATA - SOIL SAMPLES	B-1 thru B-40

APPENDIX C

	<u>Page No.</u>
CHEMICAL ANALYTICAL DATA - MONITOR WELL BORING SAMPLES AND GROUND WATER SAMPLES	C-1 thru C-23

REPORT OF GEOTECHNICAL SERVICES  
SUBSURFACE HYDROCARBON STUDY  
CHEVRON SERVICE STATION 0129  
SEATTLE, WASHINGTON  
FOR  
CHEVRON U.S.A.

INTRODUCTION

The results of our subsurface hydrocarbon study at Chevron Service Station 0129 are presented in this report. The service station site is located northeast of the intersection between Northeast 47th Street and Brooklyn Avenue Northeast in Seattle, Washington. The site location is shown relative to surrounding physical features on the Vicinity Map, Figure 1.

Chevron Service Station 0129 was undergoing renovation during our initial site visits. The service station renovation consisted of the removal of existing underground fuel storage tanks, fuel lines and service islands, followed by excavation for the installation of new underground gasoline storage tanks, service islands and fuel lines. The general layout of the service station site and the locations of the former underground tanks are shown on the Site Plan, Figure 2. The site is shown relative to surrounding properties in Figure 3.

SCOPE

The purpose of our study is to explore subsurface soil and ground water conditions at the site for the potential presence of residual hydrocarbons. The scope of services completed for this project is listed below.

1. Observe and document the removal of four underground fuel storage tanks and examine these tanks for evidence of corrosion or leaks.
2. Observe and document the removal of fuel service islands and fuel lines.
3. Obtain soil samples from the site's underground facility excavations for field screening tests and for chemical analysis of residual hydrocarbons.

4. Monitor compaction of backfill in the former underground fuel storage tanks excavation.
5. Obtain soil samples from soil stockpiles (soil removed from the underground facility excavations) for chemical analysis to characterize the soil.
6. Obtain permission for transporting soil stockpiles to the Cedar Hills Landfill for disposal.
7. Monitor the drilling of 14 exploratory borings and obtain soil samples from the borings at 5-foot intervals for field screening of residual hydrocarbons.
8. Submit at least one soil sample from each boring for chemical analysis of residual hydrocarbons.
9. Install a 2-inch-diameter PVC monitor well casing with a flush-grade lockable surface monument in each exploratory boring.
10. Develop the well screens by hand bailing with a stainless steel bailer.
11. Determine the well casing rim elevations to an accuracy of 0.01 feet using an engineer's level and an assumed site datum.
12. Measure water table elevations in the wells and sample each well for the presence of liquid hydrocarbons.
13. Measure the air space in each well casing for the presence of hydrocarbon vapors using a Bacharach TLV Sniffer calibrated to hexane.
14. Obtain ground water samples from the monitor wells for chemical analysis of dissolved hydrocarbons. Submit selected ground water samples for chemical analysis of dissolved lead.
15. Monitor the drilling and construction of an 8-inch-diameter liquid hydrocarbon recovery well.

#### SITE DESCRIPTION

The site is generally level and is situated at an elevation of approximately 200 feet above mean sea level. The area around the site slopes toward the south and southwest. The local geology consists of a glacial till cap overlying a thick sequence of sand. The site is located within a commercial and residential area in the University District of

Seattle, Washington (Figure 4). A parking lot and drive-through bank facility are located directly north of the property. A Seafirst Bank facility is located across an alley to the east. Small businesses and residential apartments are located west and south of the site, across Brooklyn Avenue Northeast and Northeast 47th Street. Circle K operates a convenience store/gasoline station on the southwest corner of the intersection between Northeast 47th Street and Brooklyn Avenue Northeast.

The renovated Chevron Service Station facility consists of a convenience store, four service islands and three underground gasoline storage tanks located south of the service islands.

#### REMOVAL OF UNDERGROUND STORAGE TANKS AND RELATED FACILITIES

O'Sullivan (O'Sullivan Construction, Inc.) removed three underground gasoline storage tanks from the northern portion of the site, two service islands, and associated fuel lines between January 3 and 12, 1990. The three removed underground gasoline storage tanks consisted of two 12,000-gallon steel tanks and one 5,000-gallon steel tank. O'Sullivan also completed an excavation in the southwestern portion of the site for the installation of the site's new underground gasoline storage tanks during this time. An abandoned 1,000-gallon underground fuel storage tank was discovered on January 8, 1990 in the eastern portion of the new gasoline tank excavation. The tank had been filled with pea gravel at the time of abandonment. We were unable to determine the type of fuel that had been stored in the abandoned tank. The location of the former underground facilities are shown in Figure 2.

A representative of GeoEngineers was present to observe the removal of the site's underground facilities and to obtain soil samples from the resulting excavations. Minor pitting and corrosion were observed on the southernmost gasoline tanks during removal procedures. No pitting or corrosion was observed on the northern gasoline tank. Severe corrosion was observed on the abandoned fuel tank. No holes were observed in any of these tanks.

The backfill surrounding the former underground facilities and some of the adjacent native soil was excavated and stockpiled temporarily on site. The backfill and native soil were placed in four separate soil stockpiles.



The soil stockpiles included (1) a stockpile from the former gasoline tanks excavation, (2) a stockpile from the area surrounding the abandoned fuel tank, (3) a stockpile from the eastern fuel line/service island excavation, and (4) a stockpile from the western fuel line/service island excavation. Additionally, soil removed from the new gasoline tank excavation was placed in two separate soil stockpiles.

The underground facilities excavations ranged in depth from 4 feet (fuel line excavations) to 15 feet (former gasoline tank excavation) below the ground surface. Ground water not observed in any of the excavations. The limits of the underground facilities excavations are shown in Figure 2.

#### BACKFILLING OF THE EXCAVATIONS

The former gasoline tank and fuel line/service island excavations were backfilled between January 5 and 7, 1990 with stockpiled soil which earlier had been removed from these excavations and with soil obtained during the excavation for the new gasoline tanks. We recommended to O'Sullivan that the backfill be compacted to at least 95 percent of the laboratory maximum dry density, based on the ASTM D-1557 compaction test procedure. A GeoEngineers representative evaluated the compaction and in-place density of the backfill placed in the excavation on January 5, 1990 and again on January 9, 1990 after the backfilling procedures were completed. GeoEngineers was not on site to monitor the entire backfilling and compaction operations.

GeoEngineers made additional compaction recommendations to O'Sullivan, based on the results of our January 5 and 9, 1990 field testing. Our compaction test results from January 5 and 9, 1990 indicated that the backfill in the northeast quadrant of the former gasoline tank excavation was less than the recommended 95 percent of the laboratory maximum dry density. We recommended that the contractor remove 1 to 2 feet of the backfill in this area and that additional compaction effort be applied to attain the proper compaction. At Chevron's request, a GeoEngineers representative visited the site to evaluate the subgrade footing excavation for the extension of the service station canopy on January 17, 1990. Based

on this site visit, we recommended to the contractor that further compaction effort be applied to bring compaction from loose to dense in the subgrade footing excavation.

#### SUBSURFACE SOIL CONDITIONS

Subsurface soil conditions at the site were observed during the removal and installation of underground facilities and explored by drilling 15 exploratory borings (MW-1 through MW-14 and R-1) at the locations shown in Figures 4 and 5. Details of the field exploration program and the boring logs are presented in Appendix A.

Borings MW-1 and R-1 encountered medium stiff to hard silt at approximately 27 and 30 feet below the ground surface, respectively.

#### GROUND WATER CONDITIONS

Ground water conditions were explored by constructing 2-inch-diameter monitor wells in 14 of the exploratory borings (MW-1 through MW-14) and an 8-inch-diameter recovery well (R-1). Construction details for the wells are presented in Appendix A.

Ground water was encountered in each exploratory boring. Water levels were measured in 12 of the 14 monitor wells (MW-2 through MW-7 and MW-9 through MW-14) on February 28 and May 8, 1990. The water level in R-1 was measured on May 8, 1990. The depth to ground water in the 12 monitor wells ranged from approximately 14 to 17.5 feet beneath the ground surface at the time of our measurements on February 28, 1990. The ground water levels were approximately 0.5 feet lower on May 8, 1990 than on February 28, 1990. The depth to ground water in R-1 was approximately 16 feet below the ground surface on May 8, 1990. Water table elevations based on our February 28 and May 8, 1990 measurements are shown in Figures 4 and 5, respectively. Based on these water table elevations, the shallow ground water beneath the site migrates generally toward the southeast.

The service station design plans were changed during the service station renovation procedures. As a result of the change in plans, MW-1 is located directly beneath the new location of the northeastern service island. A horizontal extension pipe was placed on the wellhead to provide access to the well for future abandonment purposes and for vapor concentration/ground vacuum measurements.

The depth to ground water was measured at 15.84 feet below the ground surface in MW-8 on February 8, 1990. Well MW-8 was found to be plugged at a depth of approximately 15 feet on February 20, 1990, three weeks after it was installed. Well MW-8 was destroyed during final service station renovation procedures.

#### SUBSURFACE HYDROCARBONS AND SOIL CHEMISTRY

The potential presence of hydrocarbons in the subsurface was evaluated by:

1. Performing field screening tests on soil samples obtained from the excavations and exploratory borings. The field screening methods employed included visual examination, sheen testing, and headspace vapor testing. The field screening methods are described in Appendix A.
2. Submitting selected soil samples from each excavation and exploratory boring for one or more of the following chemical analyses: BETX (benzene, ethylbenzene, toluene and xylenes) by EPA Method 8020 and fuel hydrocarbons (gasoline and diesel) by EPA Method 8015 (modified).
3. Submitting soil samples from the soil stockpiles for one or more of the following chemical analyses to characterize the soil: TPH (total petroleum hydrocarbons) by EPA Method 418.1; fuel hydrocarbons by EPA Method 8015 (modified); BETX by EPA Method 8020; PCBs (polychlorinated biphenyls) by EPA Method 8080; EP Toxicity (metals); and purgeable halocarbons by EPA Method 8010.
4. Submitting ground water samples from each monitor well for chemical analysis of BETX by EPA Method 8020 and fuel hydrocarbons by EPA Method 8015 (modified).
5. Submitting a sample of liquid hydrocarbons for chemical analysis of fuel hydrocarbons by EPA Method 8015 (modified).
6. Measuring the air space in the monitor well casings for hydrocarbon vapors using a Bacharach TLV Sniffer calibrated to hexane.

#### EXCAVATIONS AND SOIL STOCKPILES

Field screening results indicated the presence of residual hydrocarbons in soil from: (1) the base and the walls of the former gasoline tanks excavation, (2) the eastern fuel line/service island excavation, (3) the fuel line excavation for the new gasoline tanks, and (4) the southeast and northeast base, and the south wall of the new underground gasoline tanks excavation. Field screening detected little or no evidence of residual hydrocarbons in soil from the base and walls of the other excavations.

Discrete soil samples were obtained from the base and walls of each excavation for chemical analysis of residual hydrocarbons. Approximate soil sample locations are shown in Figure 2. Chemical analytical results for soil samples obtained from each excavation are summarized in Table 1. Laboratory reports are presented in Appendix B.

Chemical analytical results indicated that residual fuel hydrocarbons remain in the former gasoline tanks excavation. Soil samples obtained from the base of the excavation resulted in fuel hydrocarbon concentrations, quantified as gasoline, ranging from 897 ppm to 8,190 ppm (Sample Nos. 900104-2, 900104-5 and 900104-6). Benzene concentrations for these samples ranged from 0.60 ppm to 15.5 ppm. Chemical analytical results of soil samples obtained from the walls of the excavation indicated nondetectable concentrations of fuel hydrocarbons. Benzene was also not detected in the soil samples obtained from the excavation walls. Chemical analysis of ethylbenzene, toluene, and xylenes in soil samples obtained from the excavation walls resulted in concentrations ranging from less than 0.05 to 7.64 ppm.

Chemical analytical results indicated that residual fuel hydrocarbons and BETX were not detected in soil samples obtained from the vicinity of the abandoned fuel storage tank.

Fuel hydrocarbons, quantified as gasoline, were detected at a concentration of 1,023 ppm (Sample No. 900112-25) in the south wall of the new gasoline tanks excavation. Chemical analysis resulted in concentrations of fuel hydrocarbons, quantified as gasoline, ranging from less than 10 ppm to 122 ppm in other portions of the new gasoline tanks excavation. Benzene was detected at a concentration of 0.92 ppm, the sample (Sample No. 900112-31) from the base of the excavation's northeast corner. Benzene

was not detected in the other soil samples obtained from the excavation. Chemical analysis of ethylbenzene, toluene, and xylenes resulted in concentrations ranging from less than 0.05 ppm to 85.1 ppm in soil samples obtained from the new gasoline tanks excavation.

Chemical analysis of fuel hydrocarbons, quantified as gasoline, in the east fuel line excavation resulted in 4,397 ppm (Sample No. 900110-15) and 24 ppm (Sample No. 900108-13). Benzene concentrations were 0.49 ppm in Sample No. 900110-15 and less than 0.05 ppm in Sample No. 900108-13. Ethylbenzene, toluene, and xylene concentrations ranged from 0.64 ppm to 138 ppm in the soil samples obtained from the east fuel line excavation.

Chemical analysis of fuel hydrocarbons, quantified as gasoline, resulted in 470 ppm (Sample No. 900110-14) in the east service island excavation and 955 ppm (Sample No. 900110-16) in the west fuel line/service island excavation. Benzene concentrations were 0.49 ppm in Sample No. 900110-14 and less than 0.05 ppm in Sample No. 900110-16. Ethylbenzene, toluene, and xylene concentrations ranged from less than 0.05 ppm to 17.4 ppm in these soil samples.

Composite soil samples were obtained from the site's soil stockpiles and from exploratory boring soil cuttings for chemical analysis of residual hydrocarbons. Soil below the abandoned fuel tank was also tested for the presence of PCBs, purgeable halocarbons, and selected metals because the contents of the tank were unknown. Based on the results of our initial site studies a vapor extraction system was installed at the site to remediate subsurface hydrocarbons. A composite sample was also obtained from a soil stockpile created by excavating trenches for the VES. Chemical analytical results for the soil stockpiles are summarized in Table 2. Laboratory reports are presented in Appendix B.

#### EXPLORATORY BORING SOIL SAMPLES

Field screening tests on soil samples from 14 exploratory borings indicated the presence of residual hydrocarbons in MW-1, MW-2, MW-3, MW-4, MW-7, MW-10, MW-11 and MW-12. Soil from the recovery well boring was not field screened or submitted for chemical analysis. Field screening

indicated the presence of residual hydrocarbons in MW-1 through MW-4, MW-7, MW-10, MW-12 and MW-13. Field screening data are presented on the monitor well logs in Appendix A.

Soil samples from each boring were selected for chemical analysis on the basis of field screening results and depth. Chemical analytical results for these soil samples are summarized in Table 3. Laboratory reports are presented in Appendix C.

Chemical analysis of the soil samples resulted in fuel hydrocarbon concentrations, quantified as gasoline, ranging from 45 ppm to 5,568 ppm in MW-3, MW-4 and MW-12. Benzene was detected in MW-3, MW-4, MW-7 and MW-12 at concentrations of 27.1 ppm, 1.58 ppm, 0.17 ppm and 0.77 ppm, respectively. Concentrations of ethylbenzene, toluene, and xylenes ranging between 0.10 to 614 ppm were also detected in MW-3, MW-4, MW-7, MW-8, MW-11, MW-12 and MW-13. Fuel hydrocarbon and BETX concentrations were nondetectable in soil samples submitted from the other exploratory borings.

#### GROUND WATER CHEMISTRY

Liquid hydrocarbons were detected on the water table in MW-4 and MW-12. Measurements taken on February 28, 1990 indicated that MW-4 and MW-12 contained 2.27 and 1.22 feet of liquid hydrocarbons, respectively. A product sample was submitted from MW-4 which indicated that the product was gasoline. The results of the product sample analysis are presented in Table 4.

Ground water samples were obtained from the monitor wells between January 23 and February 20, 1990. Chemical analytical data for the ground water samples from each well with the exception of MW-4 are summarized in Table 5. Ground water samples were not obtained from MW-4 due to the presence of liquid hydrocarbons in the well. Laboratory reports are presented in Appendix C.

Chemical analytical results of fuel hydrocarbons indicated a concentration of 2,038 ppm gasoline in the ground water sample from MW-12. Fuel hydrocarbon concentrations, quantified as gasoline, ranged from 25 ppm to 526 ppm in MW-2, MW-3 and MW-6 through MW-11. Ground water from the remaining wells contained nondetectable concentrations of fuel hydrocarbons. Benzene concentrations ranged from 0.088 ppm to 29.1 ppm in 8 of the

14 monitor wells. Benzene was not detected in ground water samples from MW-5, MW-6, MW-13 and MW-14. Concentrations of ethylbenzene, toluene, and xylenes ranged from less than 0.001 ppm to 49.7 ppm in all of the ground water samples submitted. (Ground water from monitor wells MW-1 through MW-3 was analyzed for dissolved lead.) Dissolved lead was not detected in these wells.

#### HYDROCARBON VAPORS

The monitor well casings were tested for the presence of hydrocarbon vapors on February 28, 1990 and on April 14, 1990, using a Bacharach TLV Sniffer calibrated to hexane. The vapor concentrations measured are summarized in Table 5. Hydrocarbon vapor concentrations ranged from less than 400 ppm to greater than 10,000 ppm.

#### SOIL STOCKPILE DISPOSAL

The portions of soil stockpiles from the new gasoline tanks excavation which were not used to backfill other excavations on site were transported to two landfills for disposal after chemical analytical results were received. Approximately 450 cubic yards of this soil did not contain concentrations of residual fuel hydrocarbons and were transported to Coal Creek Landfill for disposal. Approximately 450 cubic yards of additional stockpiled soil from the exploratory borings and from the VES installation trenches contained concentrations of residual hydrocarbons and were transported to Cedar Hills Landfill for disposal.

Soil cuttings obtained during drilling of MW-1 through MW-14 were transported to Cedar Hills Landfill for disposal. Soil cuttings obtained during drilling of the recovery well, RW-1, were transported to Pacific Topsoil for disposal. Chemical testing of samples from the soil stockpiles and drill cuttings are summarized in Table 2.

#### LIMITATIONS

This report has been prepared for use by Chevron U.S.A. in their evaluation of subsurface hydrocarbons at Chevron Service Station 0129 in Seattle, Washington. This report may be made available to regulatory agencies. The report is not intended for use by others and the information contained herein may not be applicable to other sites.

The data reported herein are based on the sampling of several excavations and 14 monitor well borings at the service station property. It is always possible that additional subsurface hydrocarbons may exist in areas that were not explored and sampled.

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 the report was prepared. No other conditions, express or implied, should be understood.

- o o o -

If you have any questions concerning this report, please call.

Respectfully submitted,

GeoEngineers, Inc.

*Cheryl L. Haines / by JAM*

Cheryl L. Haines  
Staff Geologist

*James A. Miller*

James A. Miller, P.E.  
Principal

CLH:JAM:cs



TABLE 1 (Page 1 of 2)  
 SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS  
 OBTAINED FROM UNDERGROUND FACILITY EXCAVATIONS (1)

Soil Sample Number (2)	Date Sampled	Location	Depth (ft)	BETX (ppm) (3)				Fuel Hydrocarbons (ppm) (4)		Field Screening	
				B	E	T	X	Gasoline	Diesel	Vapor Concentration (ppm) (5)	Sheen (6)
		FORMER GASOLINE TANK EXCAVATION									
900103-1	01/03/90	North Wall	6.0	ND	ND	ND	ND	ND	ND	<100	SS
900104-2	01/04/90	Base - North Tank	14.0	15.5	14.5	1,024	754	8,190	ND	>10,000	HS
900104-3	01/04/90	East Wall	7.5	0.35	0.86	0.07	7.64	ND	ND	<100	SS
900104-4	01/04/90	West Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900104-5	01/04/90	Base - Middle Tank	13.0	0.60	15.4	27.1	107	897	ND	1,500	HS
900104-6	01/04/90	Base - South Tank	14.0	1.80	26.2	62.1	151	2,254	ND	2,500	SS
900104-7	01/04/90	South Wall	6.0	ND	0.10	ND	0.63	ND	ND	<100	SS
		ABANDONED FUEL STORAGE TANK									
900108-17	01/10/90	South Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900108-18	01/10/90	East Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900108-19	01/10/90	West Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900108-20	01/10/90	North Wall	7.0	ND	ND	ND	0.60	ND	ND	110	SS

Notes:

- (1) Chemical analysis by Sound Analytical Service. Laboratory reports are presented in Appendix B.
- (2) Sample locations are shown in Figure 2.
- (3) BETX = benzene, ethylbenzene, toluene and xylenes by EPA Method 8020. Detection limit is 0.05 ppm.
- (4) Fuel hydrocarbons by EPA Method 8015 modified. Detection limit is 10 ppm.
- (5) Vapor measurements were obtained by using a Bacharach TLV Sniffer calibrated to hexane.
- (6) "NS" indicates "no sheen"; "SS" indicates "slight sheen"; "MS" indicates "moderate sheen"; "HS" indicates "Heavy Sheen"
- "<" indicates "less than"; ">" indicates "greater than"; "f" indicates "feet"
- "ppm" indicates "parts per million"; "ND" indicates "not detected"

TABLE 1 (Page 2 of 2) (1)

Soil Sample Number (2)	Date Sampled	Location	Depth (ft)	BETX (ppm) (3)				Fuel Hydrocarbons (ppm) (4)		Field Screening	
				B	E	T	X	Gasoline	Diesel	Vapor Concentration (ppm) (3)	Sheen (6)
		NEW GASOLINE TANK EXCAVATION									
900108-9	01/08/90	West Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900108-10	01/08/90	North Wall	7.0	ND	ND	ND	ND	ND	ND	<100	NS
900108-11	01/08/90	East Wall	7.0	ND	ND	ND	ND	ND	ND	<100	SS
900108-12	01/08/90	Base (North end)	15.0	ND	ND	ND	ND	ND	ND	<100	NS
900112-21	01/12/90	Base (Southwest Corner)	15.0	NT	NT	NT	NT	NT	NT	500	MS
900112-22	01/12/90	South Wall (Southwest Corner)	13.0	ND	ND	ND	0.11	ND	ND	<100	HS
900112-23	01/12/90	West Wall (Center)	6.0	ND	ND	ND	0.15	ND	ND	<100	NS
900112-24	01/12/90	Base (Southwest Center)	14.0	ND	ND	ND	0.14	ND	ND	<100	SS
900112-25	01/12/90	South Wall (Center)	9.5	ND	ND	0.27	8.04	1,023	ND	1,200	HS
900112-29	01/12/90	East Wall (So. Center)	9.7	ND	ND	ND	0.16	ND	ND	<100	SS
900112-31	01/12/90	Base (Northeast Corner)	14.0	0.92	9.1	12.3	85.1	122	ND	>10,000	HS
		FUEL LINE/SERVICE ISLAND EXCAVATIONS									
900108-13	01/08/90	East Fuel Line	4.0	0.49	0.64	1.38	3.63	24	ND	4,000	MS
900110-15	01/10/90	East Fuel Line	4.5	ND	16.4	17.5	138	4,397	ND	2,100	HS
900110-14	01/10/90	East Service Island	4.5	0.49	1.02	3.25	17.4	470	ND	2,300	MS
900110-16	01/10/90	West Fuel Line/Service Island	4.5	ND	0.78	0.47	4.25	955	ND	<100	SS

Notes:

- (1) Chemical analysis by Sound Analytical Service. Laboratory reports are presented in Appendix B.
- (2) Sample locations are shown in Figure 2.
- (3) BETX = benzene, ethylbenzene, toluene and xylenes by EPA Method 8020. Detection limit is 0.05 ppm.
- (4) Fuel hydrocarbons by EPA Method 8015 modified. Detection limit is 10 ppm.
- (5) Vapor measurements were obtained by using a Bacharach TLV Sniffer calibrated to hexane.
- (6) "NS" indicates "no sheen"; "SS" indicates "slight sheen"; "MS" indicates "moderate sheen"; "HS" indicates "Heavy Sheen" " $<$ " indicates "less than"; " $>$ " indicates "greater than"; "ft" indicates "feet" "ppm" indicates "parts per million"; "ND" indicates "not detected"

TABLE 2 (PAGE 1 OF 3)  
SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS  
FROM SOIL STOCKPILES (1)

Sample Number	Soil Stockpile Description	Method	Parameter	Concentration (ppm)	Detection Limit (ppm)
900105-8*	Soil from former gasoline tank excavation. This soil was used to backfill the former gasoline tanks excavation.	(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	ND	0.05
			Ethylbenzene	1.02	0.05
			Toluene	0.43	0.05
			Total xylenes	9.10	0.05
		(EPA Method 8015, modified) Fuel Hydrocarbons	Gasoline	356	10
			Diesel	ND	10
900110-16A	Soil from below abandoned UST in the new USTs excavation. This soil was transported to Cedar Hills Landfill for disposal.	(EPA Method 8015, modified) Fuel hydrocarbons	Gasoline	292	10
			Diesel	ND	10
		(EPA Method 418.1) Total Petroleum Hydrocarbons (TPH)	TPH	272	5
			Polychlorinated Biphenols (PCBs)	PCBs	ND
		(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	3.41	0.05
			Ethylbenzene	6.91	0.05
			Toluene	0.16	0.05
			Total Xylenes	24.7	0.05
		EP Toxicity (metals)	Arsenic	ND	0.1
			Barium	0.4	0.1
Cadmium	ND		0.1		
Chromium	ND		0.1		
Lead	ND		0.1		
Mercury	ND		0.05		
(EPA Method 8010) Purgeable Halocarbons	Selenium	ND	0.1		
	Silver	ND	0.1		
		(EPA Method 8010) Purgeable Halocarbons	Tetrachloro-ethylene	0.07	0.1
900112-30*	Soil from east fuel line/service island excavation. This soil was used to backfill the former gasoline tanks excavation.	(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	ND	0.05
			Ethylbenzene	ND	0.05
			Toluene	0.16	0.05
			Total xylenes	39.2	0.05
		(EPA Method 8015, modified) Fuel Hydrocarbons	Gasoline	434	10
			Diesel	ND	10

Notes:  
(1) Chemical analysis by Sound Analytical Service and Analytical Technologies. Laboratory reports are presented in Appendix B.  
\*\*\* indicates "composite samples"; "NA" indicates "not applicable"; "ppm" indicates parts per million; "ND" indicates "not tested"

TABLE 2 (PAGE 2 OF 3) (1)

Sample Number	Soil Stockpile Description	Method	Parameter	Concentration (ppm)	Detection Limit (ppm)	
900112-32*	Soil from west fuel line/service island excavation. This soil was used to backfill the former gasoline tanks excavation.	(EPA Method 8020)	Benzene	ND	0.05	
			Aromatic Volatile	Ethylbenzene	ND	0.05
			Hydrocarbons	Toluene	ND	0.05
				Total xylenes	0.11	0.05
		(EPA Method 8015, modified)	Gasoline	ND	10	
			Diesel	ND	10	
900112-27*	Soil from new gasoline tanks excavation. This soil was transported to Cedar Hills Landfill for disposal.	(EPA Method 8020)	Benzene	ND	0.05	
			Aromatic Volatile	Ethylbenzene	2.28	0.05
			Hydrocarbons	Toluene	ND	0.05
				Total xylenes	0.11	0.05
		(EPA Method 8015, modified)	Gasoline	266	10	
			Diesel	ND	10	
			Fuel Hydrocarbons			
		EP Toxicity (metals)	Arsenic	ND	0.1	
			Barium	0.3	0.1	
			Cadmium	ND	0.1	
			Chromium	ND	0.1	
			Lead	0.1	0.1	
			Mercury	ND	0.05	
Selenium	ND		0.1			
Flash Point	Flash Point	147 degrees F.	NA			
	PMCC	degrees F				
900112-28*	Soil from new gasoline tanks excavation. This soil was transported to Coal Creek Landfill for disposal.	(EPA Method 8020)	Benzene	ND	0.05	
			Aromatic Volatile	Ethylbenzene	ND	0.05
			Hydrocarbons	Toluene	ND	0.05
				Total xylenes	0.16	0.05

Notes:

(1) Chemical analysis by Sound Analytical Service and Analytical Technologies. Laboratory reports are presented in Appendix B.

\*\*\* indicates "composite samples"; "NA" indicates "not applicable"; "ppm" indicates parts per million"; "ND" indicates "not tested"

TABLE 2 (PAGE 3 OF 3) (1)

Sample Number	Soil Stockpile Description	Method	Parameter	Concentration (ppm)	Detection Limit (ppm)
900207-1	Soil cuttings obtained during the drilling of exploratory borings. This was transported to Cedar Hills Landfill for disposal.	(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	3.58	0.05
			Ethylbenzene	26.9	0.05
			Toluene	52.6	0.05
			Total xylenes	139	0.05
900207-2		(EPA Method 8015, modified) Fuel Hydrocarbons	Gasoline	1,904	10
			Diesel	ND	10
900214-1	Soil stockpiles from trenches for installation of the site's vapor extraction system. This soil was transported to Cedar Hills Landfill for disposal.	(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	ND	0.05
			Ethylbenzene	ND	0.05
			Toluene	ND	0.05
			Total xylenes	ND	0.05
		(EPA Method 8015, modified) Fuel Hydrocarbons	Gasoline	ND	10
			Diesel	ND	10
S-1	Seven 55-gallon barrels of oil cuttings obtained during drilling of the recovery well. This soil was transported to Pacific Topsoil in Bothell, WA.	(EPA Method 8020) Aromatic Volatile Hydrocarbons	Benzene	ND	0.025
			Ethylbenzene	ND	0.025
			Toluene	ND	0.025
			Total xylenes	ND	0.025
		(EPA Method 8015, modified) Fuel Hydrocarbons	Gasoline	ND	5
			Diesel	ND	5

Notes:

(1) Chemical analysis by Sound Analytical Service and Analytical Technologies. Laboratory reports are presented in Appendix B.

\*\*\* indicates "composite samples"; "NA" indicates "not applicable"; "ppm" indicates parts per million; "ND" indicates "not tested"

TABLE 3  
SUMMARY OF SOIL CHEMICAL ANALYTICAL RESULTS  
BORING SAMPLES (1)

Boring Number (2)	Date Sampled	Depth (ft)	BETX (ppm) (3)				Fuel Hydrocarbons (ppm) (4)	
			B	E	T	X	Gasoline	Diesel
MW-1	01/11/90	7	ND	0.10	ND	0.28	ND	ND
MW-1	01/11/90	13	ND	ND	ND	0.18	ND	ND
MW-2	01/11/90	8	ND	0.12	ND	0.14	ND	ND
MW-2	01/11/90	13	ND	0.14	ND	0.31	ND	ND
MW-3	01/12/90	13	ND	ND	ND	0.21	ND	ND
MW-3	01/12/90	18	27.1	88.1	327	614	5,568	ND
MW-4	01/31/90	15.5	1.58	9.71	31.1	52.6	3,267	ND
MW-4	01/31/90	20.5	ND	ND	ND	ND	ND	ND
MW-5	01/31/90	5.5	ND	ND	ND	ND	ND	ND
MW-5	01/31/90	10.5	ND	ND	ND	ND	ND	ND
MW-6	02/01/90	10.5	ND	ND	ND	ND	ND	ND
MW-6	02/01/90	15.5	ND	ND	ND	ND	ND	ND
MW-7	01/30/90	8	ND	ND	ND	ND	ND	ND
MW-7	01/30/90	13	0.17	0.17	0.25	0.93	ND	ND
MW-8	01/30/90	13	ND	ND	ND	0.18	ND	ND
MW-8	01/30/90	18	ND	ND	ND	ND	ND	ND
MW-9	01/30/90	8	ND	ND	ND	0.33	ND	ND
MW-9	01/30/90	13	ND	ND	ND	ND	ND	ND
MW-10	01/29/90	8	ND	ND	ND	ND	ND	ND
MW-10	01/29/90	13	ND	ND	ND	ND	ND	ND
MW-11	01/29/90	13	ND	ND	ND	ND	ND	ND
MW-11	01/29/90	18	ND	ND	0.14	0.34	ND	ND
MW-12	01/30/90	13	ND	ND	ND	0.18	ND	ND
MW-12	01/30/90	23	0.77	1.44	1.19	7.24	45	ND
MW-13	01/29/90	8	ND	ND	ND	ND	ND	ND
MW-13	01/29/90	13	ND	ND	0.12	0.35	ND	ND
MW-14	02/01/90	10	ND	ND	ND	ND	ND	ND
MW-14	02/01/90	15	ND	ND	ND	ND	ND	ND

Notes:

(1) Chemical analysis by Sound Analytical Services. Laboratory reports are presented in Appendix C.

(2) Sample locations are shown in Figure 3.

(3) B = benzene, E = ethylbenzene, T = toluene, X = xylenes. BETX by EPA Method 8020.

Detection limit is 0.05 ppm.

(4) Fuel hydrocarbons by EPA Method 8015, modified. Detection limit is 10 ppm.

"ft" indicates "feet"

"ppm" indicates "parts per million"

"ND" indicates "not detected"

TABLE 4  
SUMMARY OF PRODUCT SAMPLE RESULTS (1)

Sample Number (2)	Fuel Hydrocarbons (3) Gasoline	API Gravity	Flash Point PMCC degrees F
MW-4	850,136	52.5	<70

Notes:

- (1) Chemical Analysis by Sound Analytical Services.  
Laboratory results are presented in Appendix C.
- (2) Sample locations are shown in Figure 3.
- (3) Fuel hydrocarbons by EPA Method 8015, modified in ppm.

"<" indicates "less than"

**TABLE 5**  
**SUMMARY OF GROUND WATER AND HYDROCARBON VAPOR RESULTS**  
**MONITOR WELLS (1)**

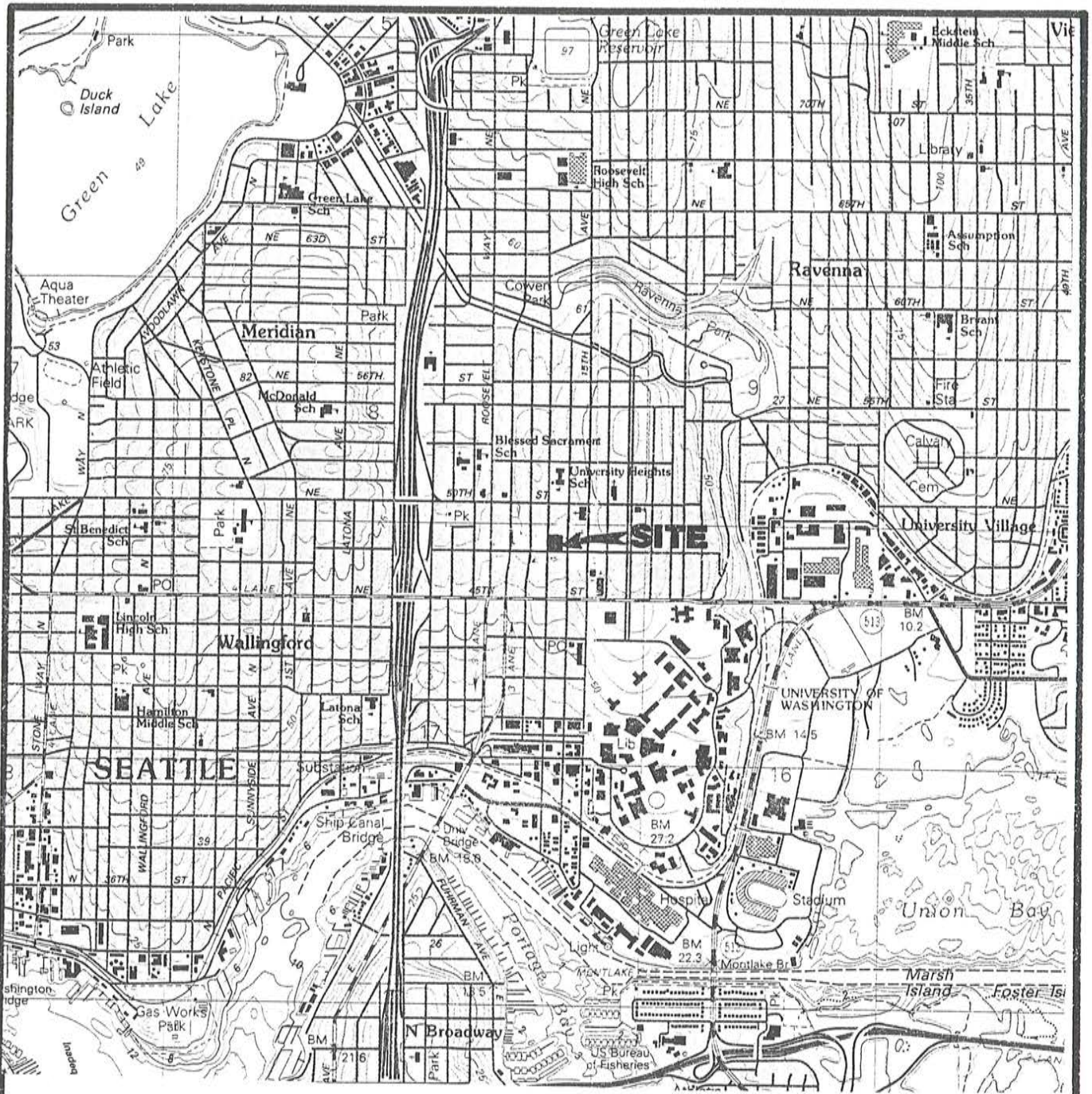
Sample Number(2)	Date Sampled	BETX (ppm)(3)				Fuel Hydrocarbons (ppm)(4)		Dissolved Lead(5)	Hydrocarbon Vapor Concentrations(6) in Well Casings ppm	
		B	E	T	X	Gasoline	Diesel		02/28/90	04/14/90
MW-1	01/22/90	0.088	<0.001	0.043	0.409	ND	ND	ND	NM	NM
MW-2	01/22/90	1.10	0.161	1.09	1.120	25	ND	ND	1,600	1,000
MW-3	01/22/90	1.38	2.06	14.1	12.8	85	ND	ND	4,300	3,700
MW-5	02/19/90	ND	ND	0.005	0.022	ND	ND	NT	2,900	150
MW-6	02/19/90	ND	0.259	0.074	2.43	38.2	ND	NT	1,400	1,100
MW-7	02/19/90	3.28	1.21	8.17	8.01	526	ND	NT	7,000	5,000
MW-9	02/19/90	0.181	0.494	0.489	4.29	99.6	ND	NT	460	240
MW-10	02/19/90	0.431	0.505	0.136	1.99	89.4	ND	NT	2,900	310
MW-11	02/19/90	0.342	2.15	5.43	9.02	244	ND	NT	5,800	3,800
MW-12	02/19/90	29.1	5.56	49.7	28.9	2038	ND	NT	>10,000	>10,000
MW-13	02/20/90	ND	0.078	0.045	0.176	ND	ND	NT	5,900	3,900
MW-14	02/19/90	ND	ND	ND	ND	ND	ND	NT	3,100	2,500

**Notes:**

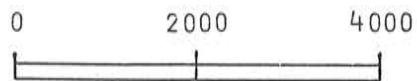
- (1) Chemical analysis by Sound Analytical Services. Laboratory reports are presented in Appendix C.
- (2) Sample locations shown in Figure 3.
- (3) B = benzene, E = ethylbenzene, T = toluene, X = xylene. Detection limit is 0.001 ppm.
- (4) Fuel hydrocarbons by EPA Method 8015, modified. Detection limit is 10 ppm.
- (5) Dissolved lead by EPA Method 6010. Detection limit is 0.1 ppm.
- (6) Vapor measurements were obtained by using a Bacharach TLV Sniffer calibrated to hexane. "ppm" indicates "parts per million"; "ND" indicates "not detected"; "<" indicates "less than"; ">" indicates "greater than"; "NM" indicates "not measured"; "NT" indicates "not tested"



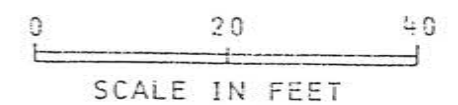
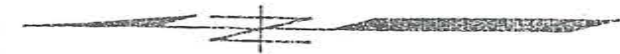
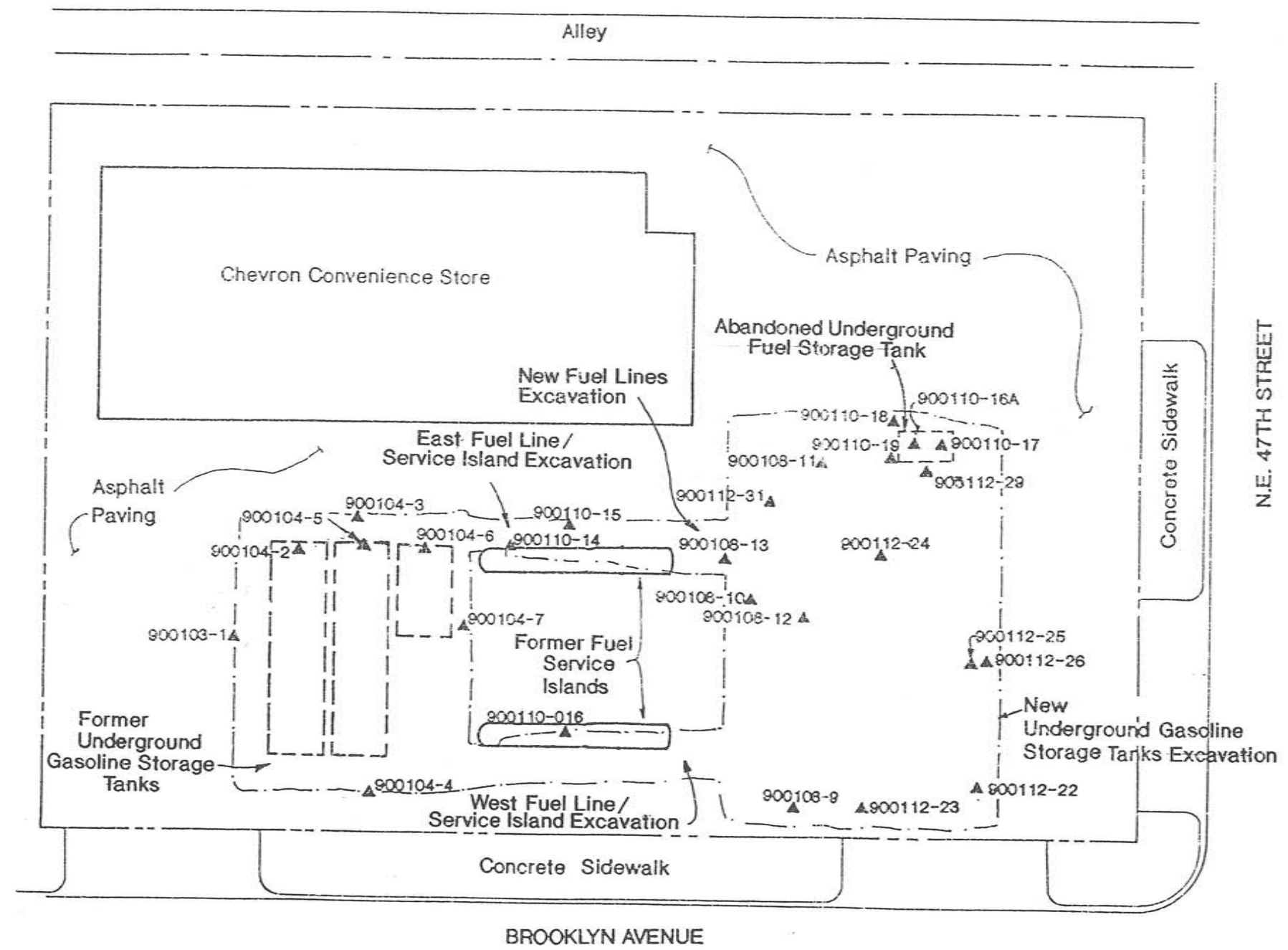
0372-068-004 CLH:KT 5-15-90



REFERENCE: USGS 7.5'X15' TOPOGRAPHIC-BATHYMETRIC QUADRANGLE MAP "SEATTLE NORTH, WASHINGTON".



SCALE IN FEET



N.E. 47TH STREET

EXPLANATION:

- 900103-1 ▲ SOIL SAMPLE LOCATION AND NUMBER.
- LIMITS OF EXCAVATION.

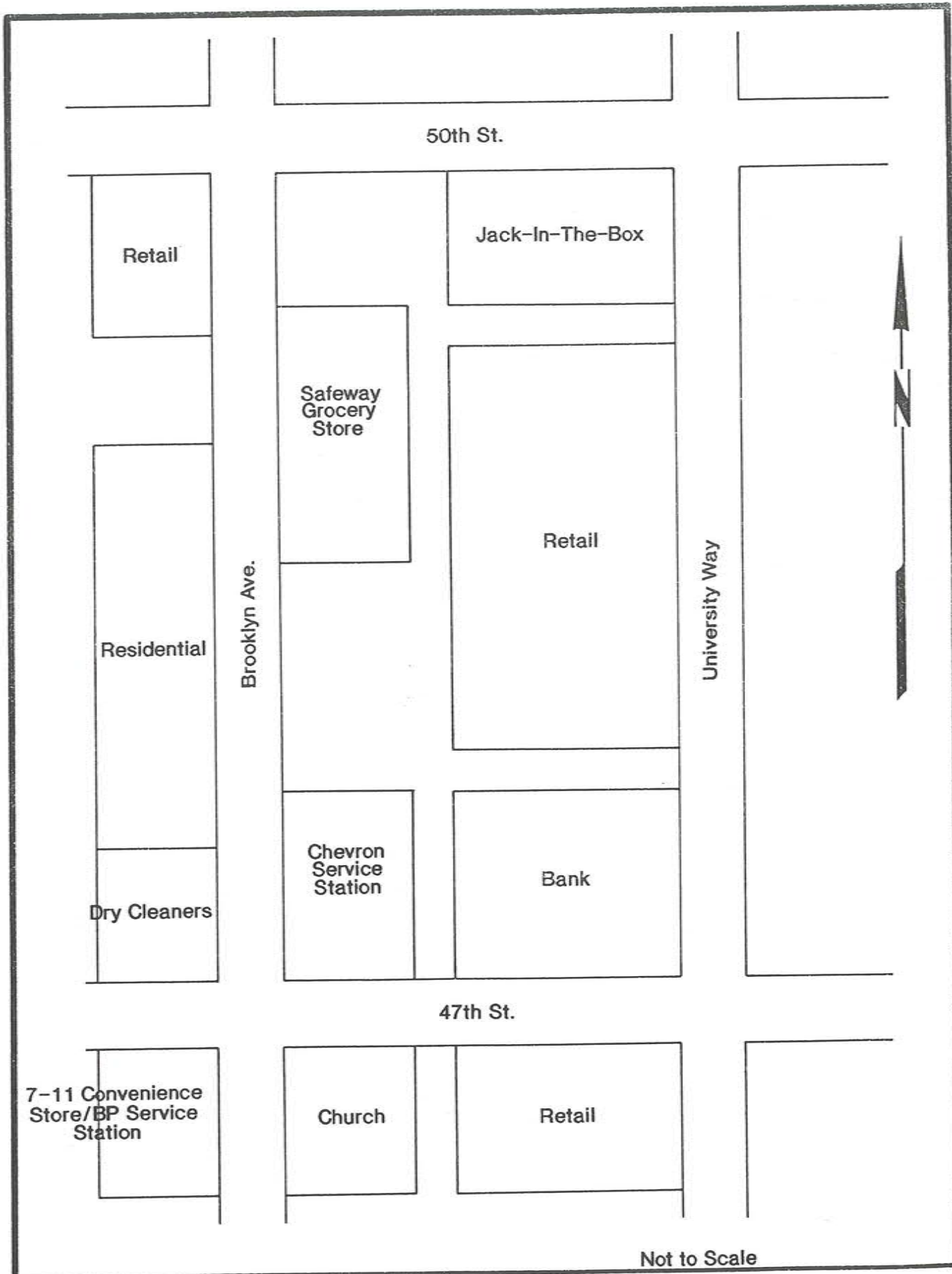
REFERENCE: DRAWING ENTITLED "SITE PLAN, 4700 BROOKLYN AVE., SEATTLE, WA.", BY ROBERT H. LEE & ASSOCIATES FOR CHEVRON U.S.A., INC., DATED 5/25.89.



SITE PLAN

FIGURE 2

0372-068-BO4 REJ:BDH 11.6.90



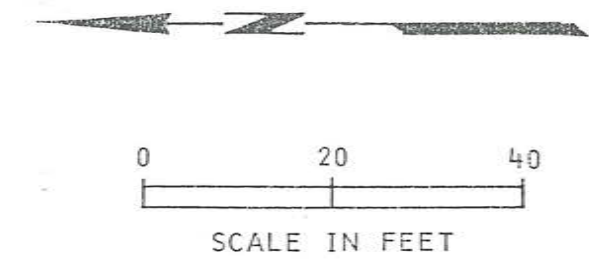
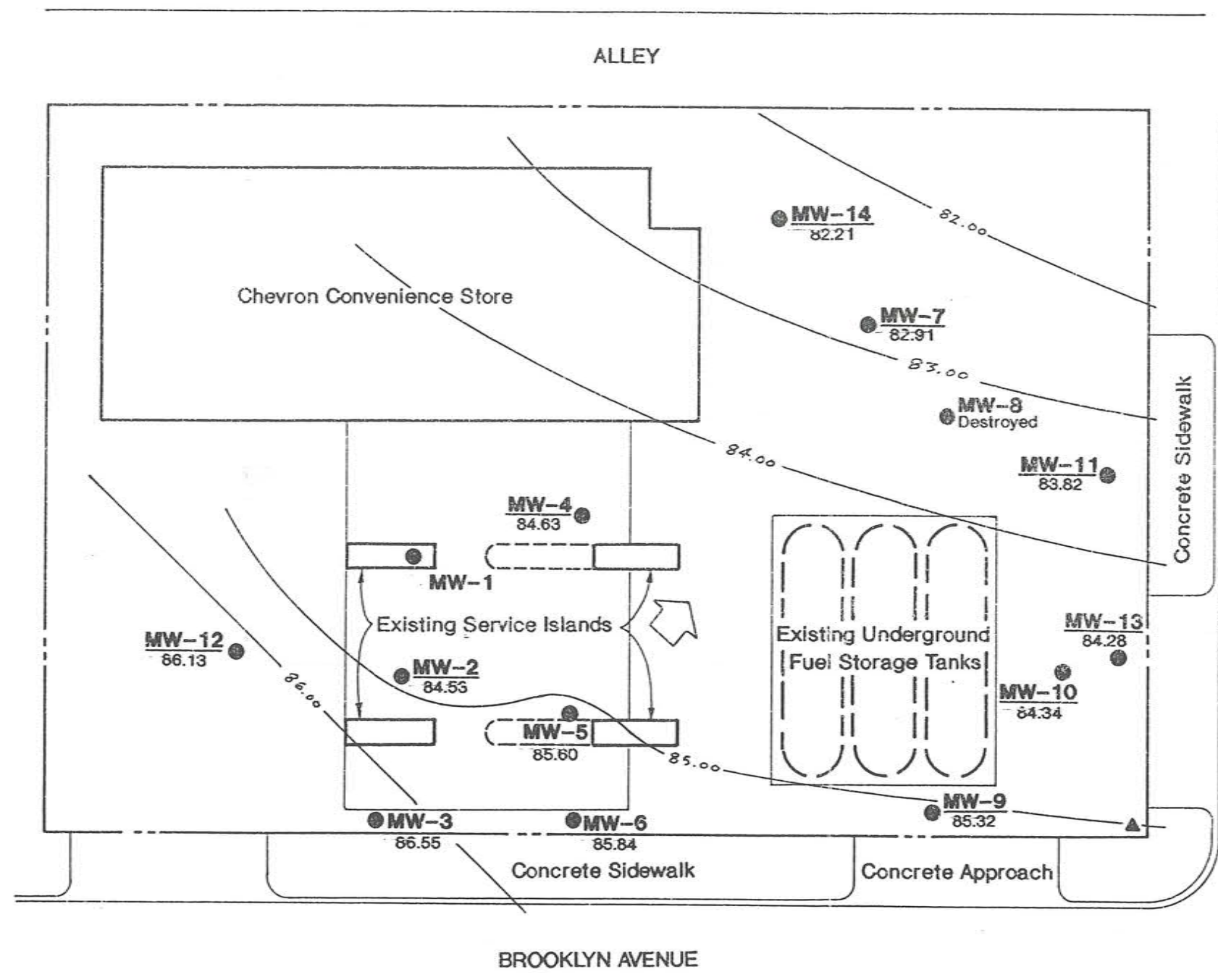
Not to Scale



SURROUNDING PROPERTY

FIGURE 3

0372.068.B04 CLH:KKT 3-9-90



- EXPLANATION:
- **MW-2** 84.53 MONITOR WELL LOCATION AND NUMBER  
GROUND WATER ELEVATION ON 2/28/90
  - ▲ ASSUMED DATUM ELEVATION  
OF 100.00 FEET
  - ⤴ GROUND WATER FLOW DIRECTION  
ON 2/28/90

N.E. 47TH STREET

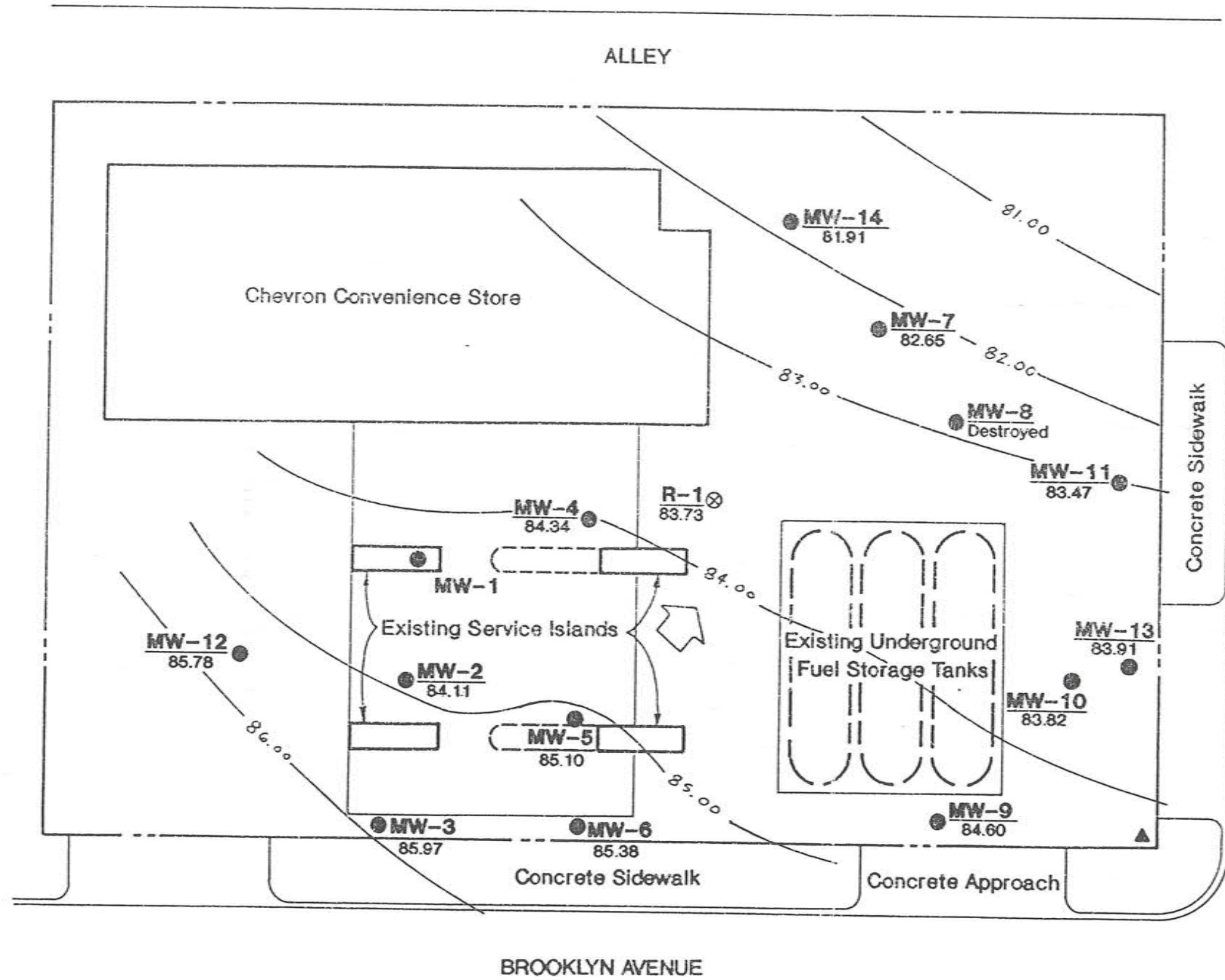
REFERENCE: DRAWING ENTITLED "SITE PLAN, 4700 BROOKLYN AVE., SEATTLE, WA.",  
BY ROBERT H. LEE & ASSOCIATES FOR CHEVRON U.S.A., INC., DATED  
5/25/89.



GROUND WATER CONTOUR MAP ON 2/28/90

FIGURE 4

0372-068-B04 CLH:KKT 3-9-90



N.E. 47TH STREET

- EXPLANATION:
- MW-2  
84.11 MONITOR WELL LOCATION AND NUMBER  
GROUND WATER ELEVATION ON 5/8/90
  - ⊗ R-1  
83.73 RECOVERY WELL LOCATION AND NUMBER  
GROUND WATER ELEVATION ON 5/8/90
  - ▲ ASSUMED DATUM ELEVATION OF 100.00  
FEET
  - ↷ GROUND WATER FLOW DIRECTION ON  
5/8/90

REFERENCE: DRAWING ENTITLED "SITE PLAN, 4700 BROOKLYN AVE., SEATTLE, WA.",  
BY ROBERT H. LEE & ASSOCIATES FOR CHEVRON U.S.A., INC., DATED  
5/25/89.



GROUND WATER CONTOUR MAP ON 5/8/90

FIGURE 5

APPENDIX A

## A P P E N D I X A

### FIELD EXPLORATIONS

#### DRILLING AND SOIL SAMPLING PROGRAM

Subsurface conditions at the site were explored by drilling 14 monitor well borings and one recovery well boring between January 11 and April 13, 1990, at the locations indicated in Figures 3 and 4. The borings were drilled to depths ranging between 23 and 34 feet using truck-mounted, hollow-stem auger equipment and top-drive air rotary equipment owned and operated by GeoBoring and Development, Inc., Pacific Testing Laboratories and Soil Sampling Service, Inc. The drilling and soil sampling equipment was cleaned with a hot-water pressure washer between each boring. The soil sampling equipment was cleaned in a trisodium phosphate (TSP) wash with distilled water rinse between each sampling attempt.

A hydrogeologist and/or a geotechnical engineer from our staff determined the boring locations (based on general predetermined boring locations established jointly by Chevron and GeoEngineers), 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-2488-83, which is described in Figure A-1. An explanation of the boring log symbols is presented in Figure A-2. The boring logs are given in Figures A-3 through A-17.

Soil samples were obtained from the exploratory borings using a split-barrel sampler (1.4-inch ID). The sampler was driven 18 inches by a 140-pound weight falling a vertical distance of approximately 30 inches. The number of blows needed to advance the sampler the final 12 inches is indicated to the left of the corresponding sample notations on the boring logs.

One or more soil samples from each boring, with the exception of the recovery well, were selected for chemical analysis based on field screening results and sample depth relative to the ground water table. Samples from the borings that were chemically tested are denoted in our boring logs with a "CA." Chain-of-custody procedures were followed in transporting the soil samples to the analytical laboratory.

FIELD SCREENING OF SOIL SAMPLES

A GeoEngineers representative conducted field screening on soil samples obtained from the site excavations and from exploratory borings. Field screening results are used as a general guideline to delineate areas of potential residual hydrocarbons in soils. In addition, screening results are often used as a basis for selecting soil samples for chemical analysis. The field screening methods employed included: (1) visual examination, (2) sheen testing, and (3) headspace vapor testing using a Bacharach TLV Sniffer calibrated to hexane. The results of headspace and sheen testing for the borings are included on the boring logs. The results of headspace and sheen testing for the excavation soil samples are presented in Table 1.

Visual screening consists of inspecting the soil for the presence of stains indicative of residual petroleum hydrocarbons. Visual screening is generally more effective in detecting the presence of heavier petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Sheen testing and measuring headspace vapors are more sensitive screening methods which have been effective in detecting hydrocarbons at concentrations less than regulatory cleanup guidelines.

Sheen testing involves immersion of the soil sample in water and observing the water surface for signs of a sheen. Because of its sensitivity, the sheen method was first tested on soils obtained from a portion of the site believed to be clean and unaffected by residual hydrocarbons. The results of the sheen tests on these soils were established as the background level of sheen for the site. Sheen classifications follow:

No Sheen (NS)	No visible sheen.
Slight Sheen (SS)	Light colorless sheen, spread is irregular, not rapid; film dissipates rapidly. (Note: Background test results were classified SS.)
Moderate Sheen (MS)	Light to heavy film, may have some color or iridescence, globular to stringy; spread is irregular to flowing.



Heavy Sheen (HS)

Heavy colorful film with iridescence; stringy, spread is rapid; sheen flows off the sample; most of water surface is covered with sheen.

Headspace vapor testing involves placing a soil sample in a plastic sample bag. The sample bag is sealed and shaken slightly to expose the soil to the air trapped in the bag. The probe of a Bacharach TLV Sniffer is inserted into the bag and the TLV Sniffer withdraws air from the bag. The instrument measures the concentration of combustible vapors present within the sample bag headspace. The TLV Sniffer records concentrations in parts per million (ppm) and is calibrated to hexane. There is no direct relationship between hydrocarbon vapor concentrations measured with the Bacharach TLV Sniffer and concentrations which could be measured through chemical analysis of a soil sample. The lower threshold of significance for the TLV Sniffer in this application is 100 ppm. Background vapor levels were less than 100 ppm at this site.

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

#### MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC pipe was installed in each monitor well boring at the completion of drilling. The lower portion of the PVC pipe is machine-slotted (0.02-inch slot width) to allow entry of water, floating hydrocarbons and hydrocarbon vapors into the well casings. Eight-inch-diameter, Schedule 40 PVC pipe was installed in the recovery well boring at the completion of drilling. The lower portion of the PVC pipe is machine-slotted (0.01-inch slot width) to allow entry of water, floating hydrocarbons and hydrocarbon vapors into the well casing. Medium sand was placed in the borehole annulus surrounding the slotted portion of the wells. Well casings are protected within flush-grade surface monuments. Monitor well construction is indicated in Figures A-3 through A-17.

Each monitor well was developed by removing approximately five well volumes of water from the well with a stainless steel bailer.

We determined the elevations of the well casing to the nearest 0.01 foot with an engineers level on February 20, 1990. We used a steel plate at the southwest corner of the site as our datum. The location of the steel plate is shown in Figures 3 and 4. We assumed an elevation of 100.00 feet. 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 MW-1 through MW-3 by GeoEngineers on January 23, 1990 and from MW-5 through MW-7 and MW-9 through MW-12 on February 20, 1990. A ground water sample was obtained from MW-13 on February 21, 1990. The water samples were collected with a teflon bailer after at least three well volumes of water were removed from each well casing. The water samples were transferred to septum vials in the field and kept cool during transport to the testing laboratory. Chain-of-custody procedures were followed during transport of the soil samples to the laboratory.

The bailer was cleaned prior to each sampling attempt with a fresh water rinse, a TSP wash and a second fresh water rinse which was followed by a distilled water rinse.

#### GROUND WATER ELEVATIONS

The depth of the ground water table relative to the monitor well casing rims was measured on February 28 and May 8, 1990. The site measurements were made using a weighted fiberglass tape and water-sensitive paste. Water table elevations were calculated by subtracting the water depth from the casing rim elevations. Water table positions as measured on February 28, 1990 are shown on the monitor well logs.

#### HYDROCARBON VAPOR CONCENTRATIONS

Hydrocarbon vapor concentrations were measured in each monitor well on February 23 and April 14, 1990. Vapor concentrations in parts per million (ppm) were measured with our Bacharach TLV Sniffer which is calibrated to hexane. These vapor concentrations are shown in Table 5. The lower threshold of significance for the TLV Sniffer in this application is 400 ppm, or 4 percent of the Lower Explosive Limit (LEL) of hexane.

CHEMICAL ANALYTICAL PROGRAM

Sixty-three soil samples from the exploratory borings, excavations and soil stockpiles and 12 ground water samples from the monitor wells were analyzed by Sound Analytical Services, Inc. One soil sample was analyzed by Analytical Technologies, Inc. Additionally, a sample of the liquid product beneath the site was chemically analyzed. The soil, ground water and product samples were submitted for one or more of the following chemical analyses: (1) benzene, ethylbenzene, toluene and xylenes (BETX) by gas chromatography/photoionization detection in accordance with EPA Method 8020, (2) fuel hydrocarbons (fuel "fingerprint") using gas chromatography/flame ionization detection techniques in accordance with EPA Method 8015 (modified), (3) total petroleum hydrocarbons (TPH) by freon extraction infrared spectroscopy in accordance with EPA Method 418.1, (4) halogenated volatile organics by gas chromatography/electrolytic conductivity in accordance with EPA Method 8010, (5) PCBs by gas chromatography/electron capture in accordance with EPA Method 8080, (6) EP-toxicity (metals) in accordance with "Test Methods for Evaluating Solid Waste" EPA SW-846, 3rd Edition, and (7) dissolved lead. The analytical data are summarized in Tables 1 through 5. The laboratory data sheets and chain-of-custody forms are included in Appendices B and C.

**SOIL CLASSIFICATION SYSTEM**

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
<b>COARSE GRAINED SOILS</b>  MORE THAN 50% RETAINED ON NO. 200 SIEVE	<b>GRAVEL</b>  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	<b>CLEAN GRAVEL</b>	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		<b>GRAVEL WITH FINES</b>	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	<b>SAND</b>  MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	<b>CLEAN SAND</b>	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		<b>SAND WITH FINES</b>	SM	SILTY SAND
			SC	CLAYEY SAND
<b>FINE GRAINED SOILS</b>  MORE THAN 50% PASSES NO. 200 SIEVE	<b>SILT AND CLAY</b>  LIQUID LIMIT LESS THAN 50	<b>INORGANIC</b>	ML	SILT
			CL	CLAY
		<b>ORGANIC</b>	OL	ORGANIC SILT, ORGANIC CLAY
			<b>SILT AND CLAY</b>  LIQUID LIMIT 50 OR MORE	<b>INORGANIC</b>
	CH	CLAY OF HIGH PLASTICITY, FAT CLAY		
	<b>ORGANIC</b>	OH		ORGANIC CLAY, ORGANIC SILT
		<b>HIGHLY ORGANIC SOILS</b>		PT

**NOTES:**

- Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
- Soil classification using laboratory tests is based on ASTM D2487-83.
- 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

**LABORATORY TESTS:**

CA Chemical Analysis

**VAPOR CONCENTRATION DATA:**

Vapor concentration given in parts per million

**SHEEN CLASSIFICATION SYSTEM:**

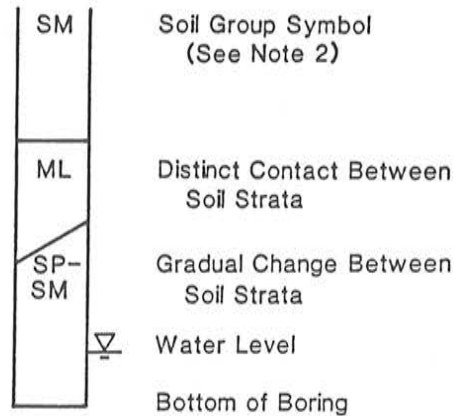
NS No visible sheen

SS Slight sheen

MS Moderate sheen

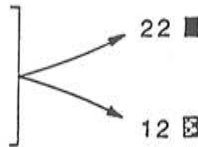
HS Heavy sheen

**SOIL GRAPH:**



**BLOW-COUNT/SAMPLE DATA:**

Blows required to drive a split-barrel sampler (2.4-inch I.D.) 12 inches or other indicated distances using 300 pound hammer falling 30 inches.



Location of relatively undisturbed sample

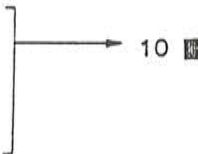
Location of disturbed sample

\*P\* indicates sampler pushed with weight of hammer or hydraulics of drill rig.



Location of sampling attempt with no recovery

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



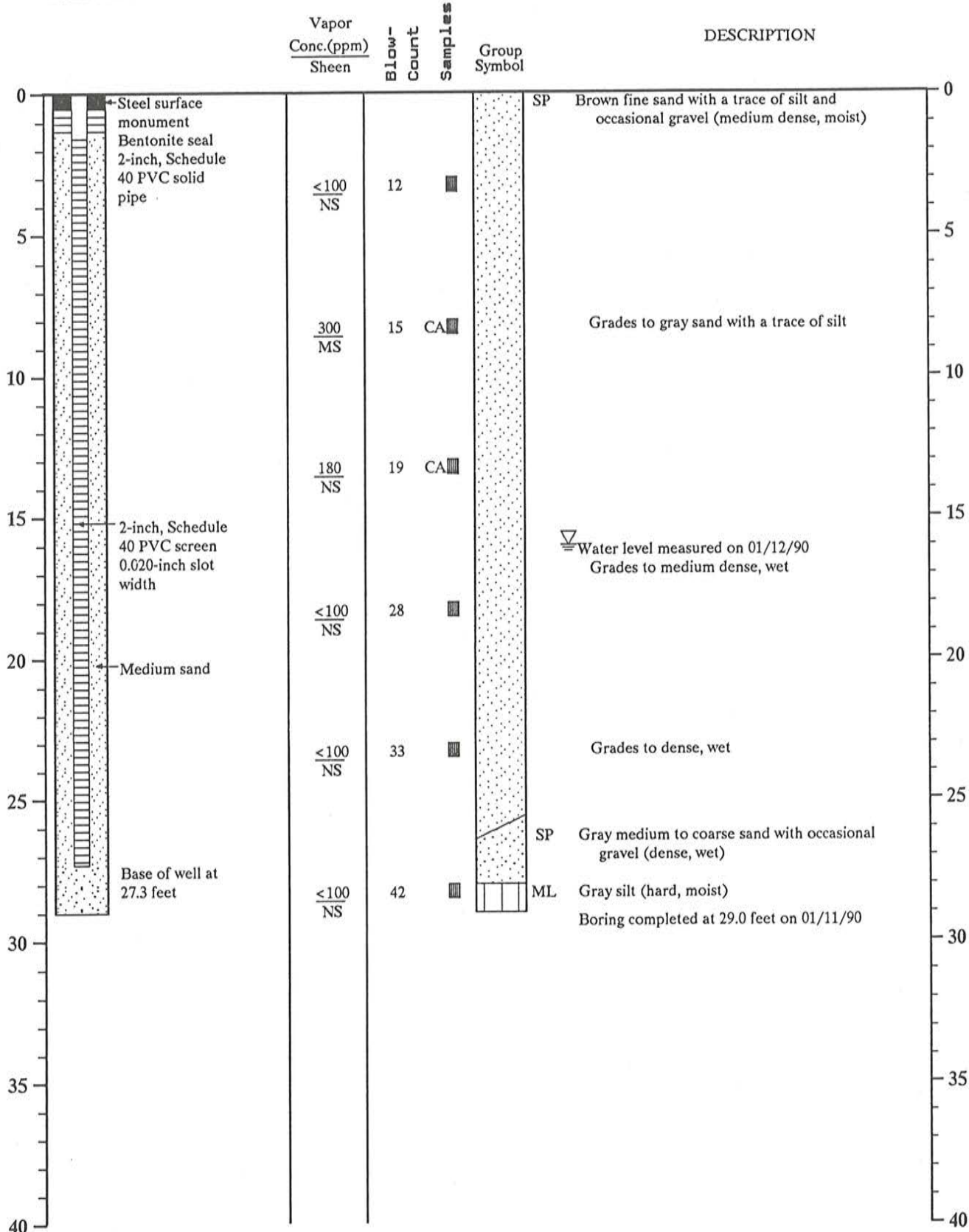
Location of sample attempt using Standard Penetration Test procedures

**NOTES:**

1. Information presented in the attached text and the Key To Boring Log Symbols is required to adequately explain the data on the boring logs.
2. Soil classification system is summarized in Figure A-1.
3. The reader must refer to the discussion in the report test as well as the exploration logs for a proper understanding of subsurface conditions.

# MONITOR WELL NO. MW-1

WELL SCHEMATIC



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/13/90

0372-068-B04



Log of Monitor Well

Figure A-3

# MONITOR WELL NO. MW-2

**WELL SCHEMATIC**

Casing Elevation: 100.25  
 Casing Stickup: -0.77

Vapor  
 Conc.(ppm)  
 Sheen

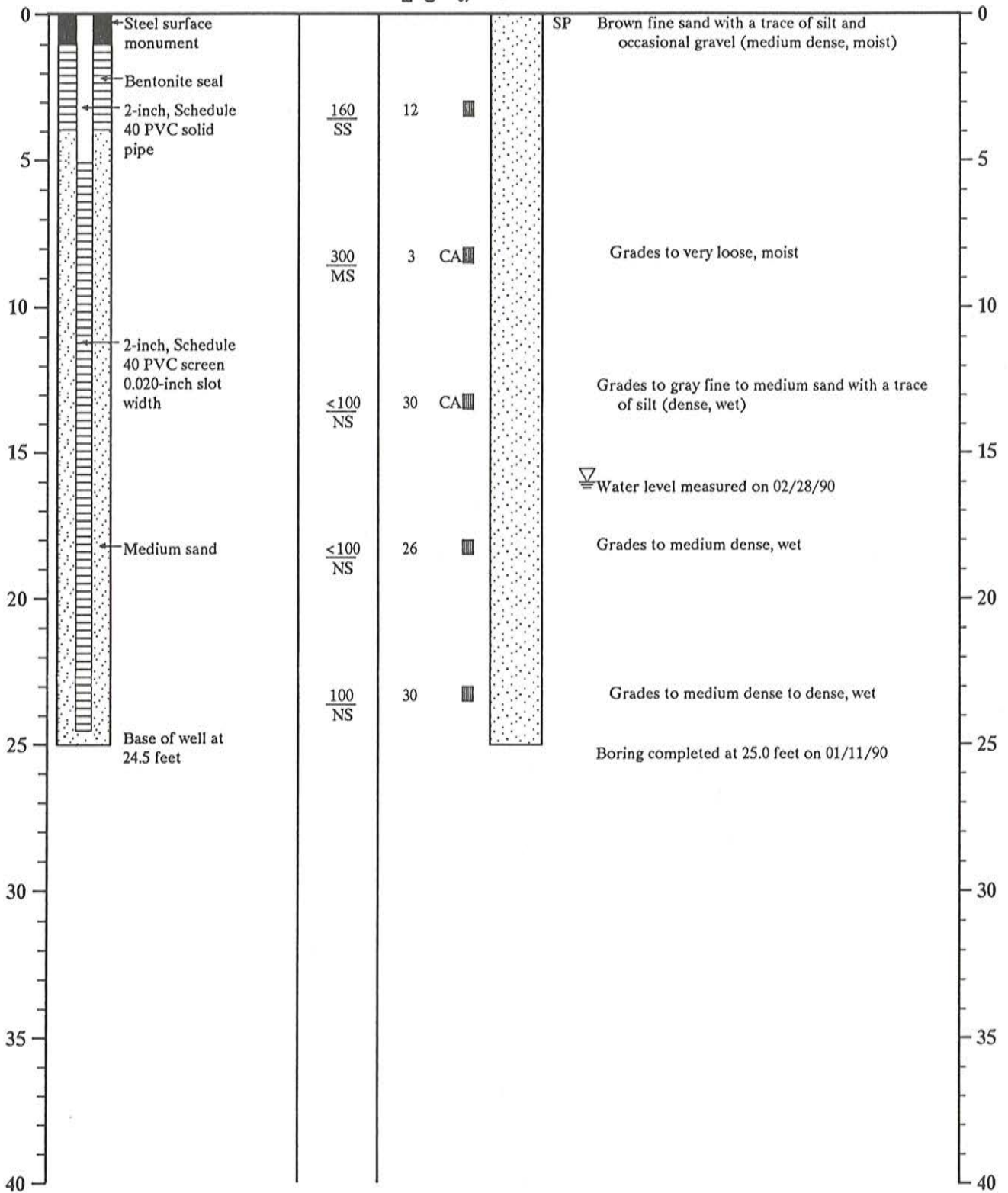
Blow-  
 Count

Samples

Group  
 Symbol

**DESCRIPTION**

Surface Elevation: 101.02



Note: See Figure A-2 for explanation of symbols



**Log of Monitor Well**

**Figure A-4**

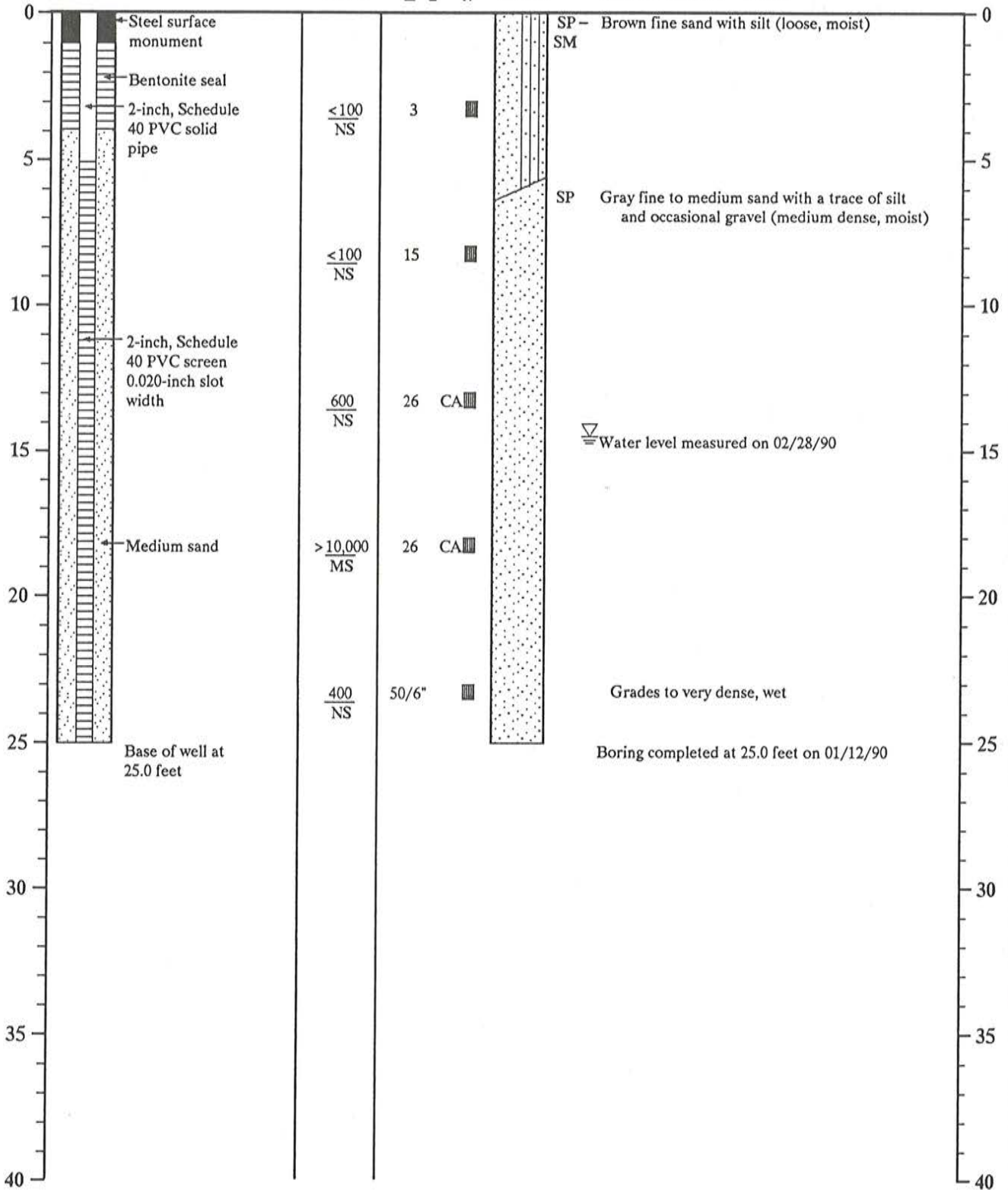
: LRM: CLH: IRA 6/13/90

0372-068-B04

# MONITOR WELL NO. MW-3

## WELL SCHEMATIC

Casing Elevation: 101.05  
 Casing Stickup: -0.39



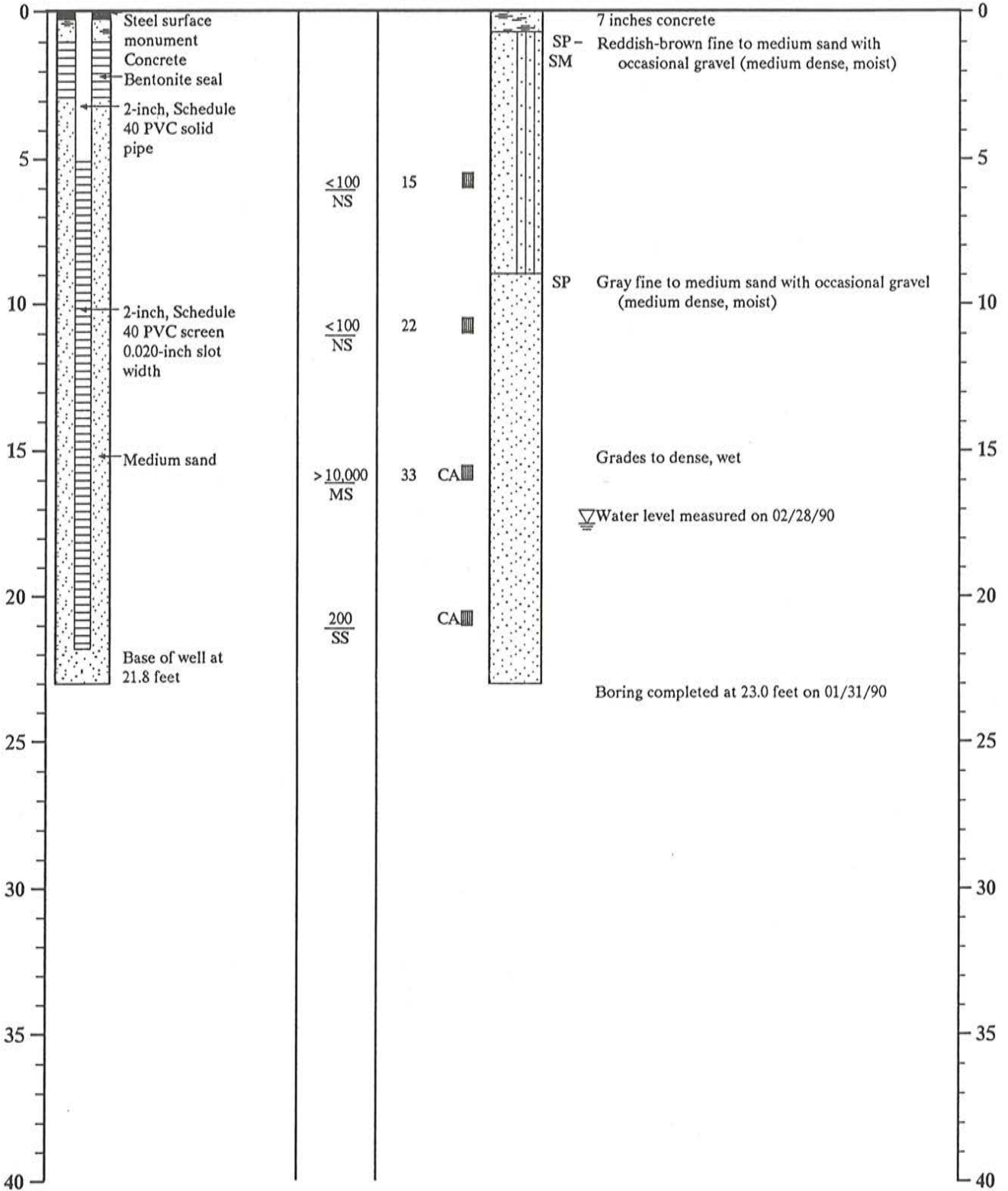
Note: See Figure A-2 for explanation of symbols



# MONITOR WELL NO. MW-4

## WELL SCHEMATIC

Casing Elevation: 100.30  
 Casing Stickup: -0.30



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/13/90

0372-068-B04



Log of Monitor Well

Figure A-6

# MONITOR WELL NO. MW-5

**WELL SCHEMATIC**

Casing Elevation: 100.75  
 Casing Stickup: -0.25

Vapor  
 Conc.(ppm)  
 Sheen

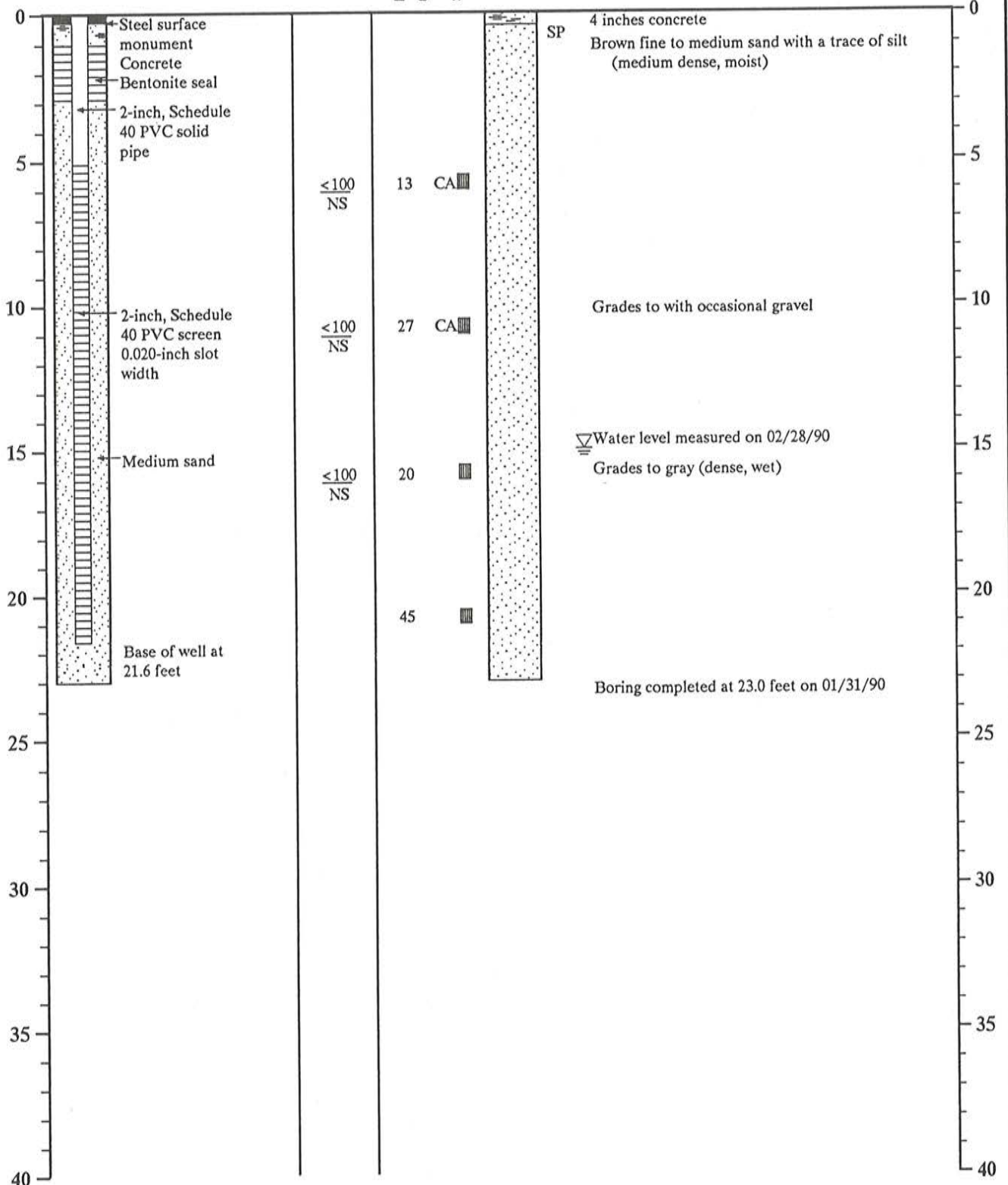
Blow-  
 Count

Samples

Group  
 Symbol

DESCRIPTION

Surface Elevation: 101.00



Note: See Figure A-2 for explanation of symbols

# MONITOR WELL NO. MW-6

## WELL SCHEMATIC

Casing Elevation: 100.83  
Casing Stickup: -0.28

Vapor  
Conc.(ppm)  
Sheen

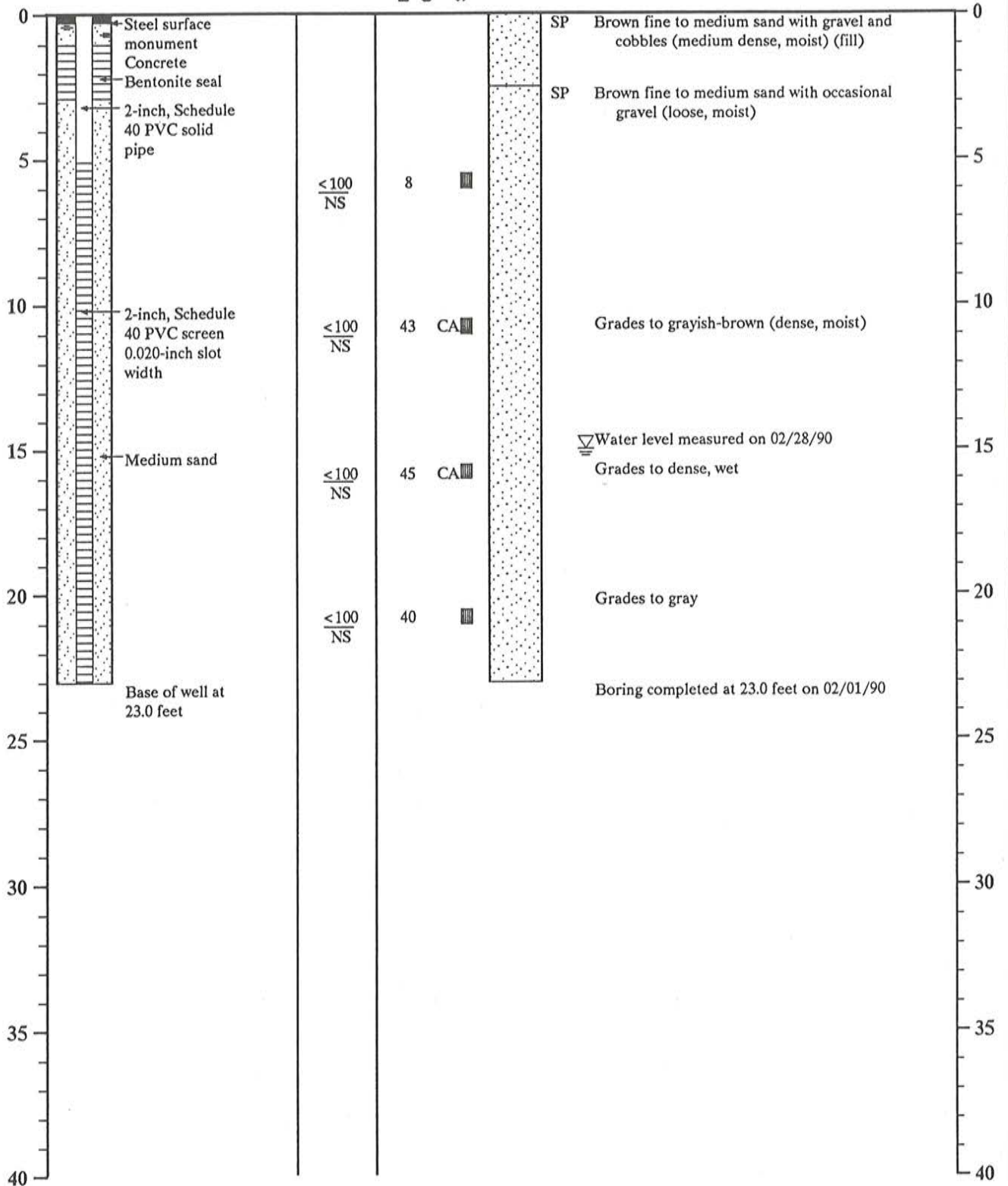
Blow-  
Count

Samples

Group  
Symbol

## DESCRIPTION

Surface Elevation: 101.11



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/15/90

0372-066-B04

# MONITOR WELL NO. MW-7

## WELL SCHEMATIC

Casing Elevation: 99.07  
Casing Stickup: -0.83

Vapor  
Conc.(ppm)  
Sheen

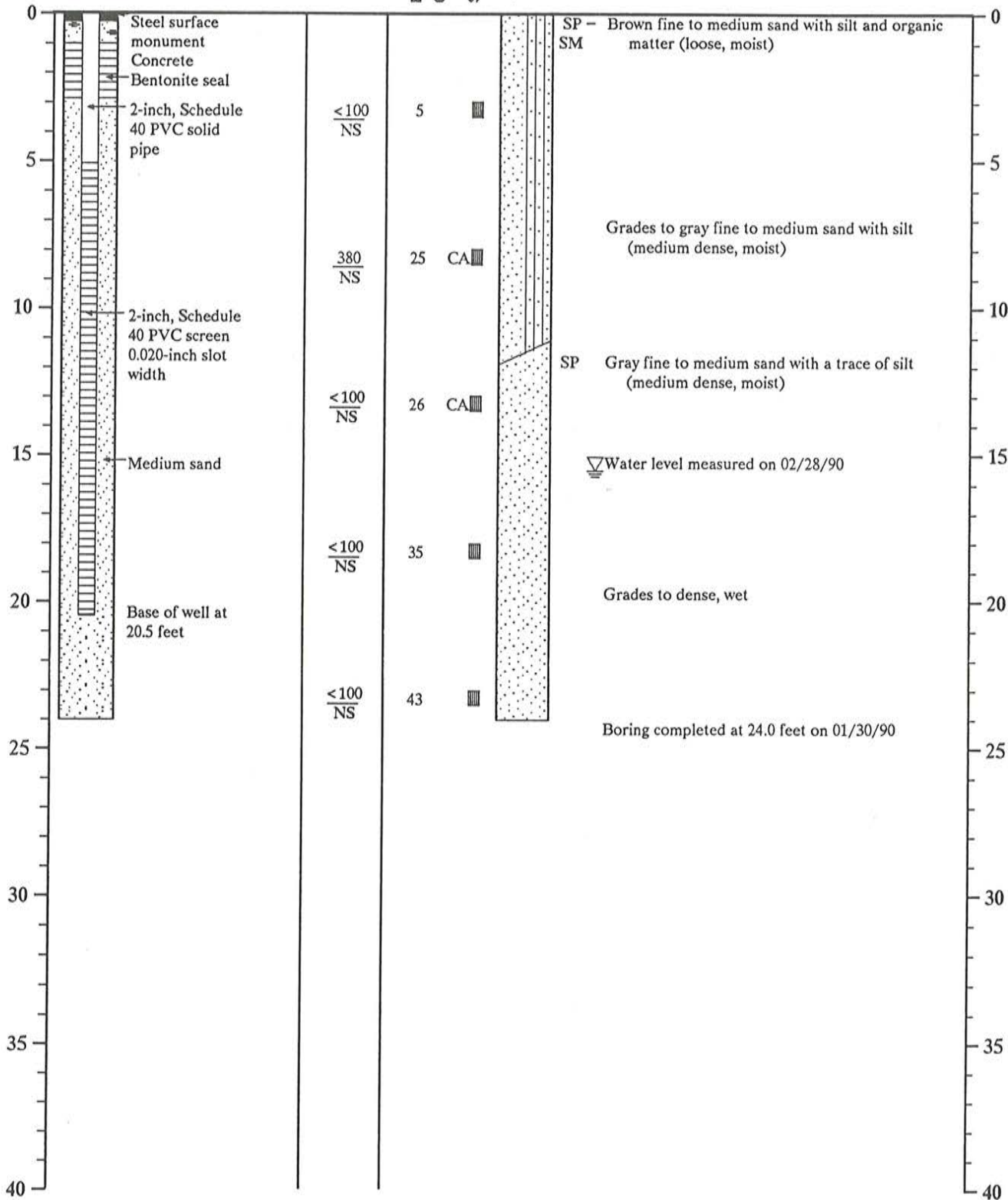
Blow-  
Count

Samples

Group  
Symbol

## DESCRIPTION

Surface Elevation: 99.90



Note: See Figure A-2 for explanation of symbols

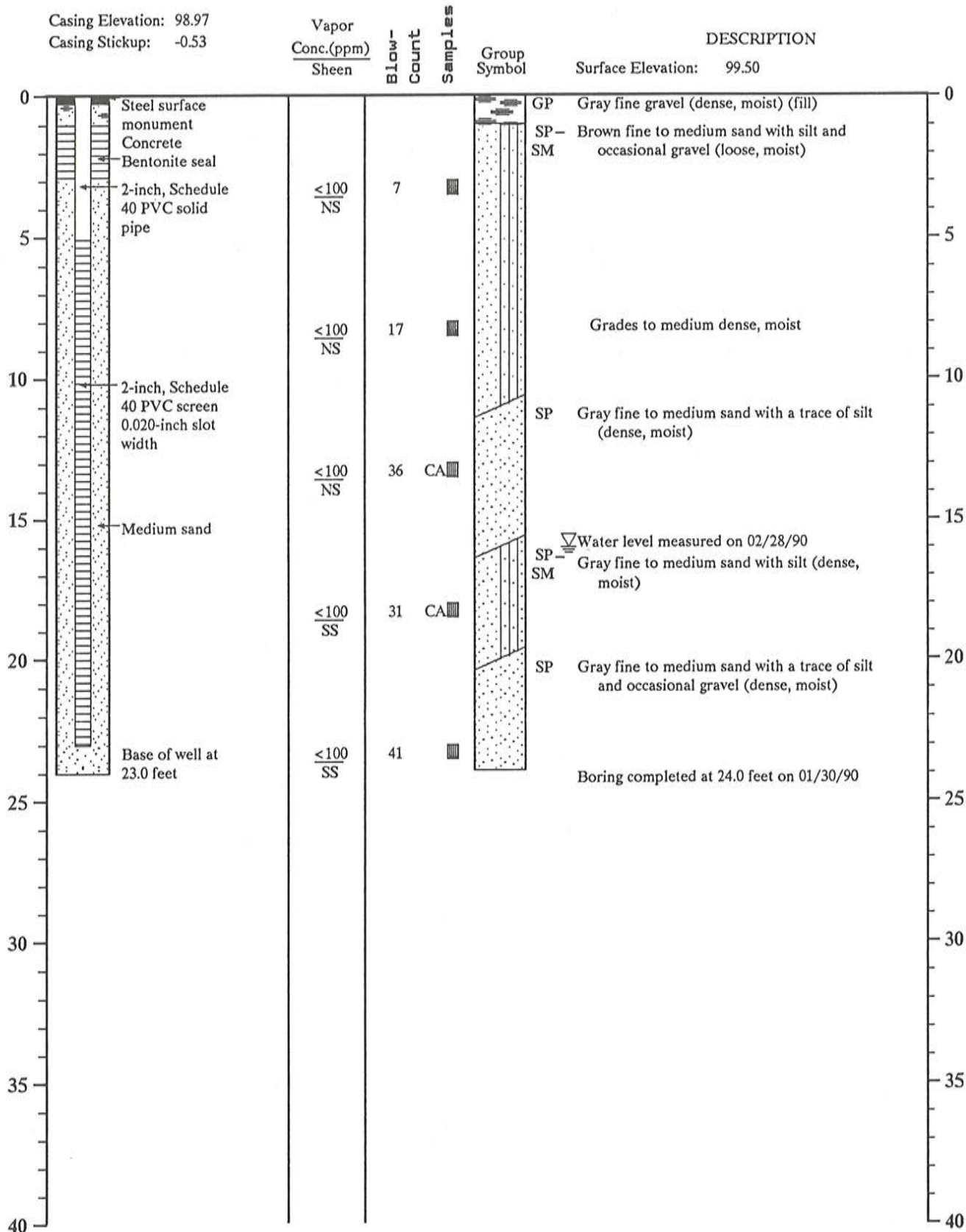
: LRM: CLH: IRA 6/13/90

0372-068-B04

# MONITOR WELL NO. MW-8

## WELL SCHEMATIC

Casing Elevation: 98.97  
 Casing Stickup: -0.53



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/13/90

0372-068-B04



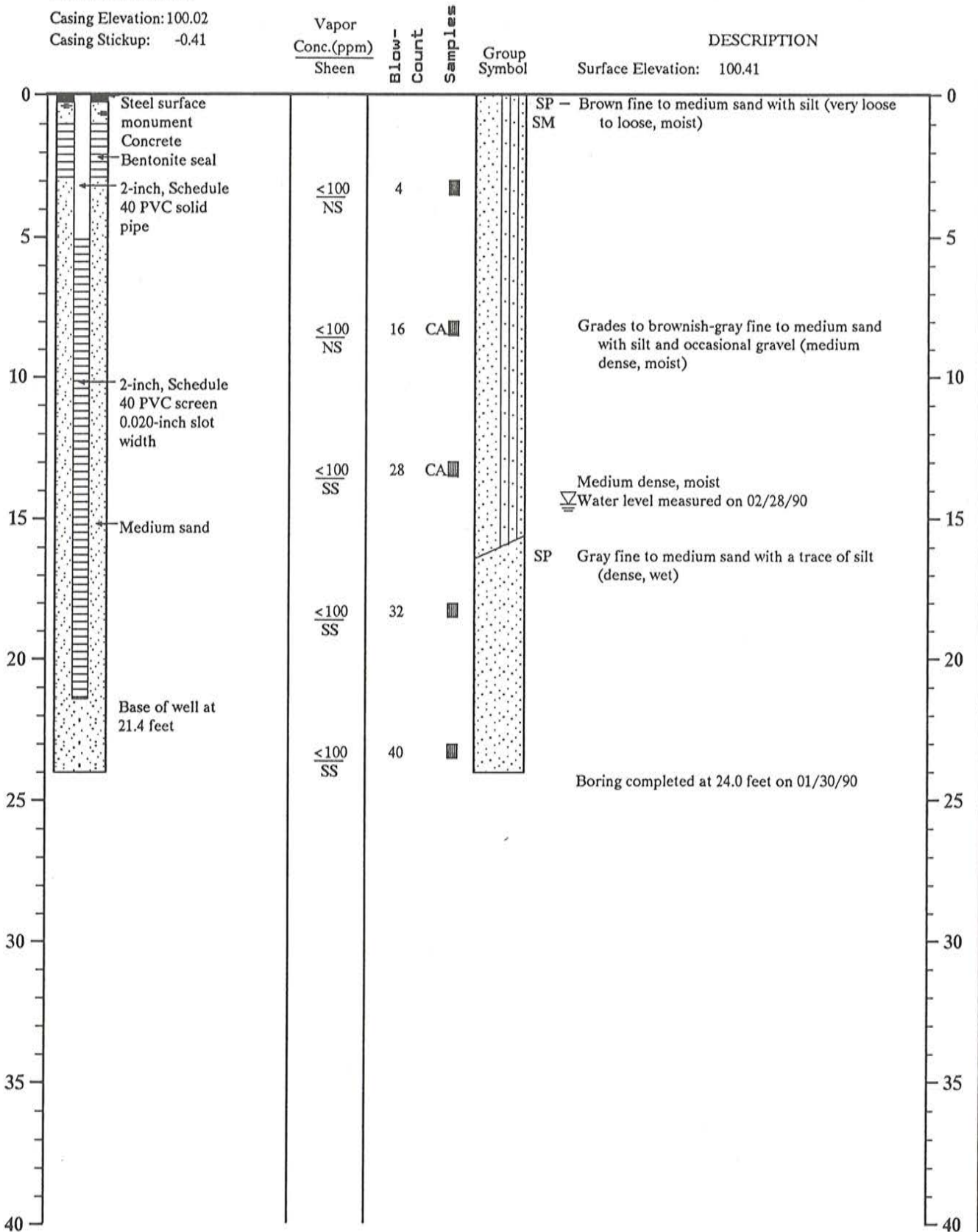
Log of Monitor Well

Figure A-10

# MONITOR WELL NO. MW-9

## WELL SCHEMATIC

Casing Elevation: 100.02  
 Casing Stickup: -0.41



Note: See Figure A-2 for explanation of symbols

:LRM:CLH:IRA 6/13/90

0372-068-B04

# MONITOR WELL NO. MW-10

**WELL SCHEMATIC**

Casing Elevation: 99.18  
 Casing Stickup: -0.19

Vapor  
 Conc.(ppm)  
 Sheen

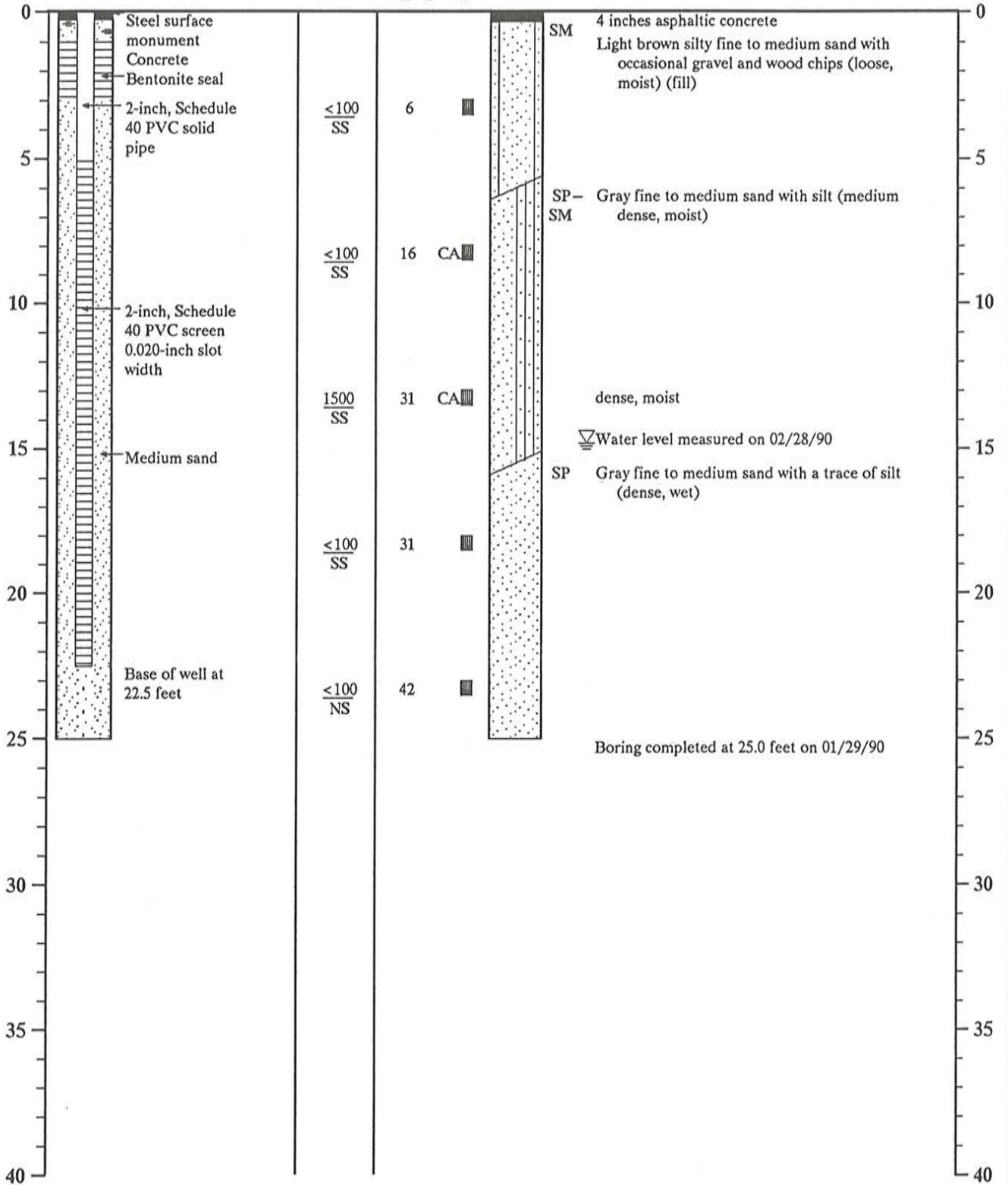
Blow-  
 Count

Samples

Group  
 Symbol

DESCRIPTION

Surface Elevation: 99.37



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/15/90

0372-068-B04

# MONITOR WELL NO. MW-11

## WELL SCHEMATIC

Casing Elevation: 98.43  
 Casing Stickup: -0.57

Vapor  
 Conc.(ppm)  
 Sheen

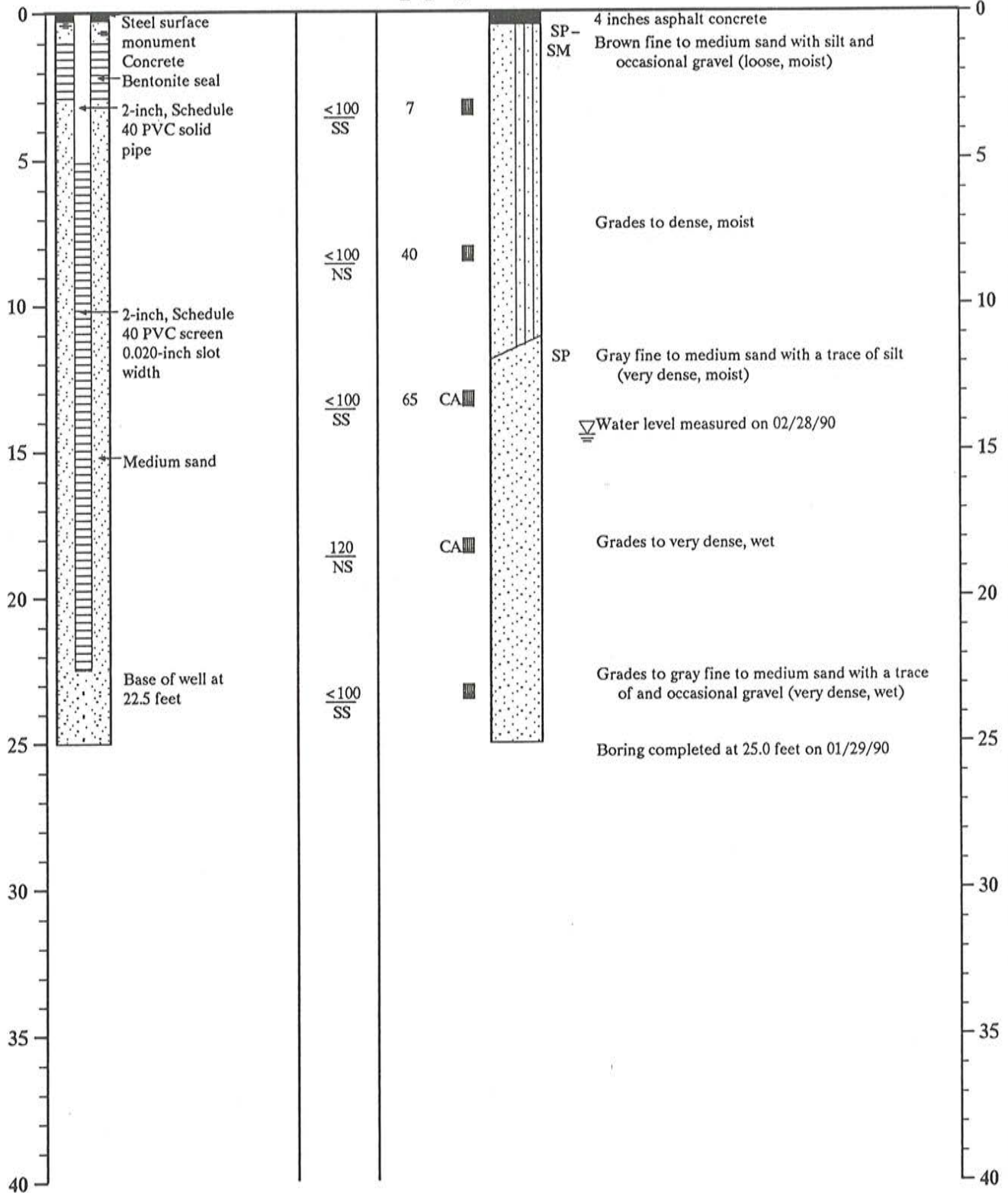
Blow-  
 Count

Samples

Group  
 Symbol

DESCRIPTION

Surface Elevation: 99.00



Note: See Figure A-2 for explanation of symbols

: LRM: CLH: IRA 6/15/90

0372-0668-B04



Log of Monitor Well

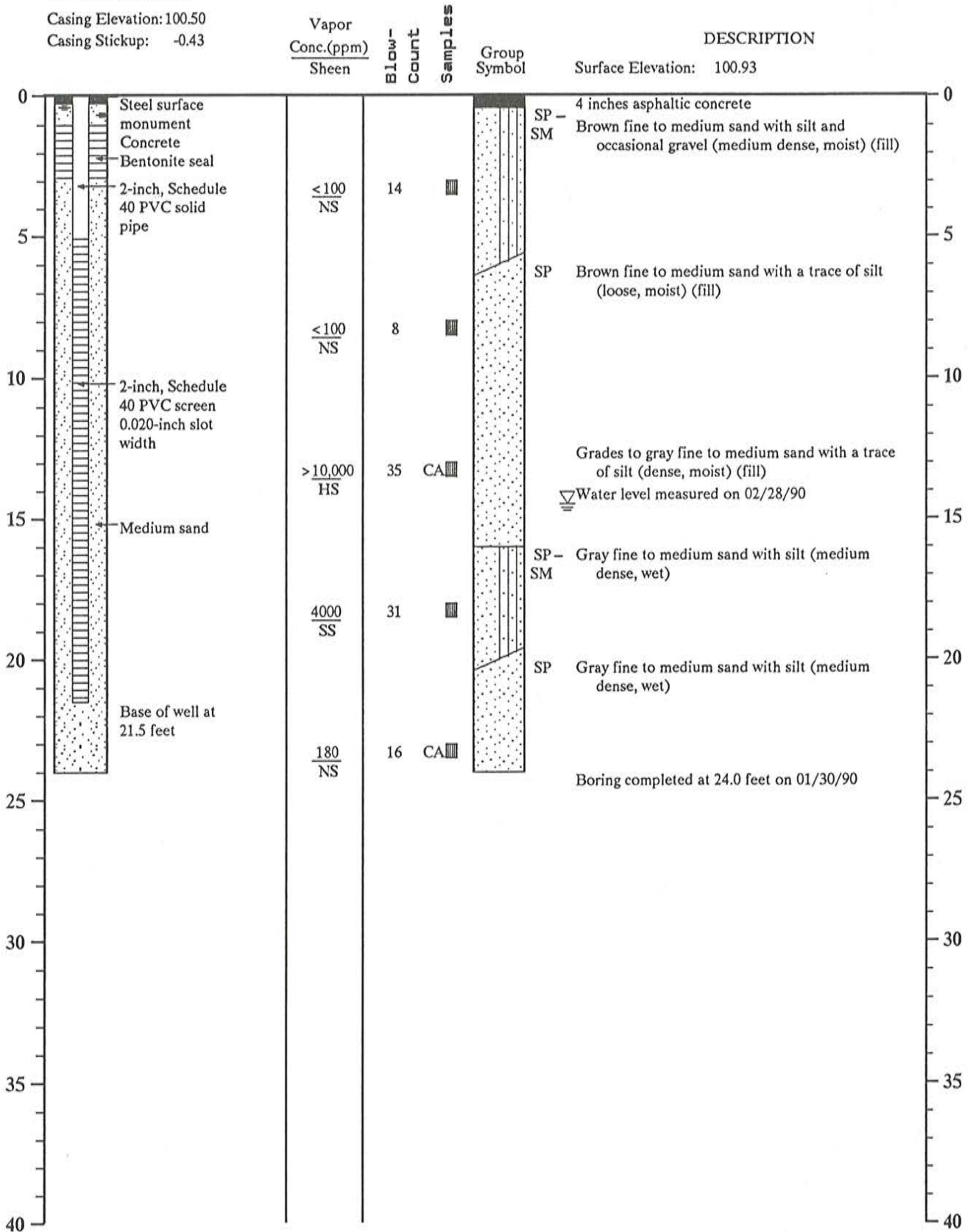
Figure A-13



# MONITOR WELL NO. MW-12

## WELL SCHEMATIC

Casing Elevation: 100.50  
Casing Stickup: -0.43



Note: See Figure A-2 for explanation of symbols

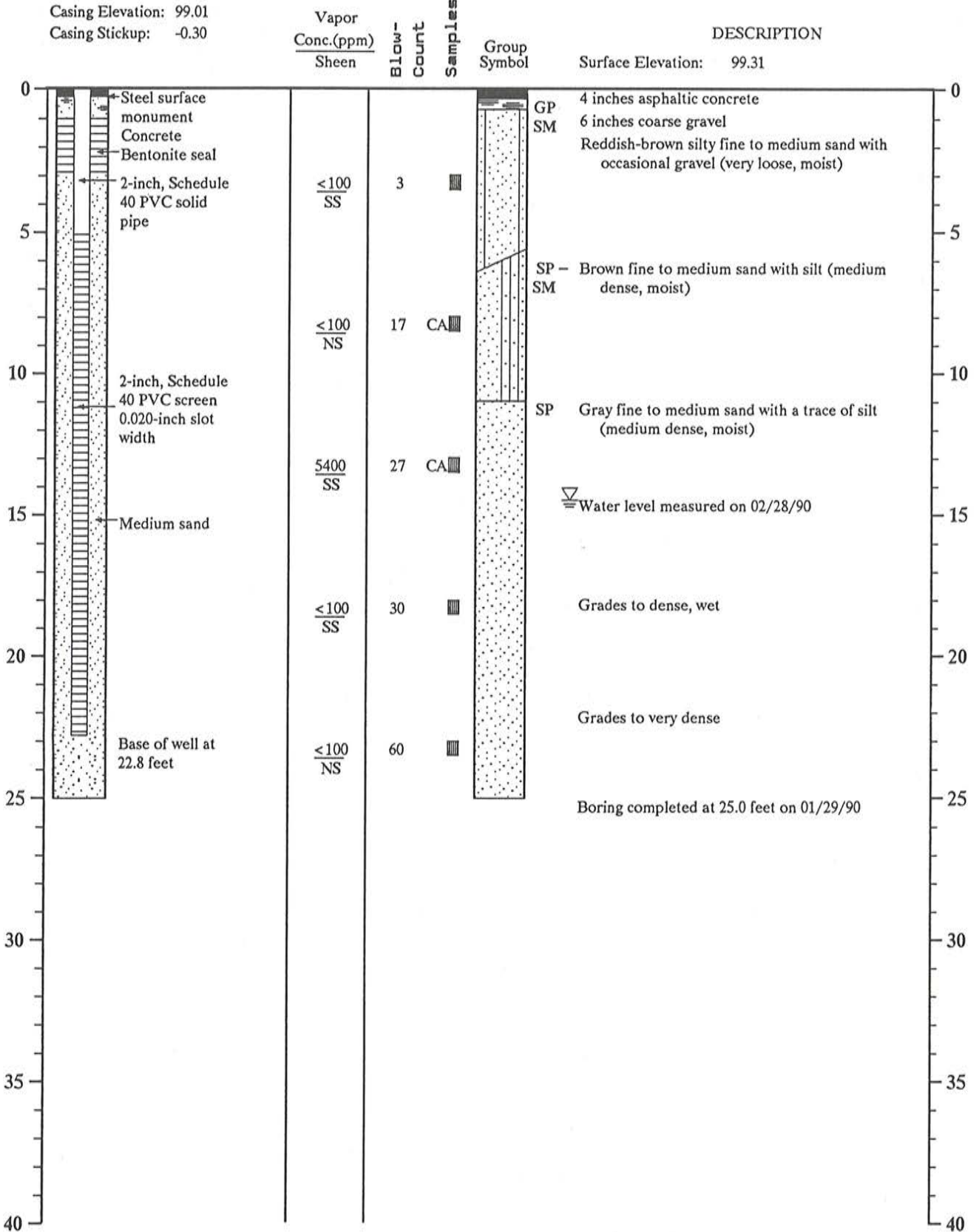
: LRM:CLH:IRA 6/13/90

0372-068-B04

# MONITOR WELL NO. MW-13

## WELL SCHEMATIC

Casing Elevation: 99.01  
 Casing Stickup: -0.30



Note: See Figure A-2 for explanation of symbols

: LRM:CLH:IRA 6/13/90

0372-068-B04

# MONITOR WELL NO. MW-14

## WELL SCHEMATIC

Casing Elevation: 99.53  
 Casing Stickup: -0.60

Vapor  
 Conc.(ppm)  
 Sheen

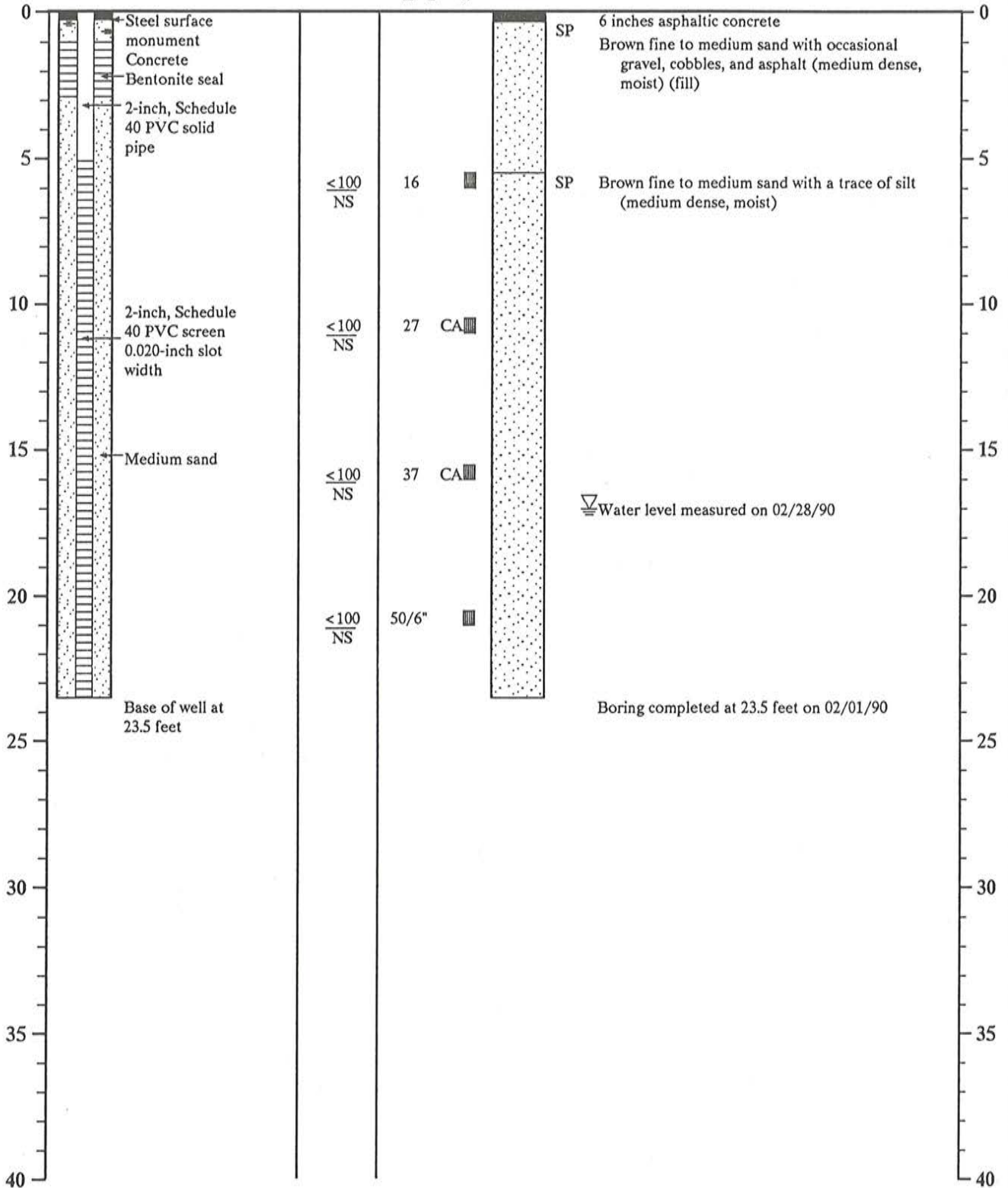
Blow-  
 Count

Samples

Group  
 Symbol

DESCRIPTION

Surface Elevation: 100.13



Note: See Figure A-2 for explanation of symbols

# RECOVERY WELL NO. RW-1

## WELL SCHEMATIC

Casing Elevation: 98.36  
 Casing Stickup: 1.97

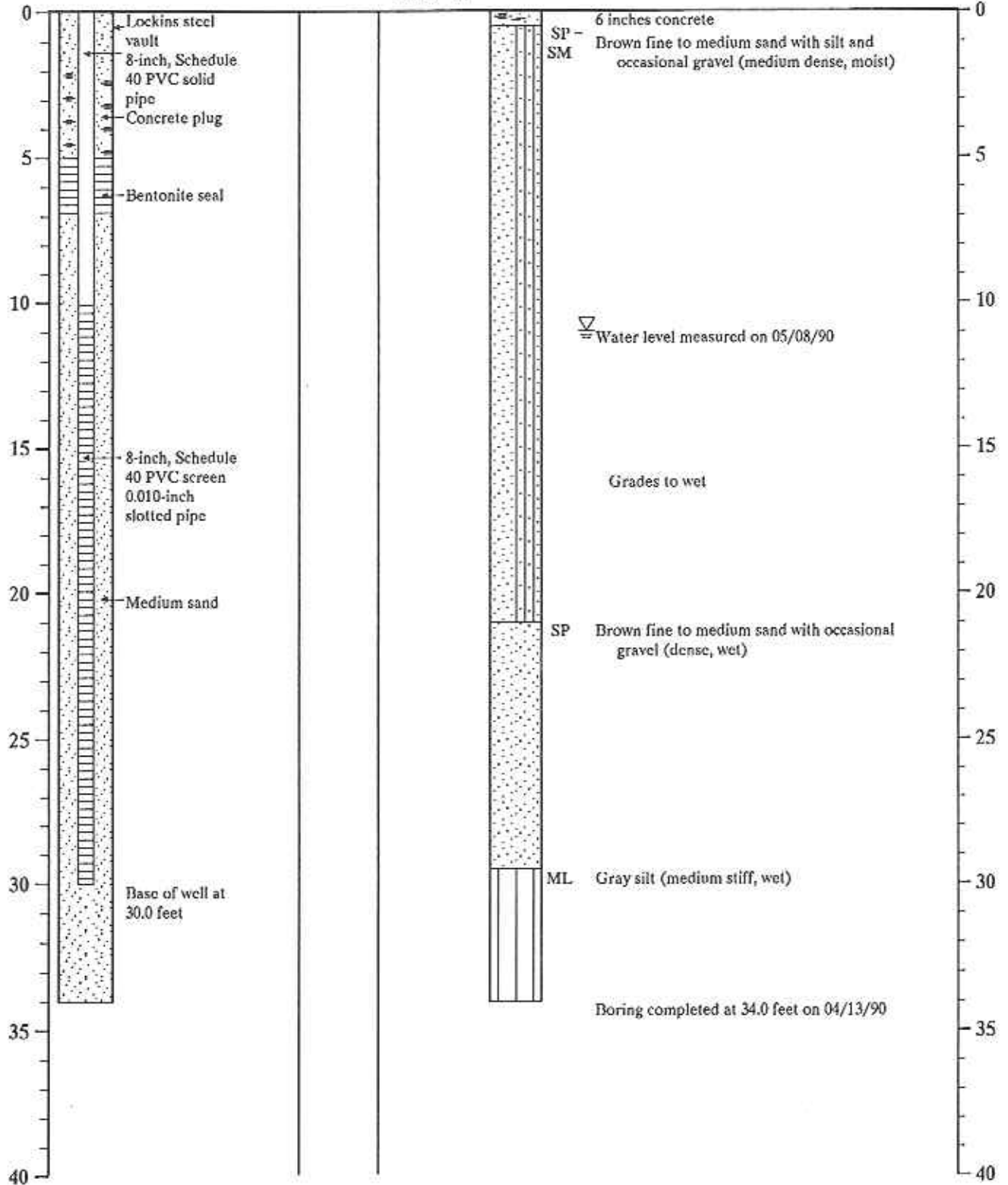
Vapor  
 Conc.(ppm)  
 Sheen

Blow-  
 Count

Samples

## DESCRIPTION

Surface Elevation: 100.33



Note: See Figure A-2 for explanation of symbols.

APPENDIX B

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 9, 1990

Report On: Analysis of Soil

Lab No.: 9216

Page 1 of 2

IDENTIFICATION:

Samples Received on 1-5-90

Project: 0372-068-B04 Chevron University, Seattle

ANALYSIS:

Lab Sample No.	Rush 1	Rush 2	Rush 3	Rush 4
Client ID	900103-1	900104-2	900104-3	900104-4
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	< 0.05	15.5	0.35	< 0.05
Toluene	< 0.05	1,024	0.07	< 0.05
Ethyl Benzene	< 0.05	145	0.86	< 0.05
Xylenes	< 0.05	754	7.64	< 0.05
BTEX by EPA SW-846 Method 8020				
Total Petroleum Fuel Hydrocarbons	< 10	8,190	< 10	< 10
AS		Gasoline		
TPH by EPA SW-846 Modified Method 8015				

Continued . . . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.

Page 2 of 2

Lab No. 9216

January 9, 1990

Lab Sample No.	Rush 5	Rush 6	Rush 7	Rush 8
Client ID	900104-5	900104-6	900104-7	900105-8
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	0.60	1.80	< 0.05	< 0.05
Toluene	27.1	62.1	< 0.05	0.43
Ethyl Benzene	15.4	26.2	0.10	1.02
Xylenes	107	151	0.63	9.10
BTEX by EPA SW-846 Method 8020				
Total Petroleum Fuel Hydrocarbons	897	2,254	< 10	356
AS	Gasoline	Gasoline		Gasoline
TPH by EPA SW-846 Modified Method 8015				

SOUND ANALYTICAL SERVICES

  
 C. LARRY ZURAW





# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

Report To: GeoEngineers, Inc.

Date: January 10, 1990

Report On: Analysis of Soil

Lab No.: 9251

Page 1 of 2

IDENTIFICATION:

Samples Received on 1-8-90

Project: 0372-068-B04

ANALYSIS:

Lab Sample No.	RUSH 1	RUSH 2	RUSH 3	RUSH 4
Client ID	900108-9	900108-10	900108-11	900108-12
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05	< 0.05
BTEX by EPA SW-846 Method 8020				
Total Petroleum Fuel Hydrocarbons	< 10	< 10	< 10	< 10
TPH by EPA SW-846 Modified Method 8015				

Continued . . . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers  
Page 2 of 2  
Lab No. 9251  
January 10, 1990

Lab Sample No. 5

Client ID: 900108-13

Matrix: Soil

Units: mg/kg

Benzene	.....	0.49
Toluene	.....	1.38
Ethyl Benzene	.....	0.64
Xylenes	.....	3.63

(BTEX by EPA SW-846 Method 8020)

Total Petroleum Fuel Hydrocarbons	.....	24.0
As	.....	Gasoline

(TPH by EPA SW-846 Modified Method 8015)

SOUND ANALYTICAL SERVICES



STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9251  
Date: January 10, 1990  
Client: GeoEngineers

Client ID: 900108-13  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Benzene	0.49	0.38	25.0	
Toluene	1.38	1.26	9.1	
Ethyl Benzene	0.64	0.60	6.5	
Xylenes	3.63	3.71	2.2	

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

Enviros Corporation  
 600 Skyline Tower  
 Laboratory:  
 10900 NE 4th St.  
 Bellevue, WA 98004  
 (206) 455-2962

PROJECT NAME: CHEVRON 129  
 PROJECT LOCATION: BROOKLYN E 47th  
 SITE NUMBER: 0372-068-804

Chain of Custody Record

SAMPLED BY: ANNE FARKAS DATE: 01-08-90

Sample Number	Date/Time Sampled	Type of Samples	# of Containers	Analyses Required	Comments
900108-9	01-08-90	SOIL	1	8020/8015	<del>24 HR</del>
900108-10	01-08-90	SOIL	1	8020/8015	<del>24 HR</del>
900108-11	01-08-90	SOIL	1	8020/8015	24HR RUN MODIFIED 8020
900108-12	01-08-90	SOIL	1	8020/8015	24HR BETX ONLY AND
900108-13	01-08-90	SOIL	1	8020/8015	REGULAR 8015.

Relinquished by: (Signature) NAME: <u>Anne E. Farkas</u> FIRM: <u>GEO ENGINEERS</u>	Date: <u>01-08-90</u> Time: <u>1435</u>	Received by: (Signature) NAME: <u>R. Berman</u> FIRM: #310 <u>Enviros</u> TRK R. Berman	Date: <u>1-8-90</u>
Relinquished by: (Signature) NAME: #310 <u>Enviros</u> FIRM: <u>R. Berman</u>	Date: <u>1/8/90</u> Time: <u>3:30P</u>	Received by: (Signature) NAME: <u>Jay Baker</u> FIRM: <u>SOOND ANALYTICAL</u> Enviros Corporation	Date: <u>1-9-90</u> Time: <u>3:30 PM</u> Enviros' Client:

Additional Comments: CONTACT CHERYL HANNAH AT 746-5200 W/ RESULTS  
SAMPLES 9-12 24 HR TURN AROUND/ SAMPLE 13 REGULAR TURN  
AROUND.

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 16, 1990

Report On: Analysis of Soil

Lab No.: 9307

IDENTIFICATION:

Samples Received on 01-10-90

Project: 0372-068-B04 Chevron 47th & Brooklyn

-----

ANALYSIS:

Lab Sample No.	1	2	3
Client ID	900110 -14	900110 -15	900110 -16
Total Petroleum Fuel Hydrocarbons, mg/kg as, by EPA SW-846 Modified Method 8015	470 Gasoline	4,397 Gasoline	955 Gasoline
Benzene, mg/kg	0.49	< 0.05	< 0.05
Toluene, mg/kg	3.25	17.5	0.47
Ethyl Benzene, mg/kg	1.02	16.4	0.78
Xylenes, mg/kg	17.4	138	4.25
BTEX by EPA SW-846 Method 8020			

SOUND ANALYTICAL SERVICES

  
C. LARRY ZURAW



# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 15, 1990

Report On: Analysis of Soil

Lab No.: 9326

Page 1 of 3

IDENTIFICATION:

Samples Received on 1-11-90

Project: 0372-068-B04 Chevron Univers 47th & Brook

ANALYSIS:

Lab Sample No.	1	2	3	4
Client ID:	900110 -17	900110 -18	900110 -19	900110 -20
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons by EPA SW-846 Method 8015	< 10	< 10	< 10	< 10
Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05	0.60
BTEX by EPA SW-846 Method 8020				

Continued . . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 3  
 Lab No. 9326  
 January 15, 1990

Lab Sample No: 5      Client ID: 900110-16A Soil mg/kg

Total Petroleum Hydrocarbons, mg/kg .....	272
by EPA Method 418.1	
Total Petroleum Fuel Hydrocarbons, mg/kg .....	292
by EPA SW-846 Method 8015	
As .....	Gasoline
PCB, Type .....	ND
PCB, mg/kg .....	< 0.1
Benzene, mg/kg .....	3.41
Toluene, mg/kg .....	0.16
Ethyl Benzene, mg/kg .....	6.91
Xylenes, mg/kg .....	24.7
BTEX by EPA Method 8020	

Sample was analyzed for EP toxicity in accordance with "Test Methods for Evaluating Solid Waste", EPA SW-846, 3rd Edition, Sept. 1986.

<u>Contaminant</u>	<u>Concentration (mg/l)</u>	<u>Max Conc., (mg/l)</u>
Arsenic	< 0.1	5.0
Barium	0.4	100.0
Cadmium	< 0.1	1.0
Chromium	< 0.1	5.0
Lead	< 0.1	5.0
Mercury	< 0.05	0.2
Selenium	< 0.1	1.0
Silver	< 0.1	5.0

Continued . . . . .



# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc  
Page 3 of 3  
Lab No. 9326  
January 15, 1990

Lab Sample No: 5      Client ID: 900110-16 Soil mg/kg

Purgeable Halocarbons per EPA SW-846, Method 8010.

<u>Contaminant</u>	<u>Concentration (mg/kg) (ppm)</u>
Methylene chloride	< 0.05
1,1-dichloroethylene	< 0.05
1,2-dichloroethane	< 0.05
1,2-transdichloroethylene	< 0.05
Chloroform	< 0.05
1,2-dichloroethane	< 0.05
Freon	< 0.05
1,1,1-trichloroethane	< 0.05
Bromodichloromethane	< 0.05
Carbon Tetrachloride	< 0.05
1,2-dichloropropane	< 0.05
Trans-1,3-dichloropropene	< 0.05
Trichlorethylene	< 0.05
Cis-1,3-dichloropropene	< 0.05
1,1,2-trichloroethane	< 0.05
Chlorodibromomethane	< 0.05
Bromoform	< 0.05
Tetrachloroethylene	0.07
1,1,2,2-tetrachloroethane	< 0.05
Chlorobenzene	< 0.05
1,2 Dichlorobenzene	< 0.05
1,3 Dichlorobenzene	< 0.05
1,4 Dichlorobenzene	< 0.05

SOUND ANALYTICAL SERVICES

  
C. LARRY ZURAW

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9326  
Date: January 15, 1990  
Client: GeoEngineers, Inc.  
Client ID: 900110-19  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*
Total Petroleum Fuel Hydrocarbons	< 10	< 10	----
Benzene	< 0.05	< 0.05	----
Toluene	< 0.05	< 0.05	----
Ethyl Benzene	< 0.05	< 0.05	----
Xylenes	< 0.05	< 0.05	----

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$



# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 18, 1990  
Revised: January 26, 1990

Report On: Analysis of Soil

Lab No.: 9383-2

IDENTIFICATION:

Samples Received on 01-15-90

Project: 0372-068-B04 47th/Brooklyn

-----

ANALYSIS:

Lab Sample No.	5	6	7
Client ID	900112-22	900112-23	900112-24
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05
Xylenes	0.11	0.15	0.14
BTEX by EPA SW-846 Method 8020			
Total Petroleum Fuel Hydrocarbons	< 10	< 10	< 10
by EPA SW-846 Modified Method 8015			

Continued . . . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 2  
 Lab No. 9383-2  
 January 18, 1990  
 Revised: January 26, 1990

Lab Sample No.	8	9	10
Client ID	900112-25	900112-29	900112-31
Benzene	< 0.05	< 0.05	0.92
Toluene	0.27	< 0.05	12.3
Ethyl Benzene	< 0.05	< 0.05	9.1
Xylenes	8.04	0.16	85.1
BTEX by EPA SW-846 Method 8020			
Total Petroleum Fuel Hydrocarbons	1,023	< 10	122
TPH as	Aged Gasoline		Gasoline
TPH by EPA SW-846 Modified Method 8015			

SOUND ANALYTICAL SERVICES

  
 STAN P. PALMQUIST

83-8

SAMPLE 9383-2-8  
CLIENT 900112-26

21.223	21.160	20.987	21.554	21.291
20.903	19.950	19.853	19.787	20.511
19.246	19.119	18.916	18.848	18.848
18.462	18.355	18.173	18.100	18.100
17.682	17.526	17.428	17.355	17.355
16.812	16.735	16.526	16.453	16.453
16.005	15.946	15.710	15.646	15.646
15.099	14.859	14.662	14.589	14.589
14.356	14.050	13.844	13.771	13.771
13.581	13.275	13.012	12.939	12.939
12.814	12.516	12.245	12.172	12.172
12.010	11.728	11.456	11.383	11.383
11.269	10.943	10.684	10.611	10.611
10.414	10.130	9.925	9.766	9.766
9.627	9.310	9.066	8.887	8.887

4.465

6.073

ADC

CR

INJECT  
FID 4X11 9.5 CM/M 10%

NO.	NAME	MIN	MG-L	COUNTS
1	GAS	6.255	717.5066	5138148
2		10.006		4677
3	DIESEL	17.500	166.4613	915389
4	OTHER	31.500	0.0000	890
TOTAL:			883.9679	6059105

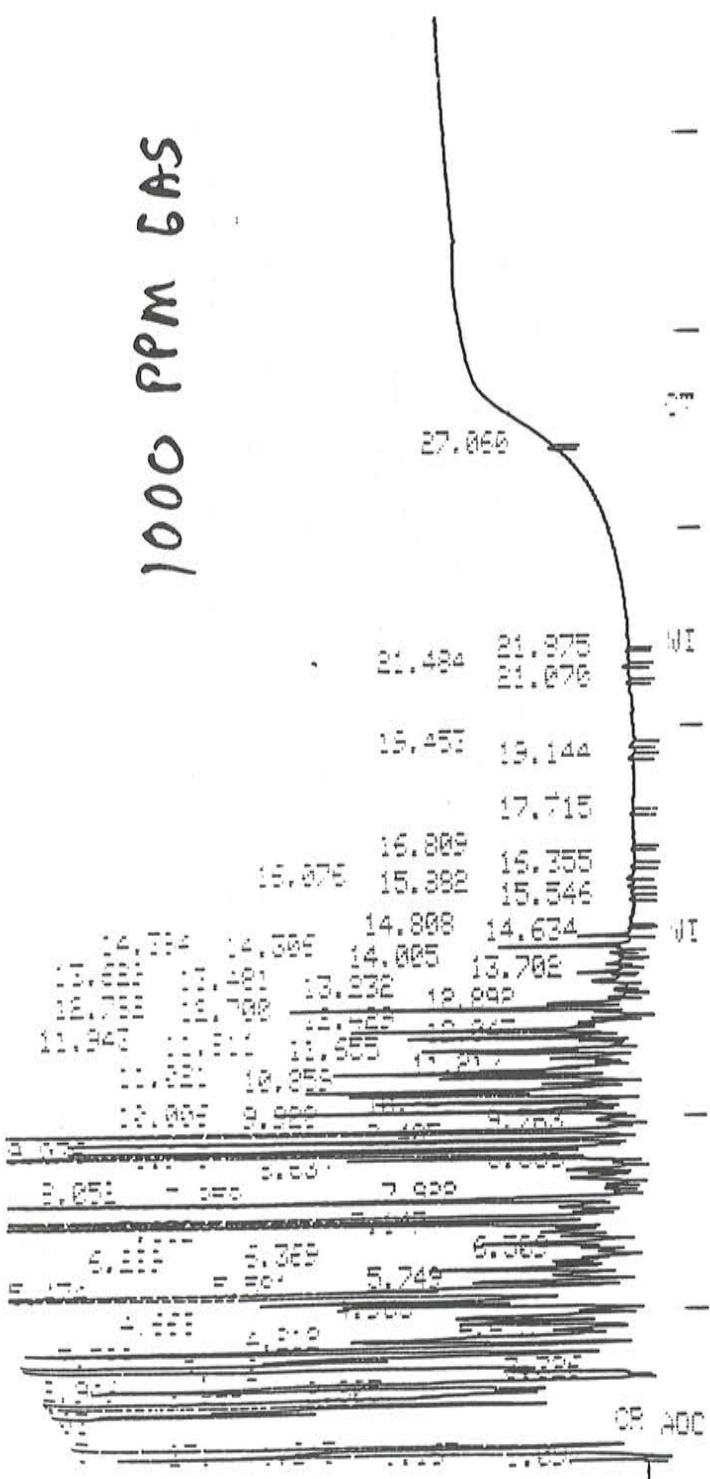
DETECTED PEAKS: 117 REJECTED PEAKS: 0  
 AMOUNT STANDARD: 1.0000000  
 MULTIPLIER: 1.0000000 DIVISOR: 1.0000000  
 NOISE: 123.7 OFFSET: -32

RACK 16 VIAL 1 INJ 1

ERROR LOG:  
 ADC OVERRANGE

END

1000 PPM GAS



OR ADC

PEAK NO.	PEAK NAME	TIME MIN	RESULT MG-L	AREA COUNTS
1	GAS	6.255	47.0590	336995
2	DIESEL	17.500	925.9389	5091842
3	OTHER	31.500	0.0001	2969
TOTALS:			972.9981	5431807

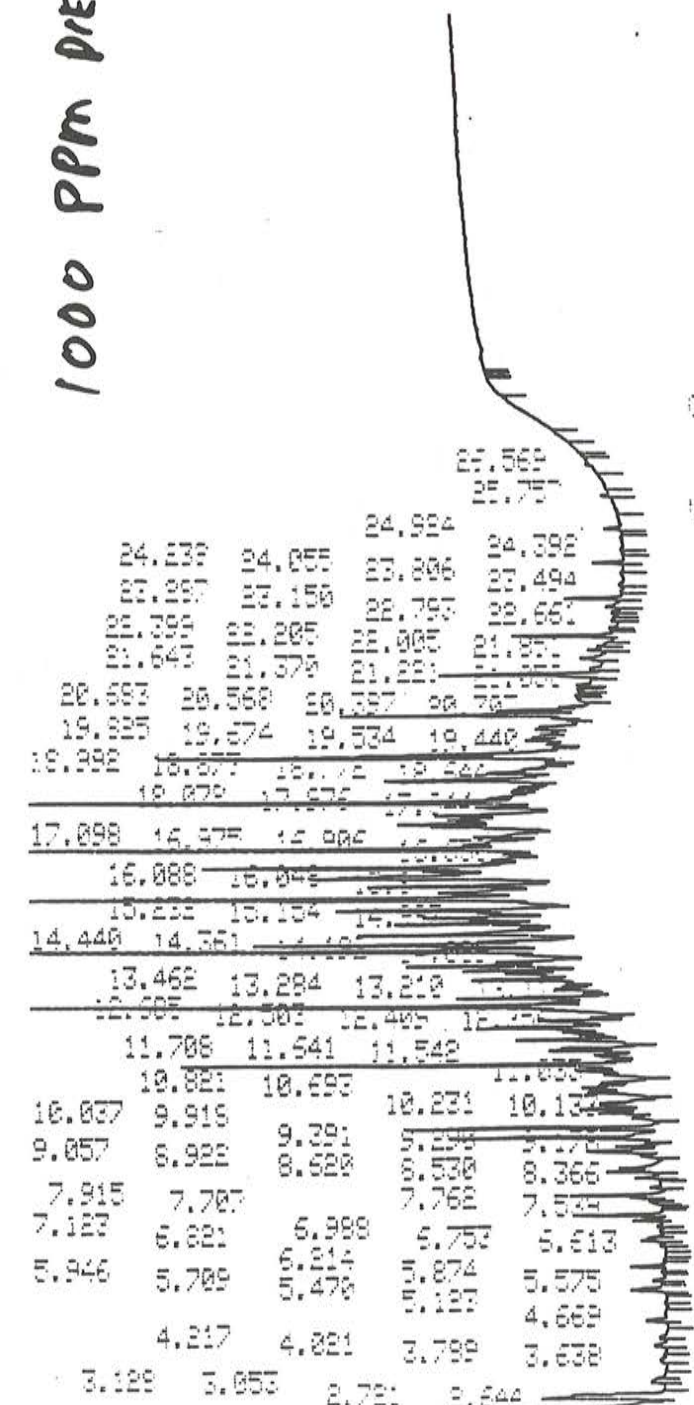
DETECTED PEAKS: 167 REJECTED PEAKS: 0  
 AMOUNT STANDARD: 1.0000000  
 MULTIPLIER: 1.0000000 DIVISOR: 1.0000000  
 NOISE: 121.7 OFFSET: -35

RACK 16 VIAL 1 INJ 1

ERROR LOG:  
 ADC OVERRANGE  
 ANNOTATION OMITTED

END

1000 PPM DIESEL



OR ADC

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 18, 1990

Report On: Analysis of Soil

Lab No.: 9383-1

IDENTIFICATION:

Samples Received on 01-15-90

Project: 0372-068-B04 47th/Brooklyn

ANALYSIS:

Lab Sample No.	RUSH 1	RUSH 2	RUSH 3	RUSH 4
Client ID	900112-27	900112-28	900112-30	900115-32
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	0.16	< 0.05
Ethyl Benzene	2.28	< 0.05	< 0.05	< 0.05
Xylenes	6.73	0.16	39.2	0.11
BTEX by EPA SW-846 Method 8020				
Total Petroleum Fuel Hydrocarbons	266	< 10	434	< 10
TPH as  by EPA SW-846 Modified Method 8015	Gasoline		Gasoline	

Continued . . . . .



# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
Page 2 of 2  
Lab No. 9383-1  
January 18, 1990

## ANALYSIS:

Lab Sample No. RUSH 1

Client ID: 900112-27

Sample was analyzed for EP toxicity in accordance with "Test Methods for Evaluating Solid Waste", EPA SW-846, 3rd Edition, Sept. 1986.

<u>Contaminant</u>	<u>Concentration (mg/l)</u>	<u>Max Conc., (mg/l)</u>
Arsenic	< 0.1	5.0
Barium	0.3	100.0
Cadmium	< 0.1	1.0
Chromium	< 0.1	5.0
Lead	0.1	5.0
Mercury	< 0.05	0.2
Selenium	< 0.1	1.0
Silver	< 0.1	5.0

Flash, PMCC<sup>OF</sup> ..... 147

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9383-1  
Date: January 18, 1990  
Client: GeoEngineers

Client ID: 900115-32  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Benzene	< 0.05	< 0.05	---	
Toluene	< 0.05	< 0.05	---	
Ethyl Benzene	< 0.05	< 0.05	---	
Xylenes	0.11	0.11	---	
Total Petroleum Hydrocarbons	< 10	< 10	---	

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

2405 - GEOENGINEER, INC. SUITE 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

PROJECT LOC. 47th/Brooklyn  
 PROJECT NAME CHEL # 129  
 GEI FILE NO. 0372-068-B04

CHAIN OF CUSTODY RECORD

SAMPLED BY ANNE FARKAS DATE 1-12-90 / 1-15-90

SAMPLE No.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
900112-22	1-12-90	AM	13.0'	SOIL			8015 Map/8020	1	
900112-23		AM	6.0'	SOIL				1	
900112-24		AM	14.0'	SOIL				1	
900112-25		AM	9.5'	SOIL				1	
900112-27		AM	STOCK	SOIL				1	24 TURN
900112-28		PM	STOCK	SOIL				1	24 TURN
900112-29		PM	9.7'	SOIL				1	
900112-30		PM	STOCK	SOIL				1	24 TURN
900112-31		PM	14.0'	SOIL				1	<del>24</del> TURN
900115-32		AM	STOCK	SOIL				1	24 TURN
RELINQUISHED BY (SIGNATURE) <i>Anne Farkas</i> NAME <i>Anne Farkas</i> FIRM <i>GEOENGINEERS INC</i>									
RECEIVED BY (SIGNATURE) <i>[Signature]</i> NAME _____ FIRM _____ DATE 1-15-90 TIME 945 AM									
RECEIVED BY (SIGNATURE) _____ NAME _____ FIRM _____ DATE 1/15/90 TIME 11:20 AM									
ADDITIONAL COMMENTS:									

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: February 9, 1990

Report On: Analysis of Soil

Lab No.: 9793 GeoEngineers

IDENTIFICATION:

Samples Received on 2-8-90  
Project: 0372-68-4 Chevron

FEB 14 1990

Routing CH     
File

ANALYSIS:

Lab Sample No. RUSH 1

Client ID: 900702-1

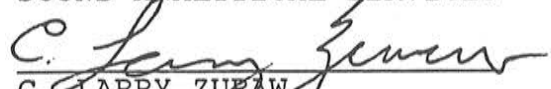
Benzene, mg/kg .....	3.58
Toluene, mg/kg .....	52.6
Ethyl Benzene, mg/kg .....	26.9
Xylenes, mg/kg .....	139
BTEX by EPA SW-846 Method 8020	

Lab Sample No. RUSH 2

Client ID: 900702-2

Total Petroleum Fuel Hydrocarbons, mg/kg .....	1,904
by EPA SW-846 Modified 8015	
TPH As .....	Gasoline

SOUND ANALYTICAL SERVICES

  
C. LARRY ZURAW

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9793  
Date: February 9, 1990  
Client: GeoEngineers, Inc.  
Client ID: 900702-1  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*
Benzene	3.58	3.78	5.4
Toluene	52.6	47.0	11.3
Ethyl Benzene	26.9	26.6	1.0
Xylenes	139	142	2.1

Client ID: 900702-2  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*
Total Petroleum Fuel Hydrocarbons	1,904	1,608	16.9

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

# CHAIN OF CUSTODY RECORD

Page 1 of 1

CUSTOMER: GeoEngineers INC

PROJECT: Chevron P.O./JOB NO.: 0372-68-4

SAMPLER: JCK

Lab No.	Sample No.	Date	Time	Cont.	Analysis Required
	900702-1	2-7	2:30	So:1	<del>8020</del> 8020
	900702-2	2-7	2:30	So:1	8015 (mod)
					please send results
					to Cheryl Haines
					Rush 24hr
					TURN AROUND
					THANKS - Cheryl
					Haines

Relinquished by:	Date	Time	Received by:	Date	Time
<u>Jon C Koloski</u>	<u>2-7-90</u>		<u>Frank Michalek</u>	<u>2-8-90</u>	<u>9:21</u>
Relinquished by:	Date	Time	Received by:	Date	Time
<u>Frank Michalek</u>	<u>2-8-90</u>	<u>10:05</u>	<u>Ally Waldman</u>	<u>2/8/90</u>	<u>10:05</u>
Dispatched by:	Date	Time	Received at lab by:	Date	Time

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: February 15, 1990

Report On: Analysis of Soil

Lab No.: 9869

IDENTIFICATION:

Samples Received on 2-14-90

Project: 0372-068-B04 Chevron-Univ.

Client ID: RUSH 900214-1

-----

ANALYSIS:

Total Petroleum Fuel Hydrocarbons, mg/kg ..... <10  
by EPA SW-846 Modified 8015

Benzene, mg/kg ..... < 0.05

Toluene, mg/kg ..... < 0.05

Ethyl Benzene, mg/kg ..... < 0.05

Xylenes, mg/kg ..... < 0.05

BTEX by EPA SW-846 Method 8020

SOUND ANALYTICAL SERVICES

  
C. LARRY ZURAW







ATI I.D. # 9004-081

**GeoEngineers**

APR 26 1990

Routing     
File

April 25, 1990

GeoEngineers, Inc.  
2405-140th Ave. NE  
Suite 105  
Bellevue, WA 98005

Attention : Roy Jensen

Project Number : 372-68-2

Project Name : 47th & Brooklyn

On April 17, 1990 Analytical Technologies, Inc. received one soil sample for analysis. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva  
Senior Project Manager

FWG/tc

Frederick W. Grothkopp  
Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 372-68-2
PROJECT NAME : 47TH & BROOKLYN

Table with 4 columns: ATI #, CLIENT DESCRIPTION, DATE SAMPLED, MATRIX. Row 1: 9004-081-1, S-1, 04/17/90, SOIL

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row 1: SOIL, 1

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 # : 372-68-2  
PROJECT NAME : 47TH & BROOKLYN

ANALYSIS	TECHNIQUE	REFERENCE	LAB
BETX	GC/PID	EPA 8020	R
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	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



PURGEABLE AROMATICS ANALYSIS  
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 372-68-2	DATE RECEIVED	: N/A
PROJECT NAME	: 47TH & BROOKLYN	DATE EXTRACTED	: 04/17/90
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/18/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
TOTAL XYLENES	<0.025

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	87
--------------------	----

PURGEABLE AROMATICS ANALYSIS  
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/17/90
PROJECT #	: 372-68-2	DATE RECEIVED	: 04/17/90
PROJECT NAME	: 47TH & BROOKLYN	DATE EXTRACTED	: 04/17/90
CLIENT I.D.	: S-1	DATE ANALYZED	: 04/17/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

## RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
TOTAL XYLENES	<0.025

## SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	65
--------------------	----

PURGEABLE AROMATICS  
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 9004-072-2
PROJECT #	: 372-68-2	DATE EXTRACTED	: 04/16/90
PROJECT NAME	: 47TH & BROOKLYN	DATE ANALYZED	: 04/17/90
EPA METHOD	: 8020 (BETX)	MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.60	0.502	84	0.517	86	3
TOLUENE	<0.025	0.60	0.596	99	0.622	104	4
TOTAL XYLENES	<0.025	0.83	0.773	93	0.824	99	6

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

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



FUEL HYDROCARBONS ANALYSIS  
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 372-68-2	DATE RECEIVED	: N/A
PROJECT NAME	: 47TH & BROOKLYN	DATE EXTRACTED	: 04/17/90
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 04/17/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	5 C6 - C8 GASOLINE
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	<5 - DIESEL



FUEL HYDROCARBONS ANALYSIS  
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 04/17/90
PROJECT #	: 372-68-2	DATE RECEIVED	: 04/17/90
PROJECT NAME	: 47TH & BROOKLYN	DATE EXTRACTED	: 04/17/90
CLIENT I.D.	: S-1	DATE ANALYZED	: 04/17/90
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

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



FUEL HYDROCARBONS  
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 9004-073-2
PROJECT #	: 372-68-2	DATE EXTRACTED	: 04/16/90
PROJECT NAME	: 47TH & BROOKLYN	DATE ANALYZED	: 04/18/90
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	573	115	522	104	9

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

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



FUEL HYDROCARBONS  
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC.	SAMPLE I.D. : BLANK SPIKE
PROJECT # : 372-68-2	DATE EXTRACTED : 04/16/90
PROJECT NAME : 47TH & BROOKLYN	DATE ANALYZED : 04/19/90
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	458	92	N/A	N/A	N/A

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

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



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.  
PROJECT # : 372-68-2  
PROJECT NAME : 47TH & BROOKLYN

SAMPLE MATRIX : SOIL  
UNITS : %

ATI I.D.#	CLIENT I.D.	MOISTURE
9004-081-1	S-1	21



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.  
PROJECT # : 372-68-2  
PROJECT NAME : 47TH & BROOKLYN

SAMPLE MATRIX : SOIL  
UNITS : %

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9004-081-1	21	21	0	N/A	N/A	N/A

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

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

# Chain of Custody

9004-081

DATE 4/17/15 PAGE 1 OF 1

LABORATORY NUMBER:

ANALYSIS REQUEST

PROJECT MANAGER: Kay Jensen  
 COMPANY: Geo Engineers  
 ADDRESS: \_\_\_\_\_  
 PHONE: 246-5200 SAMPLED BY: ESG

SAMPLE DISPOSAL INSTRUCTIONS

ATT Disposal @ \$5.00 each  Return  Pickup (will call)

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE	418.1	413.2	8015	TOC	TOX	%	TCLP	Priority	EPTOX	EP TOX	
C-1	4/17	11:00AM	5051	-1	Halogenated Volatiles	Aromatic Volatiles	<input checked="" type="checkbox"/>	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	PCB's ONLY	Phosphate Pesticides	Herbicides	PAH/HH (WAC 173)	(TPH)	Grease & Oil	(Modified)	9060	9020	Moisture		Metals (13)	(8) Total	(8) EP EXT	

NUMBER OF CONTAINERS

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER: <u>372-68-2</u>	TOTAL NUMBER OF CONTAINERS: <u>1</u>	RELINQUISHED BY: <u>[Signature]</u>	RELINQUISHED BY: <u>[Signature]</u>
PROJECT NAME: <u>47th &amp; Brooklyn</u>	CHAIN OF CUSTODY SEALS Y/N/A: <u>N/A</u>	Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>
PURCHASE ORDER NUMBER: _____	INTACT? Y/N/A: <u>N/A</u>	Printed Name: <u>Kay Jensen</u>	Printed Name: <u>[Name]</u>
VIA: _____	RECEIVED GOOD COND./COLD: <u>Y/Y</u>	Date: <u>4/17/15</u>	Date: <u>4/17/15</u>
TAT: <input checked="" type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS (Normal)		Company: <u>Geo</u>	Company: _____
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA		RECEIVED BY: <u>[Signature]</u>	RECEIVED BY: <u>[Signature]</u>
SPECIAL INSTRUCTIONS:		Time: <u>11:40AM</u>	Time: <u>11:40AM</u>
		Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>
		Printed Name: <u>Kay Jensen</u>	Printed Name: <u>[Name]</u>
		Date: <u>4/17/15</u>	Date: <u>4/17/15</u>
		Company: <u>Geo</u>	Company: _____
		Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>
		Printed Name: <u>[Name]</u>	Printed Name: <u>[Name]</u>
		Date: <u>4/17/15</u>	Date: <u>4/17/15</u>
		Company: <u>Analytical Technologies, Inc.</u>	Company: _____

APPENDIX C

## SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL &amp; TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: January 18, 1990

Report On: Analysis of Soil

Lab No.: 9382

IDENTIFICATION:

Samples Received on 01-15-90

Project: 0372-068-B04 Seattle

ANALYSIS:

Lab Sample No.	1	2	3
Client ID	MW-1 #2	MW-1 #3	MW-2 #2
Benzene, mg/kg	<0.05	<0.05	<0.05
Toluene, mg/kg	<0.05	<0.05	<0.05
Ethyl Benzene, mg/kg	0.10	<0.05	0.12
Xylenes, mg/kg  (BTEX by EPA SW-846 Method 8020)	0.28	0.18	0.14
Total Petroleum Hydrocarbons, mg/kg as, by EPA SW-846 Method 8015	<10	<10	<10

Continued . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 2  
 Lab No. 9382  
 January 18, 1990

Lab Sample No.	4	5	6
Client ID	MW-2 #3	MW-3 #3	MW-3 #4
Benzene, mg/kg	<0.05	<0.05	27.1
Toluene, mg/kg	<0.05	<0.05	327
Ethyl Benzene, mg/kg	0.14	<0.05	88.1
Xylenes, mg/kg	0.31	0.21	614
(BTEX by EPA SW-846 Method 8020)			
Total Petroleum Hydrocarbons, mg/kg as by EPA SW-846 Method 8015	<10	<10	5,568 Gasoline

SOUND ANALYTICAL SERVICES

  
 STAN P. PALMQUIST



# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9382  
Date: January 18, 1990  
Client: GeoEngineers, Inc.  
Client ID: MW-3 #3  
Matrix: Soil  
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*
Benzene	<0.05	<0.05	----
Toluene	<0.05	<0.05	----
Ethyl Benzene	<0.05	<0.05	----
Xylenes	0.21	0.18	15.4
Total Petroleum Hydrocarbons	<10	<10	----

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

GEOTECHNICAL ENGINEERS, INC.  
 2405 - 140th AVE. N.E., SUITE 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

SAMPLED BY LYNN MILLER

DATE 1/16/90

PROJECT LOC. SEATTLE  
 PROJECT NAME \_\_\_\_\_  
 GEI FILE NO. 0372-068-804

SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	NO	NO	NO. OF SAMPLE CONTAINERS	COMMENTS
MW-1x2	1/11		8	Soil			NO	1	
MW-1x3	1/11		13						
MW-2x2	1/11		8						
MW-2x3	1/11		13						
MW-3x3	1/12		13						
MW-3x4	1/12		18						

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	1/16	10:00	<i>[Signature]</i>	1-15-90	10:05 AM
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
<i>[Signature]</i>	1/15	11:20 AM	<i>[Signature]</i>	1-15-90	11:20

FEB 12 1990

SPECIALIZING IN INDUSTRIAL &amp; TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: February 8, 1990

Report On: Analysis of Soil

Lab No.: 9741

Page 1 of 2

IDENTIFICATION:

Samples Received on 2-5-90

Project: 372-68-B04 Chevron Brooklyn &amp; 47th

ANALYSIS:

Lab Sample No.	1	2	3	4
Client ID:	MW-4 15'	MW-4 20'	MW-5 5'	MW-5 10'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons by EPA SW-846 Modified 8015	3,267	< 10	< 10	< 10
TPH As	Gasoline			
Benzene	1.58	< 0.05	< 0.05	< 0.05
Toluene	31.1	< 0.05	< 0.05	< 0.05
Ethyl Benzene	9.71	< 0.05	< 0.05	< 0.05
Xylenes BTEX by EPA SW-846 Method 8020	52.6	< 0.05	< 0.05	< 0.05

Continued . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 2  
 Lab No. 9741  
 February 8, 1990

Lab Sample No.	5	6	7	8
Client ID:	MW-6 10'	MW-6 15'	MW-14 10'	MW-14 15'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons by EPA SW-846 Modified 8015	< 10	< 10	< 10	< 10
Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05	< 0.05
BTEX by EPA SW-846 Method 8020				

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9741  
Date: February 8, 1990  
Client: GeoEngineers

Client ID: MW-14 15'  
Matrix: Soil  
Units: mg/kg

Compound	Sample (S)	Duplicate (D)	RPD*	
Total Petroleum Fuel Hydrocarbons	< 10	< 10	---	
Benzene	< 0.05	< 0.05	---	
Toluene	< 0.05	< 0.05	---	
Ethyl Benzene	< 0.05	< 0.05	---	
Xylenes	< 0.05	< 0.05	---	

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

FEB 12 1990  
 EN 14-18

2405 - 140th AVE. N.E. SUITE 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

CHAIN OF CUSTODY RECORD

PROJECT LOC. Brooklyn & 4th  
 PROJECT NAME Chevron  
 GEI FILE NO. 372-68-B04

SAMPLED BY Erin Nelson DATE 2/2/90

SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
MW-4	1/31/90		15.0	Soil	No	No	8015, 8020	1	
MW-4	"		20.0	Soil	No	No	8015, 8020	1	
MW-5	1/31/90		5.0	Soil	No	No	"	1	
MW-5	"		10.0	Soil	No	No	"	1	
MW-6	2/1/90		10.0	Soil	No	No	"	1	
MW-6	"		15.0	Soil	No	No	"	1	
MW-14	2/1/90		10.0	Soil	No	No	"	1	
MW-14	"		15.0	Soil	No	No	"	1	

RELINQUISHED BY (SIGNATURE)  
Erin Nelson  
 FIRM GeoEngineers

DATE 2/2/90  
 TIME 3:15 pm

RECEIVED BY (SIGNATURE)  
Ray Green  
 FIRM GeoEngineers

DATE 2/5/90  
 TIME 2:00 pm

ADDITIONAL COMMENTS:

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

Report To: GeoEngineers, Inc.

Date: February 7, 1990

Report On: Analysis of Soil

Lab No.: 9684

Page 1 of 2

IDENTIFICATION:

Sample Received on 2-1-90

Project: 0372-068-B04 Chevron Seattle

RECEIVED  
 GeoEngineers  
 FEB 12 1990  
 Routing  
 [Signature: clh]  
 To: [ ] [ ] [ ] [ ]

ANALYSIS:

Lab Sample No.	1	2	3	4
Client ID	MW-7 8'	MW-7 13'	MW-8 13'	MW-8-18'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons	< 10	< 10	< 10	< 10
Benzene	< 0.05	0.17	< 0.05	< 0.05
Toluene	< 0.05	0.25	< 0.05	< 0.05
Ethyl Benzene	< 0.05	0.17	< 0.05	< 0.05
Xylenes	< 0.05	0.93	0.18	< 0.05

Lab Sample No.	5	6	7	8
Client ID	MW-9 8'	MW-9 13'	MW-10 8'	MW-10 13'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons	< 10	< 10	< 10	< 10
Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	0.33	< 0.05	< 0.05

Continued . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 2  
 Lab No. 9684  
 February 7, 1990

Lab Sample No.	9	10	11	12
Client ID	MW-11 13'	MW-11 18'	MW-12 13'	MW-12 23'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons	< 10	< 10	< 10	45
TPH as				Gasoline
Benzene	< 0.05	< 0.05	< 0.05	0.77
Toluene	< 0.05	0.14	< 0.05	1.19
Ethyl Benzene	< 0.05	< 0.05	< 0.05	1.44
Xylenes	< 0.05	0.34	0.18	7.24

Lab Sample No.	13	14
Client ID	MW-13 8'	MW-13 13'
Matrix/Units	Soil mg/kg	Soil mg/kg
Total Petroleum Fuel Hydrocarbons	< 10	< 10
Benzene	< 0.05	< 0.05
Toluene	< 0.05	0.12
Ethyl Benzene	< 0.05	< 0.05
Xylenes	< 0.05	0.35

TPH by EPA SW-846 Modified Method 8015  
 BTEX by EPA SW-846 Method 8020

SOUND ANALYTICAL SERVICES

  
 STAN P. PALMQUIST



# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9684  
Date: February 7, 1990  
Client: GeoEngineers

Client ID: MW-11 13' Matrix: Soil Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Fuel Hydrocarbons	< 10	< 10	---	

Client ID: MW-11 18' Matrix: Soil Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Benzene	< 0.05	< 0.05	---	
Toluene	0.10	0.14	33.3	
Ethyl Benzene	< 0.05	< 0.05	---	
Xylenes	0.34	0.38	11.1	
Fuel Hydrocarbons	< 10	< 10	---	

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

GEOENGINEERS INC.  
 2405 - 140TH AVE. N.E., SUITE 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

PROJECT LOC. Seattle  
 PROJECT NAME Cherry Hill  
 GEI FILE NO. 0372-068-001

CHAIN OF CUSTODY RECORD

SAMPLED BY Norm Puri

DATE 2/1/90

SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
MW-7(8')	1/30/90	-	8'	Soil	No	ice	mo. 2020, 2015	1	
MW-7(13')	1/30/90	-	13'	"	"	"	"	1	
MW-8(13')	1/30/90	-	13'	"	"	"	"	1	
MW-8(18')	1/30/90	-	18'	"	"	"	"	1	
MW-9(8')	1/29/90	-	8'	"	"	"	"	1	
MW-9(13')	1/29/90	-	13'	"	"	"	"	1	
MW-10(8')	1/30/90	-	8'	"	"	"	"	1	
MW-10(13')	1/30/90	-	13'	"	"	"	"	1	
MW-11(13')	1/29/90	-	13'	"	"	"	"	1	
MW-11(18')	1/29/90	-	18'	"	"	"	"	1	
MW-12(13')	1/30/90	-	13'	"	"	"	"	1	
RELINQUISHED BY (SIGNATURE) <u>Cheryl Heine</u> NAME <u>Cheryl Heine</u> FIRM <u>Earthwest, Inc.</u> DATE <u>2/1/90</u> TIME RECEIVED BY (SIGNATURE) <u>Cheryl Heine</u> NAME <u>Cheryl Heine</u> FIRM <u>Earthwest, Inc.</u> DATE <u>2/1/90</u> TIME <u>9:35</u>									
ADDITIONAL COMMENTS: <u>Please send results to Cheryl Heine. Thanks!</u>									

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 • TELEPHONE (206)922-2310 • FAX (206)922- 5047

Report To: GeoEngineers, Inc.

Date: January 26, 1990

Report On: Analysis of Water

Lab No.: 9521

IDENTIFICATION:

Samples Received on 1-23-90

Project: 372-68-4 Chevron

-----

ANALYSIS:

Lab Sample No.	1	2	3
Client ID.	MW-1	MW-2	MW-3
Matrix/Units	Water mg/l	Water mg/l	Water mg/l
Dissolved Lead	< 0.1	< 0.1	< 0.1
Total Petroleum Fuel Hydrocarbons	< 10	25	85
TPH as by EPA SW-846 Modified 8015	Gasoline	Gasoline	Gasoline
Benzene	0.088	1.10	1.38
Toluene	0.043	1.09	14.1
Ethyl Benzene	< 0.001	0.161	2.06
Xylenes	0.409	1.120	12.8
BTEX by EPA SW-846 Method 8020			

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9521  
Date: January 26, 1990  
Client: GeoEngineers, Inc.  
Client ID: MW-3  
Matrix: Water  
Units: mg/l

Compound	Sample(S)	Duplicate(D)	RPD*
Total Petroleum Fuel Hydrocarbons	85	82	3.6
Benzene	1.38	1.17	16.5
Toluene	14.1	13.9	1.4
Ethyl Benzene	2.06	2.33	12.2
Xylenes	12.8	14.3	11.0

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

## CHAIN OF CUSTODY RECORD

Page 1 of 1

CUSTOMER: Geo Engineers INC  
 PROJECT: Zheuron P.O./JOB NO.: 372-68-4  
 SAMPLER: Jon C Koloski

Lab No.	Sample No.	Date	Time	Cont.	Analysis Required
	<i>mw-1</i>	<i>1-22</i>		<i>H2O</i>	<i>dissolved Pb, 8020, 8015</i>
	<i>mw-2</i>	<i>"</i>		<i>"</i>	
	<i>mw-3</i>	<i>"</i>		<i>"</i>	

Relinquished by:	Date	Time	Received by:	Date	Time
<i>Jon C Koloski</i>	<i>1-23</i>	<i>11:45</i>	<i>Cathy Feldman</i>	<i>1-23-90</i>	<i>2:00pm</i>
Relinquished by:	Date	Time	Received by:	Date	Time
<i>Ray J. Allen</i>	<i>1-23-90</i>	<i>2:00</i>			
Dispatched by:	Date	Time	Received at lab by:	Date	Time

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: February 22, 1990

Report On: Analysis of Water

Lab No.: 9935

Page 1 of 2

IDENTIFICATION:

Samples Received on 2-20-90

Project: 372-068-B04 Chevron Seattle

ANALYSIS:

Lab Sample No.	1	2	3	4
Client ID:	MW5	MW6	MW12	MW9
Matrix/Units	Water mg/l	Water mg/l	Water mg/l	Water mg/l
Total Petroleum Fuel Hydrocarbons by EPA SW-846 Modified 8015	< 10	38.2	2,038	99.6
TPH As		Gasoline	Gasoline	Gasoline
Benzene	< 0.001	< 0.001	29.1	0.181
Toluene	0.005	0.074	49.7	0.489
Ethyl Benzene	< 0.001	0.259	5.56	0.494
Xylenes	0.022	2.43	28.9	4.29
BTEX by EPA SW-846 Method 8020				

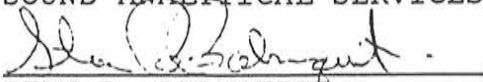
Continued . . . .

# SOUND ANALYTICAL SERVICES, INC.

GeoEngineers, Inc.  
 Page 2 of 2  
 Lab No. 9935  
 February 22, 1990

Lab Sample No.	5	6	7	8
Client ID:	MW10	MW11	MW7	MW14
Matrix/Units	Water mg/l	Water mg/l	Water mg/l	Water mg/l
Total Petroleum Fuel Hydrocarbons by EPA SW-846 Modified 8015	89.4	244	526	< 10
TPH As	Gasoline	Gasoline	Gasoline	
Benzene	0.431	0.342	3.28	< 0.001
Toluene	0.136	5.43	8.17	< 0.001
Ethyl Benzene	0.505	2.15	1.21	< 0.001
Xylenes	1.99	9.02	8.01	< 0.001
BTEX by EPA SW-846 Method 8020				

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

## QUALITY CONTROL REPORT

### DUPLICATES

Lab No: 9935  
Date: February 22, 1990  
Client: GeoEngineers

Client ID: MW9  
Matrix: Water  
Units: mg/l

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Fuel Hydrocarbons	99.6	104	4.3	
Benzene	0.181	0.189	4.3	
Toluene	0.489	0.463	5.5	
Ethyl Benzene	0.494	0.447	10.0	
Xylenes	4.29	3.79	12.4	

Lab No: 9935  
Date: February 22, 1990  
Client: GeoEngineers

Client ID: MW14  
Matrix: Water  
Units: mg/l

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Fuel Hydrocarbons	< 10	< 10	---	
Benzene	< 0.001	< 0.001	---	
Toluene	< 0.001	< 0.001	---	
Ethyl Benzene	< 0.001	< 0.001	---	
Xylenes	< 0.001	< 0.001	---	

\*RPD = relative percent difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$



GEENGINEERS INC.  
2405 - 140th AVE. N.E., SUITE 105  
BELLEVUE, WASHINGTON 98005  
206-746-5200

PROJECT LOC. SEATTLE

PROJECT NAME CHURN SEA TLE

GEI FILE NO. 32-068-BBY

CHAIN OF CUSTODY RECORD

SAMPLED BY JIM WHITBREAO

DATE 02/19/90

SAMPLE No.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
MWS	02/19			WATER	NO	NO	8020 (BETA), 8015	2	
MW6							8020 (BETA), 8015	2	
MW12									
MW9									
MW10									
MW11									
MW7									
MW14									
RELINQUISHED BY (SIGNATURE)							RECEIVED BY (SIGNATURE)		
NAME <u>J.P. SEA CONSULTING</u> FIRM <u>SEA CONSULTING</u>				DATE	TIME		NAME <u>R.P.A. SEA CONSULTING</u> FIRM <u>SEA CONSULTING</u>	DATE	TIME
				02/20/90	0:20			2/20/90	8:50
RELINQUISHED BY (SIGNATURE)							RECEIVED BY (SIGNATURE)		
NAME <u>J.P. SEA CONSULTING</u> FIRM <u>SEA CONSULTING</u>				DATE	TIME		NAME <u>J.P. SEA CONSULTING</u> FIRM <u>SEA CONSULTING</u>	DATE	TIME
				2/20/90	9:45			2/20/90	9:45

ADDITIONAL COMMENTS: ANALYZE ALL SAMPLES FOR BETA, BY 8020 AND 8015, PLEASE INCLUDE

CHECKIN OF CUSTODY W/REPORT

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: GeoEngineers, Inc.

Date: February 23, 1990

Revised: June 25, 1990

Report On: Analysis of Water

Lab No.: 9960

GeoEngineers

JUN 26 1990

IDENTIFICATION:

Sample Received on 2-21-90

Project: 0372-068-B04 Chevron, Seattle

Client ID: MW-13

Routing

KRF K CH

-----  
ANALYSIS:


Concentration, ppm

Benzene	< 0.001
Toluene	0.045
Ethyl Benzene	0.078
Xylenes	0.176
Total Petroleum Fuel Hydrocarbons	< 10

Analysis Procedures: BTEX by EPA SW-846 Method 8020  
TPH by EPA SW-846 Modified Method 8015

Revisions made on the project identification on this lab report, number 9960.

SOUND ANALYTICAL SERVICES

  
C. LARRY ZURAW

GEOENGINEERS INC.  
 2405 - 140th AVE. N.E., SUITE 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

PROJECT LOC. SEATTLE  
 PROJECT NAME  
 GEI FILE NO. 0372-068-Bo4

CHAIN OF CUSTODY RECORD

SAMPLED BY LANCE MILLER DATE 2/20/90

SAMPLE No.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
MW-13	2/20	1830		WATER	NO	NO	3020 (BETX) & DIS	2	

RELINQUISHED BY (SIGNATURE)  
LANCE MILLER  
 FIRM GEOENGINEERS, INC.  
 DATE 2/21 TIME 0845 RECEIVED BY (SIGNATURE)  
STAN PEGRAM  
 FIRM FARNESI 375  
 DATE 2/21/90 TIME 10:35 AM  
 RECEIVED BY (SIGNATURE)  
Stan Pegram  
 FIRM Stan Pegram  
 DATE 2/21/90 TIME 10:35 AM

ADDITIONAL COMMENTS:

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922- 5047

Report To: GeoEngineers

Date: February 2, 1990

Report On: Analysis of Liquid Product Lab No.: 9710

IDENTIFICATION:

Sample Received on 2-2-90

Project: 0372-068 Chevron Seattle

Client ID: MW-4 #1

FEB - 8 1990

Ch #

ANALYSIS:

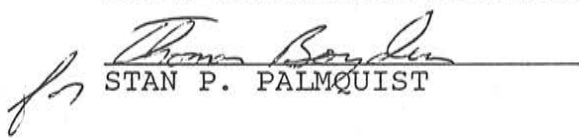
Total Petroleum Fuel Hydrocarbons, ppm ..... 850,136  
by EPA SW-846 Modified Method 8015

TPH as ..... Gasoline

API Gravity ..... 52.5

Flash PMCC<sup>o</sup>F ..... < 70

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

2405 - 140th Ave. N.E., Suite 105  
 BELLEVUE, WASHINGTON 98005  
 206-746-5200

PROJECT LOC. *Seattle, Wa*  
 PROJECT NAME *Cherron*  
 GEI FILE NO. *0372-068*

CHAIN OF CUSTODY RECORD

SAMPLED BY *Craig Nelson* DATE *2/11/90*

SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS	RECEIVED BY (SIGNATURE)	DATE	TIME
										NAME	DATE	TIME
<i>#1</i>	<i>2/11/90</i>	<i>11:30</i>	<i>-</i>	<i>product</i>	<i>No</i>	<i>NONE</i>	<i>(modified, 8015) API Gravity Flash Point</i>	<i>1</i>		<i>[Signature]</i>	<i>2/2/90</i>	<i>09:20</i>
										<i>[Signature]</i>	<i>2/2/90</i>	<i>10:44</i>

RECEIVED BY (SIGNATURE) NAME FIRM DATE TIME  
 RECEIVED BY (SIGNATURE) NAME FIRM DATE TIME

ADDITIONAL COMMENTS:  
*Please analyze the product for (EPA method 8015, modified),  
 A.P.I. Gravity and Flash Point.*