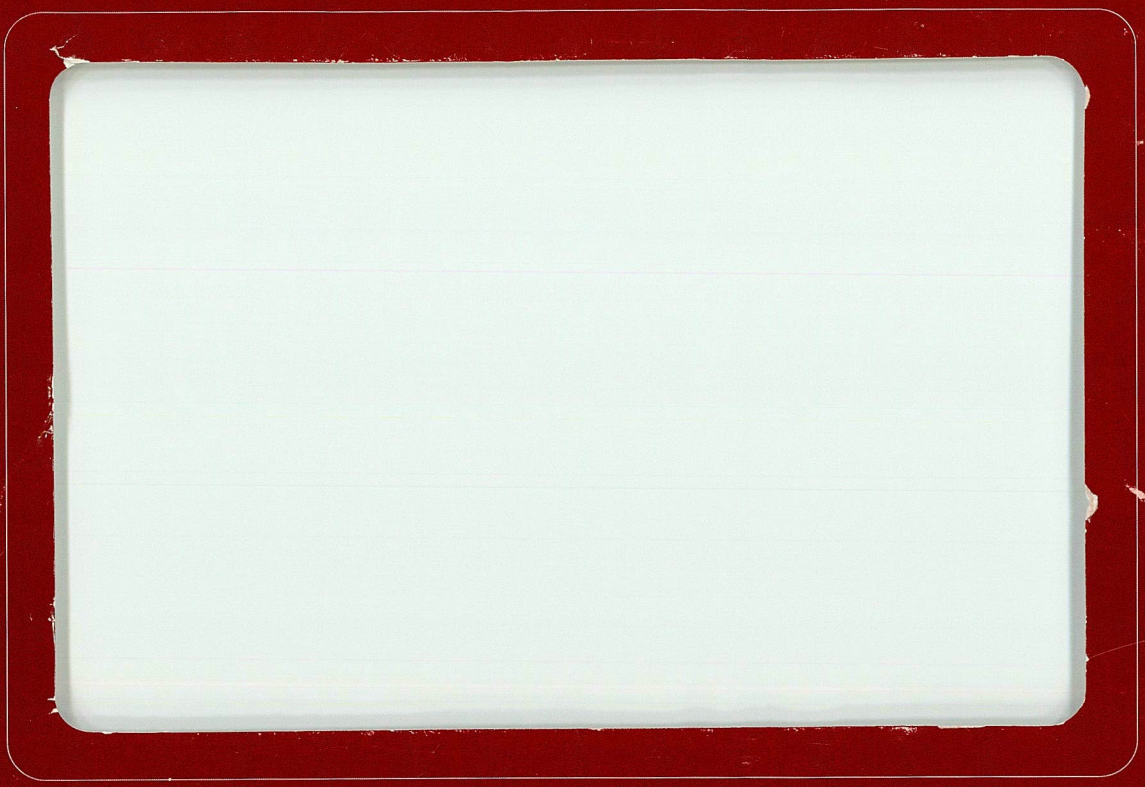


NORTHWEST ENVIROCON INC.

INDUSTRIAL HYGIENE
ENVIRONMENTAL ENGINEERING

OFFICES NATIONWIDE

03-93-0008

QUARTERLY GROUND WATER MONITORING REPORT

Delco Company (formerly Flying J)
17873 SE McLoughlin Boulevard
Milwaukie, Oregon 97267

Project Number 16122

Prepared for:
Devinder Dhillon
14 Longleaf Drive
Hamilton Square, New Jersey

October 12, 1994

Prepared by:
Laure Brown, CHMM

Northwest Envirocon, Inc.
7410 Delaware Lane
Vancouver, Washington 98664
(206) 699-4015

TABLE OF CONTENTS

1.0 INTRODUCTION

This report is to summarize the first quarter ground water sampling event that took place at the Delco facility (formerly Flying J) in Milwaukie, Oregon on July 18 and 19, 1994. This site is located at 17873 McLoughlin Boulevard, in Milwaukie, Oregon, as shown in Figure 1. Ground water was sampled on July 19, 1994 from each of six (6) monitoring wells on the site. Analytical results indicated that the benzene concentration in all six wells exceeds the Oregon Cleanup Level of 5 parts per billion (ppb). The ethylbenzene concentration in MW-4 exceeds the Oregon Cleanup Level of 700 ppb. Free product was discovered in MW-3. Weekly sampling and manual removal of free product has been conducted since July 19, 1994. Free product has not been observed in the other five (5) monitoring wells.

1.1 Objective

The purpose of this investigation was to ascertain the environmental impact of a petroleum hydrocarbon plume to the ground water at the Delco (formerly Flying J) gasoline station in Milwaukie, Oregon.

1.2 Background

In May of 1993, Delta Environmental in Bellevue, Washington conducted a Phase I Environmental Assessment of the Flying J (now Delco) gasoline station in Milwaukie, Oregon. Conclusions based on the results of the Phase I indicated the likelihood the facility may have had an unauthorized release and a Phase II preliminary site characterization was initiated. Geotech Exploration drilled five soil borings in prearranged locations within the property's boundaries. The borings did not penetrate the soil/groundwater interface. Soil samples were collected from each of the borings and analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), total petroleum hydrocarbons (TPH) and total petroleum hydrocarbons as gasoline (TPH-G). Concentrations of BTEX and TPH were found in the soil samples in levels high enough to warrant additional drilling on the site. All five borings were subsequently abandoned with concrete after the investigation was concluded.

In June of 1993, Geotech Explorations and Delta Environmental drilled six monitoring wells on site to evaluate the potential environmental impact to ground water. According to the Delta Environmental Phase III report (contained in Table 1), the wells on the site are constructed of flush-jointed, 2-inch diameter, schedule 40 PVC pipe, fitted with 10-foot long, 0.020-inch factory slotted well screens. In each well, the screen was set at a depth which intersected the groundwater surface observed at the time of the drilling, and was surrounded by a washed silica sand filter pack to a level at least one foot above the top of the screened interval. The remaining borehole was filled with bentonite, and the well was completed with a concrete seal and a flush-mounted locking steel protective casing at the ground surface.

The results of the sampling conducted in June 1993 indicated that soils from borings MW-1 through MW-5 contained concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX), total petroleum hydrocarbons (TPH) and total petroleum hydrocarbons as gasoline (TPH-G). Benzene and TPH were above Oregon Cleanup Levels in borings MW-1 through MW-5. Ground water was sampled and analyzed from each of the six wells for BTEX, TPH, and TPH-G. Laboratory analysis of the water samples obtained indicated that MW-1 through MW-5 contained concentrations of benzene and TPH which exceeded Oregon cleanup levels. MW-6 however, showed concentrations of benzene and TPH below Oregon cleanup requirements.

Since the completion of Delta Environmental Phase III in June 1993, the ground water on this site had not been sampled until July 1994 when Northwest Envirocon, Inc. was retained by Mr. Devinder Dhillon to sample the ground water from each of the six monitoring wells previously drilled by Geotech Explorations.

2.0 GROUND WATER MONITORING ACTIVITIES

2.1. Groundwater Sampling Methods

To ensure representative ground water samples were obtained, on July 18, 1994 Northwest Envirocon field technicians purged approximately five well volumes from each of the monitoring wells using a Graco® Husky 715 pump. The purged water from each well was collected and stored in individual 55-gallon drums on the site. Static water level measurements were taken using a Slope® Water Level Indicator. Water samples were collected using a disposable bailer for each well.

The six wells on site are fast recharging wells, and each well was allowed to recharge to at least 80 percent of its original volume prior to sampling. The ground water was then sampled using a new, pre-wrapped Voss® single sample disposable bailer and a new set of latex gloves for each well. Bailer twine was replaced between each sampling event to decrease the risk of cross-contamination. Water was discharged from a single check valve on the bottom of the bailer into two (2) 40 milliliter glass VOA vials which were supplied by Wy'East Laboratory. The samples were collected with no headspace in the vials. The water sample vials were labeled and stored in a cooler with ice packs and transported to Wy'East Laboratory in Portland with the appropriate chain-of-custody. Copies of the chain-of-custody and laboratory results are contained in Table 2.

Static water level measurements were recorded at each well with a Slope® Water Level Indicator. The measurements were taken from the asphalt surface. The levels obtained from each well are indicated below.

Monitoring Well	Depth to ground water
MW-1	7.21 feet
MW-2	9.01 feet
MW-3	6.28 feet
MW-4	6.75 feet
MW-5	7.95 feet
MW-6	7.52 feet

Based on the ground water measurements, the Delta Phase III report indicated that the inferred ground water flow direction is to the west-northwest.

2.3 Ground Water Analysis and Results

Northwest Envirocon conducted the quarterly ground water sampling on July 19, 1994. A total of twelve 40-milliliter VOA vials (two from each well) were analyzed by Wy'East Laboratory for BTEX. The results were compared to the Oregon UST Cleanup Levels [340-122-242(4)]. Laboratory analysis revealed that all six monitoring wells exceed the Oregon cleanup level of 5 parts per billion (ppb) benzene, and one well exceeds the 1,000 ppb cleanup level for ethylbenzene. All six wells were below the recommended cleanup levels for xylene (10,000 ppb)

and toluene (1,000 ppb). The highest concentration of benzene and ethylbenzene was discovered in MW 4 (7,460 ppb and 2,730 ppb respectively) to the west of the UST basin. Monitoring well #4 was the only well that exceeded cleanup levels for more than one constituent (benzene and ethylbenzene). The second highest level of benzene was found in MW 1 to the southwest of the pump islands (770 ppb). The third, fourth, and fifth highest concentrations for benzene were discovered in MW 5 southwest of the UST basin (237 ppb), MW 3 east of the UST basin (226 ppb), and MW 2 north of the pump islands (25 ppb), respectively. MW 6 had the lowest concentration of benzene (14 ppb) and is located on the south end of the Jiffy Lube building. A copy of the laboratory results and chain-of-custody can be found in Table 2.

3.0 FREE PRODUCT RECOVERY

Free product was observed during the ground water sampling in MW-3, east of the diesel fuel pump. Free product has been manually removed on a weekly basis since July 19, 1994 and has not been observed in the other five monitoring wells. The bailed free product and ground water are stored in a 55-gallon drum on the site. The chart below summarizes free product recovery activities:

Week of	Amount of product observed in bailer	Number of bailer volumes removed
July 17	1/2 to 3/4 inch	4 volumes
July 24	1/2 to 3/4 inch	4 volumes
July 31	1/2 to 3/4 inch	5 volumes
August 7	1/2 inch	5 volumes
August 14	1/2 inch	6 volumes
August 21	1/2 inch	6 volumes
August 28	1/2 inch	6 volumes
September 4	1/4 inch	6 volumes
September 11	less than 1/4 inch	6 volumes
September 18	less than 1/4 inch	6 volumes
September 25	less than 1/4 inch	8 volumes
October 2	only residue on outside of bailer - no layer of product	6 volumes
October 9	residue on outside of bailer	5 volumes

A photograph was taken of the first bailer volume sampled from the well the week of July 31, 1994 and again the week of September 4, 1994. As the photographs and the chart above

indicate, the amount of free product observed in MW3 has decreased since manual removal of product began on July 18, 1994. By the week of October 2nd, a sheen of product residue was observed on the outside of the bailer. The water in the bailer did not have a product layer as seen in the previous weeks. The photographs are contained in the Appendix.

The well caps from MW1, MW2 and MW3 were replaced with new, tighter fitting caps the week of September 11th. The remaining well caps were replaced the week of October 2nd.

4.0 RECOMMENDATIONS

The results of this sampling event indicate that MW6 has been impacted since the last sampling event in June 1993. Since all of the monitoring wells on the site detected benzene above Oregon cleanup levels, we recommend the installation of additional monitoring wells on the property to further delineate the extent of the plume.

This Assessment has been performed in accordance with generally accepted environmental practices and procedures, as of the date of the Report. All services have been performed employing that degree of care and skill ordinarily exercised under similar circumstances by reputable environmental technologists practicing in this, or similar localities. No other warranty or guarantee, expressed or implied, is made or offered.

The conclusions and recommendations stated in this Report are based upon observations made by employees of Northwest Envirocon, Inc. and also upon information provided by others. We have no reason to suspect or believe that the information provided is inaccurate. However, we cannot be held responsible for the accuracy of the information provided to us by others.

5.0 APPENDIX

FIGURES

1. Topographic Map

2. Site Diagram

TABLES

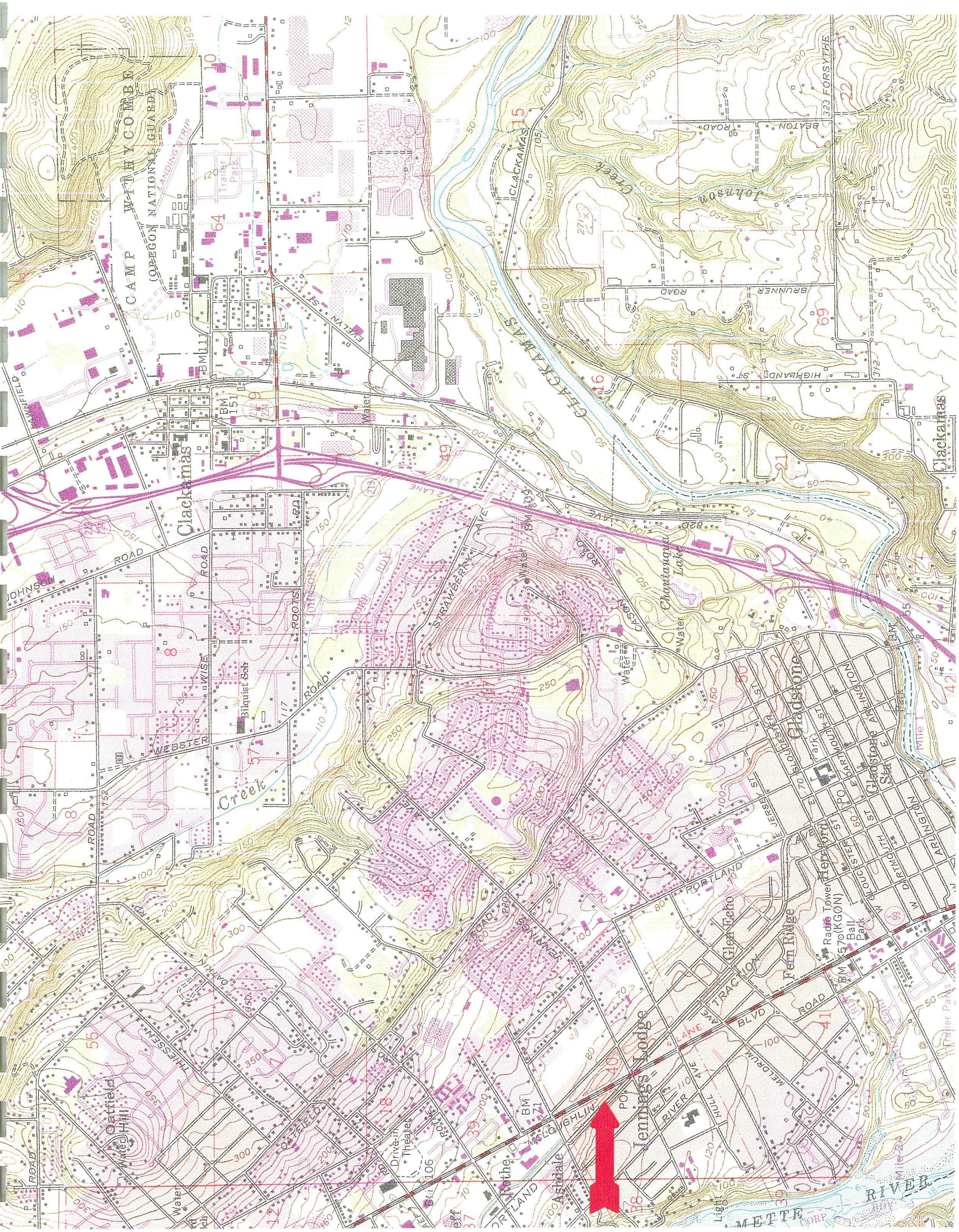
1. Delta Environmental Phase III Report

2. Laboratory Results and Chain of Custody

PHOTOGRAPHS

FIGURE 1

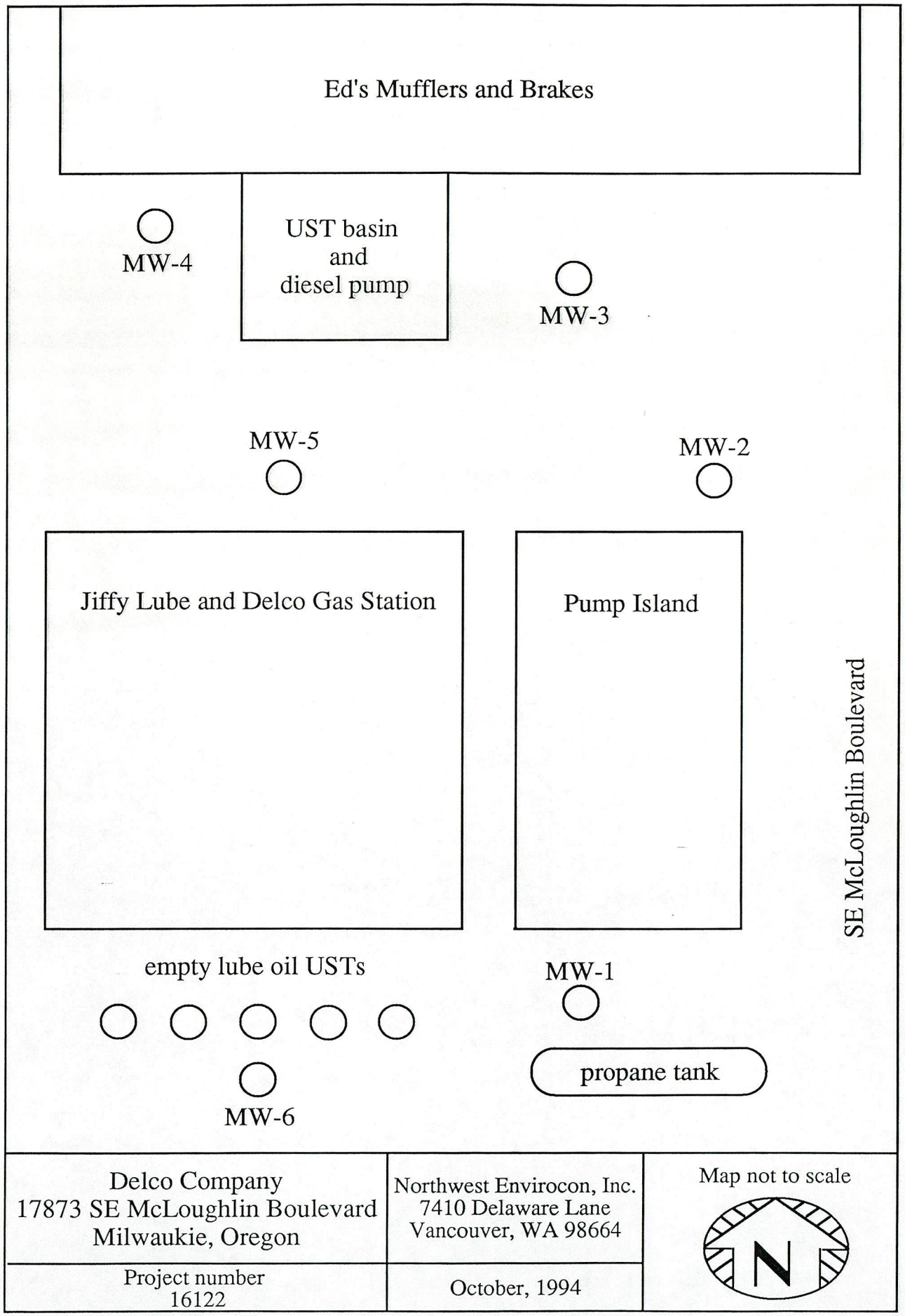
TOPOGRAPHIC MAP



CAMP WITHYCOMBE
(OREGON NATIONAL GUARD)
LANDING STRIP
Trailer Park
Pit
CLACKAMAS
Clackamas
Johnson Creek
BEATON ROAD
FORSYTHE
BRUNNER ROAD
HIGHLAND ST
JOHNSON ROAD
ROOTS RD
WISE
Bilquist Sch
WEBSTER ROAD
Creek
STRAWBERRY LANE
Chautauqua Lake
Water
Gladstone
ARLINGTON
DARTMOUTH ST
GLOUCESTER ST
PORTLAND AVE
Glen Echo
Fern Ridge
Radio Tower (KGON)
Ball Park
TRACTION
BLVD
MELDRUM
RIVER
HULL
Jennings Lodge
Ashdale
Drive-in Theater
OATFIELD ROAD
THIESSEN RD
Oatfield Hill
McLOUGHLIN
RIVER

FIGURE 2

SITE DIAGRAM



Delco Company 17873 SE McLoughlin Boulevard Milwaukie, Oregon	Northwest Envirocon, Inc. 7410 Delaware Lane Vancouver, WA 98664	Map not to scale N
Project number 16122	October, 1994	

TABLE 1

DELTA ENVIRONMENTAL PHASE III

PHASE III
ENVIRONMENTAL ASSESSMENT REPORT

JIFFY LUBE INTERNATIONAL STORE #1012
17869 S.E. McLOUGHLIN BOULEVARD
MILWAUKIE, OREGON

DELTA PROJECT NO. 43-93-011

Prepared By:

DELTA ENVIRONMENTAL CONSULTANTS, INC.
3150 Richards Road, Suite 100
Bellevue, Washington 98005
(206)649-9663

TABLE OF CONTENTS

PHASE III ENVIRONMENTAL ASSESSMENT REPORT

JIFFY LUBE INTERNATIONAL STORE #1012
17869 S.E. McLOUGHLIN BOULEVARD
MILWAUKIE, OREGON

DELTA PROJECT NO. 43-93-011

1.0 EXECUTIVE SUMMARY

A third phase of investigation was conducted at the Jiffy Lube International Store #1012, 17869 S.E. McLoughlin Boulevard, Milwaukie, Oregon, to assess the potential for environmental concerns at the property. The investigation involved drilling six soil borings and installing six monitoring wells at locations throughout the subject site, collecting representative soil samples, taking water level measurements and collecting groundwater samples from the monitoring wells. The soil sample results indicated that the soils tested from MW-1 through MW-5 contained concentrations of benzene, toluene, ethylbenzene, xylenes (BTEX), total petroleum hydrocarbons (TPH) and total petroleum hydrocarbons as gasoline (TPH-G). In general, detected levels of benzene and TPH are above acceptable Oregon Cleanup Levels in samples from borings MW-1 through MW-5. The soil sample from MW-6 did not contain detectable levels of benzene. Concentrations of TPH-G were detected only in MW-1 at levels above the Oregon Action Levels. Groundwater sample results indicated that the samples from MW-1 thru MW-5 contained concentrations of BTEX compounds. Benzene concentrations were detected in all five of these monitoring wells above the acceptable Oregon Cleanup Levels. Toluene was detected in monitoring wells MW-1, MW-3, and MW-4 above the Oregon Cleanup Levels and ethylbenzene and xylenes were detected in MW-3 in excess of the Oregon Cleanup Levels. The sample from MW-6 did not contain detectable BTEX concentrations.

2.0 INTRODUCTION

2.1 Background Information

Two phases of investigation were conducted at the Jiffy Lube International Store #1012, between May 12, 1993 and May 27, 1993. The phase I study involved an in-depth look at historical and potential environmental impacts to the project site. The phase II study involved drilling five soil borings, collecting and analyzing samples and comparing the results with the Oregon Department of Environmental Quality (DEQ) clean up criteria. In order to evaluate the potential for groundwater impacts from the facility a third phase investigation was conducted.

2.2 Scope of Work

An investigation was conducted at the Jiffy Lube International Store #1012, 17869 S.E. McLoughlin Boulevard, in Milwaukie, Oregon (Figure 1), on June 18, 1993 and June 21, 1993 by Delta Environmental Consultants, Inc. (Delta). The purpose of the investigation was to further assess the potential for environmental concerns at the

property. The scope of work included the following:

- Drilling six soil borings, collecting representative soil samples and installing monitoring wells;
- Analyzing soil samples for BTEX and TPH;
- Collecting groundwater samples and water level measurements;
- Analyzing groundwater samples for BTEX, TPH, TPH-G;
- Preparing a summary report.

3.0 SITE ACTIVITIES

3.1 Drilling and Monitoring Well Installation

On June 18, 1993, six soil borings (MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6) were drilled on-site, generally in the area surrounding the underground storage tank basin and adjacent to the former lube oil tanks. A subcontracted drilling company performed this work under the direction of a Delta representative. The selected monitoring well locations are indicated on Figure 2.

The borings were drilled and sampled utilizing a hollow stem auger that had been steam cleaned prior to use. Soil samples were obtained at 2.5 foot depth intervals of using split-spoon samplers that were decontaminated prior to each use. Soil samples were screened using a photoionization meter (h-Nu). A portion of each sample was retained in a laboratory prepared glass bottle for potential analyses. The remaining portion of the sample was used for soil classification. After completion of the field drilling program, the field screening results were reviewed, and the sample from a depth closest to the groundwater interface in each boring was submitted for laboratory analyses.

The soil borings were drilled to total depths ranging from 15.0 feet to 16.5 feet. Soil boring logs have been included in Appendix A, which indicate the soil conditions encountered during drilling.

Monitoring wells were installed in each of the soil borings at the time it was drilled. Details of the monitoring well construction are indicated on the monitoring well installation diagrams in Appendix B.

3.2 Groundwater Sampling and Water Level Measurements

On June 21, 1993, water level measurements were taken and the monitoring wells were purged to remove sediment and increase hydrologic communication with the surrounding formation. Ground water was then

sampled for laboratory analyses. Immediately prior to sampling, at least three well volumes were bailed from each of the wells using a new, disposable polyethylene bailer and nylon cord for each well. Water samples were collected in laboratory prepared bottles, chilled and held under chain of custody until delivered to the laboratories of Alden Analytical Laboratories Inc., in Seattle, Washington.

The top of each well casing was surveyed relative a temporary benchmark assigned an elevation of 100.00 feet for the purposes of this study.

Based on the water level measurement, ground water migration was inferred toward the west-northwest with a hydraulic gradient of 0.001 feet per foot as measured between monitoring wells MW-1 and MW-5. An inferred groundwater contour map is included as Figure 3.

3.3 Laboratory Analytical Data

3.3.1 Soil Samples

One soil sample from each boring was submitted for laboratory analysis for benzene, toluene, ethylbenzene, xylene (BTEX) by EPA Method 8020, total petroleum hydrocarbons (TPH) by a modified EPA Method 418.1 I.R. analysis preferred by the Oregon Department of Environmental Quality (DEQ) and total petroleum hydrocarbons as gasoline (TPH-G). The sample identification, sample depths, and analytical results are shown in Table 1.

The analytical results indicate that the soil samples from monitoring well MW-1 through MW-5 have concentrations of benzene and TPH above the Oregon cleanup levels. Benzene concentrations ranged from 0.51 ppm in MW-1 to 23.0 ppm in MW-2, located near the south and north ends of the pump islands, with an action level of 0.1 ppm. Total petroleum hydrocarbons were detected in all of the soil samples, ranging from 110 ppm in MW-1 to 1,100 ppm in MW-2. Total petroleum hydrocarbons as gasoline were detected above the detection limit in monitoring wells MW-1 through MW-5, however, only MW-1 had concentrations exceeding the an Oregon Soil Matrix Cleanup Level of 80.0 ppm.

3.3.2 Groundwater Samples

Groundwater analytical results indicate that benzene concentrations were detected in monitoring wells MW-1 through MW-5. Concentrations ranged from 0.14 ppm in MW-2 to 3.50 ppm in MW-4, above the DEQ action

level of 0.005 ppm. Toluene concentrations in excess of DEQ cleanup levels were detected in MW-1, MW-3, and MW-4. Ethylbenzene and xylenes concentrations above DEQ criteria were detected in MW-3. Lower concentrations on ethylbenzene and xylenes were detected in all of the other monitoring wells with the exception of MW-6.

The results of the soil sample laboratory analyses are summarized in Table 1, the groundwater analytical results are shown in Table 2 and the laboratory reports are attached in Appendix B.

4.0 METHODOLOGIES

4.1 Locating Underground Utilities

Prior to the commencement of work on site, Delta researched the locations of all underground utilities with the assistance of Underground Utility Located Services. On June 16, 1993, Underground Utility Located Services was on site to determine and mark the locations of all the underground utilities. Work associated with the drilling was preceded by hand-digging of the soil borings to a minimum depth of 4 feet to avoid contact with underground fuel distribution lines, vent lines and other unmarked utilities.

4.2 Drilling and Soil Sampling Procedures

Soil borings and soil sampling were performed under the direction of a Delta field geologist. The soil borings were advanced using a truck-mounted drill rig utilizing hollow-stem augers.

Soil sampling was done in general accordance with procedure ASTM 1586-84. Samples were placed in glass jars as well as plastic bags for later screening with a photoionization detector (h-Nu). The jarred samples were placed in a iced cooler for transport to the laboratory. The soil samples were submitted to Alden Analytical Laboratory, Inc. of Seattle, Washington, accompanied by a Chain-of-Custody form.

4.3 Decontamination Protocol

To reduce the chances of cross contamination between boreholes, all down-hole drilling equipment was cleaned between each soil boring. To reduce cross contamination between samples, the split-barrel sampler was washed in a soap solution and double rinsed between each sampling event.

4.4 Soil Classification

As the samples were obtained in the field, they were classified by the Delta geologist in general accordance with the Unified Soil Classification System as outlined in ASTM:D2488-84. Logs of the borings indicating the depth and identification of the various strata, the blow counts, water-level information and pertinent information regarding the method of maintaining and advancing the bore holes were completed. The boring logs are included in Appendix A.

4.5 Monitoring Well Installation

The monitoring wells were constructed of flush-jointed, 2-inch diameter, schedule 40 PVC pipe, fitted with 10-foot long, 0.020-inch factory slotted well screens. In each well, the screen was set at a depth which intersected the groundwater surface observed at the time of drilling, and was surrounded by a washed silica sand filter pack to a level at least one foot above the top of the screened interval. The remaining borehole was filled with bentonite, and the well was completed with a concrete seal and a flush-mounted locking steel protective casing at the ground surface.

5.0 CONCLUSIONS

Silty sand soils underlie the site to a depth of approximately 15 feet below the ground surface. A silty clay wa encountered in all soil borings at shallow depths. Ground water was encountered at approximately 7 feet belo ground surface.

Soil samples submitted from MW-1 through MW-5 for analyses contained benzene concentrations in excess o established Oregon Clean-up Levels. TPH and TPH-G concentrations were detected in the samples from all o the borings, the samples from MW-3 containing concentrations above Oregon Cleanup criteria.

Groundwater samples indicated concentrations of BTEX compounds above Oregon Cleanup Levels in monitori well MW-1 thru MW-5.

The conclusions contained in this report represent our professional opinions. These opinions are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location and are subject to the inherent limitations of the proposed work.

Delta's report is prepared in accordance with the proposal and the standard terms and conditions presented in the service contract, and no other warranties, representations, or certifications are made.

Delta has been pleased to be of service in this matter. If you have any questions regarding the information contained in this report, or if we may be of any further assistance, please feel free to contact us.

Respectfully submitted,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

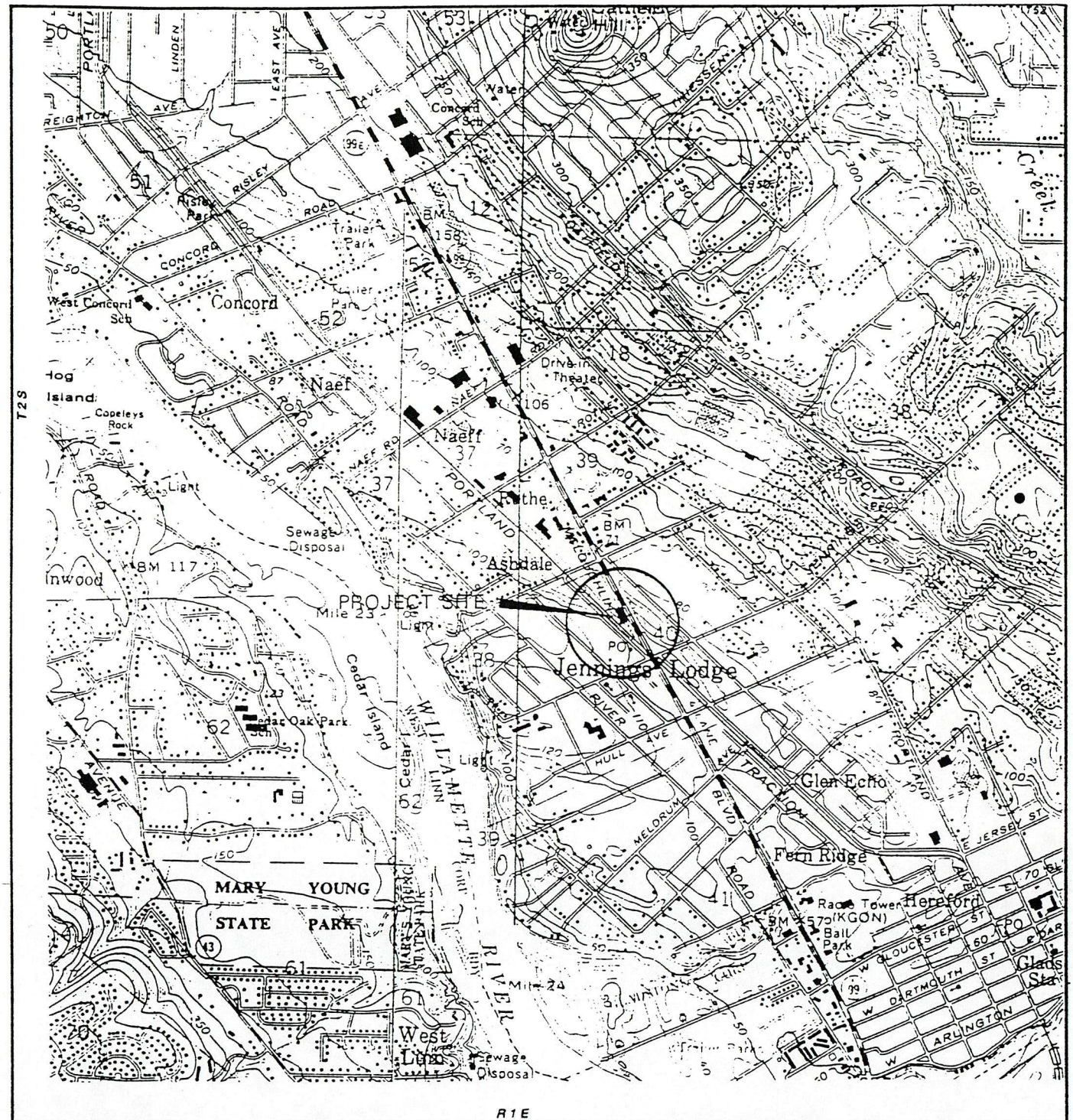
PREPARED BY:

(for Patti A. Crump)

Patricia A. Crump
Staff Professional

Daniel S. Whitman
Senior Environmental Geologist

FIGURES



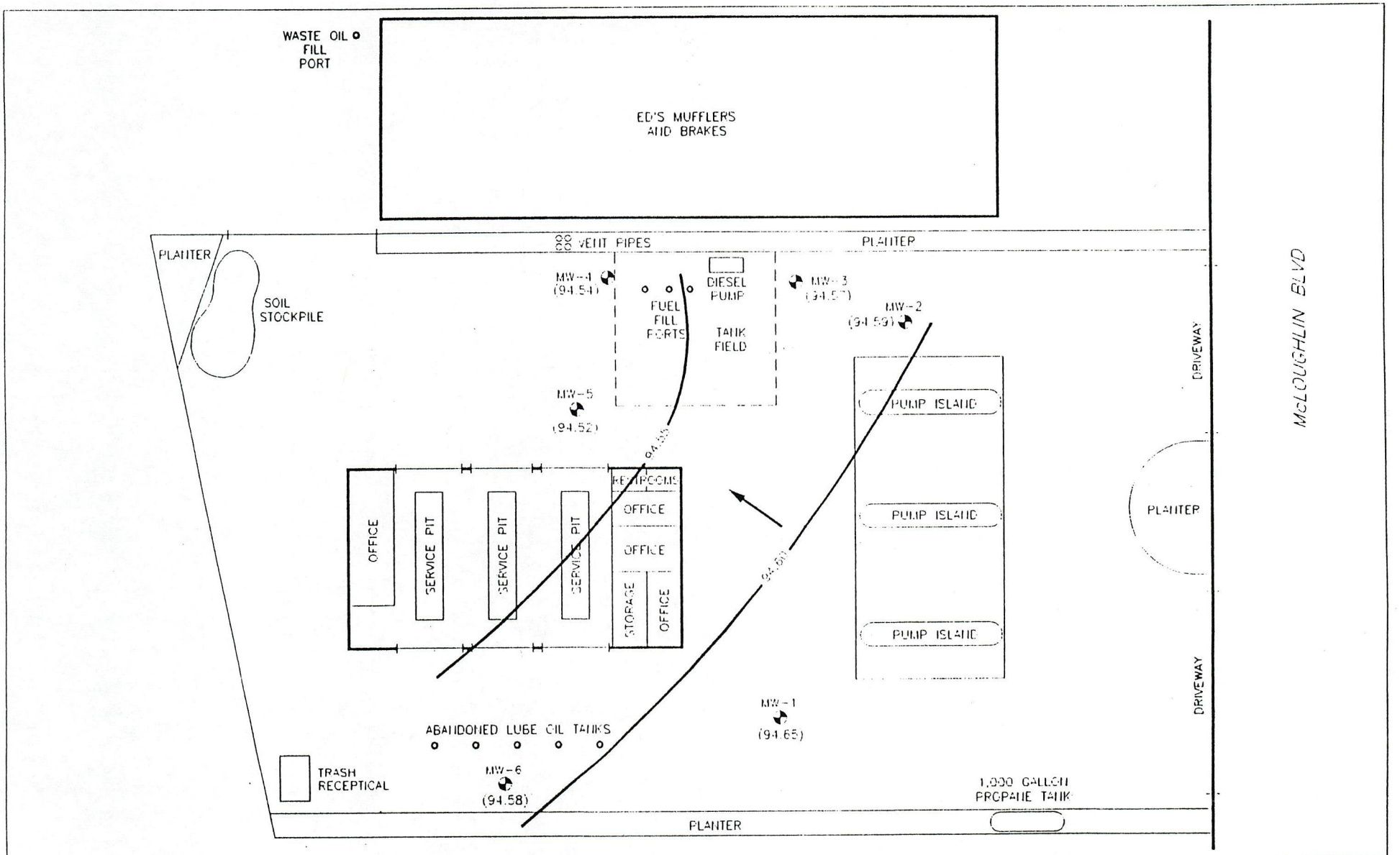
GENERAL NOTES:
BASE MAPS FROM U.S.G.S.
MILWAUKIE, OR
7.5x15 MIN TOPOGRAPHIC
PHOTOREVISED 1984

FIGURE 1
SITE LOCATION MAP

JIFFY LUBE INTERNATIONAL STORE #1012
17869 MCLOUGHLIN BOULEVARD
MILWAUKIE, OREGON

Project No.	Drawn By:
43-93-011	PAC
File No.	Prepared By:
FIG4011	PAC
Revision No.	Reviewed By:
0	

Delta Environmental Consultants, Inc.



LEGEND:

- MW-1 — MONITORING WELL LOCATION
- (94.65) — GROUND WATER ELEVATION IN FEET RELATIVE TO AN ASSUMED BENCH MARK
- 94.60 — INFERRED WATER TABLE CONTOUR IN FEET RELATIVE TO AN ASSUMED BENCH MARK
- INFERRED GRADIENT DIRECTION

North

0 30 FT

APPROX. SCALE

FIGURE 3

INFERRED WATER TABLE CONTOUR MAP – 6/21/93

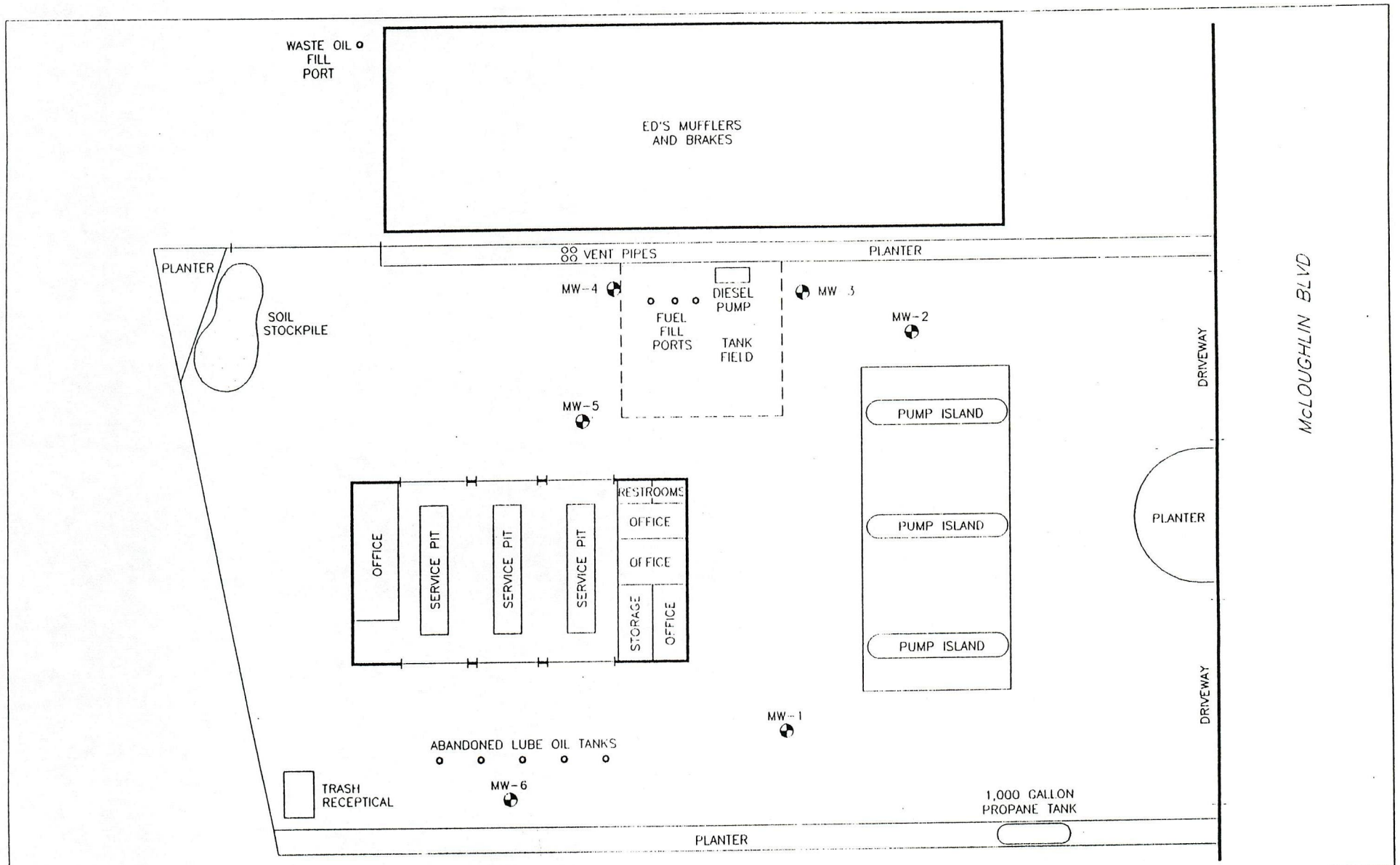
JIFFY LUBE INTERNATIONAL STORE #1012

17869 S.E. McLOUGHLIN BOULEVARD

MILWAUKIE, OR.

PROJECT NO. 43-93-011	DRAWN BY I.H. 7/13/93
FILE NO. 43930111A	PREPARED BY PAC
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.



LEGEND:

MW-1 MONITORING WELL LOCATION

North

0 30 FT

APPROX. SCALE

FIGURE 2

MONITORING WELL LOCATION MAP

JIFFY LUBE INTERNATIONAL STORE #1012

17869 S.E. McLOUGHLIN BOULEVARD

MILWAUKIE, OR.

PROJECT NO. 43-93-011	DRAWN BY I.H. 7/13/93
FILE NO. 4393011A	PREPARED BY PAC
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
Jiffy Lube International Store #1012
Milwaukie, Oregon
Delta Project No. 43-93-011

Sample ID	Date	Sample Depth (in feet)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Total-Xylenes (ppm)	TPH-418.1 (ppm)	TPH-G (ppm)
MW-1	6/18/93	5	0.51	0.044	0.15	1.05	110	87
MW-2	6/18/93	5	23.0	0.32	9.80	40.5	1,100	29
MW-3	6/18/93	5	3.80	49.0	51.0	289	680	62
MW-4	6/18/93	5	4.60	0.52	6.00	10.5	120	8.4
MW-5	6/19/93	5	2.90	0.084	1.30	3.25	210	13
MW-6	6/19/93	5	<0.03	<0.03	<0.03	<0.03	160	<2.0
Laboratory Method:			EPA 8240	EPA 8240	EPA 8240	EPA 8240	EPA 418.1 Modified	Oregon TPH-G
Oregon Cleanup levels:			0.1	80.0	100.0	800.0	80.0	80.0*

All concentrations are reported in mg/kg (ppm).
* Evaluation of Soil Matrix Cleanup Levels (level 2).

TABLE 2
GROUNDWATER SAMPLE ANALYTICAL RESULTS
Jiffy Lube International Store #1012
Milwaukie, Oregon
Delta Project No. 43-93-011

Sample ID	Date	Groundwater Depth (in feet)	Groundwater Elevation* (in feet)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Total-Xylenes (ppm)
MW-1	6/21/93	5.02	94.65	0.910	1.30	0.470	2.09
MW-2	6/21/93	4.20	94.59	0.140	0.013	0.020	0.075
MW-3	6/21/93	4.00	94.57	1.60	3.80	1.90	10.1
MW-4	6/21/93	4.76	94.54	3.50	1.50	0.42	2.36
MW-5	6/21/93	6.14	94.52	0.50	0.75	0.18	1.09
MW-6	6/21/93	5.71	94.58	<0.001	<0.001	<0.001	<0.001
Laboratory Method:				EPA 8240	EPA 8240	EPA 8240	EPA 8240
Oregon Cleanup levels:				0.005	1.000	0.700	10.000

All concentrations are reported in mg/l (ppm).
* - Groundwater elevation relative to an on-site benchmark datum assigned an elevation of 100.00 feet for the purposes of this study.

APPENDICES

APPENDIX A

APPENDIX A

Soil Boring Logs

PROJECT NAME/LOCATION:	Project Number	43-93-011	Boring Number	MW-1
Jiffy Lube Internation Store #1012 17869 S.E.McLoughlin Boulevard Milwaukie, OR	Contractor	Geotech Explorations	Drilling Method	6 1/4" Hollow Stem Auger
	Driller	Mike Reneker	Drilling Rig	B-61
	Start	8:36 a.m. 06/18/93	Completed	9:16 a.m. 06/18/93
Landowner: Flying J Corporation	Surface Elev.	-----	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: hNu Units: ppm	Observations Comments
					0	Asphalt Concrete and Gravel Base		
					1			
SS	1	4 9 8	2.5-4.0	6	2	GRAVELY SILT; dark grey, damp	0	
					3			
					4			
SS	2	1 1 1	5.0-6.5	6	5	GRAVELY SILT; dark grey, damp	0	
					6			
SS	3	3 6 7	7.5-9.0	6	7	MEDIUM GREY CLAY; trace silt, damp	0	
					8			
					9			
SS	4	3 3 5	10.0-11.5	6	10	DARK GREY CLAY; trace silt, damp	0	
					11			
SS	5	0 2 4	12.5-14.0	6	12	DARK GREY CLAY; trace silt, damp	0	
					13			
					14			
SS	6	5 9 12	15.0-16.5	6	15	DARK GREY FINE-MEDIUM SAND; wet	0	
					16			
					17	End of Soil Boring at 16.5 feet below ground surface. Monitoring Well MW-1 installed.		
					18			
					19			
					20			
					21			
					22			
					23			

BOREHOLE WATER LEVEL DATA			
Date	06/18/93		
Time	9:25 a.m.		
GWL	7.0 feet		
Casing Depth	15.0 feet		

Delta Environmental Consultants, Inc.

Sheet 1 of 1

Rev. July 8, 1993

PROJECT NAME/LOCATION:		Project Number	43-93-011	Boring Number	MW-2
Jiffy Lube International Store #1012 17869 S.E. McLoughlin Boulevard Milwaukie, OR		Contractor	Geotech Exploration	Drilling Method	6 1/4" Hollow Stem Auger
		Driller	Mike Reneker	Drilling Rig	B-61
		Start	10:23 a.m. 06/18/93	Completed	11:16 p.m. 06/18/93
Landowner:	Flying J Corporation	Surface Elev.	-----	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: Units: hNu ppm	Comments
					0	Asphalt Concrete and Gravel Base		
					1			
					2		30	
SS	1	2 5 6	2.5-4.0	6	3	SILTY CLAY; dark grey, damp		
					4			
SS	2	1 3 1	5.0-6.5	6	5	CLAY; trace silt, dark grey, damp	0	
					6			
					7			
SS	3	2 6 8	7.5-9	6	8	CLAY; trace silt, medium grey, moist-damp	0	
					9			
SS	4	2 3 3	10.0-11.0	6	10	CLAY; trace silt, dark grey, moist	0	
					11			
					12			
SS	5	2 3 6	12.5-14.0	6	13	CLAY; trace organics, moist	0	
					14			
SS	6	N/A	15.0-16.5	6	15	3" heave-no sample recovered	0	
					16	End of boring at 16.5 feet below ground surface. Monitoring Well MW-2 installed.		
					17			
					18			
					19			
					20			
					21			
					22			
					23			

BOREHOLE WATER LEVEL DATA

Date	06/18/93		
Time	11:25 a.m.		
GWL	7.0 feet		
Casing Depth	14.0 feet		

Delta Environmental Consultants, Inc.

PROJECT NAME/LOCATION:	Project Number	43-93-011	Boring Number	MW-3
Jiffy Lube International Store #1012 17869 S.E. McLoughlin Boulevard Milwaukie, OR	Contractor	Geotech Exploration	Drilling Method	6 1/4" Hollow Stem Auger
	Driller	Mike Reneker	Drilling Rig	B-61
	Start	10:58a.m. 05/27/93	Completed	11:25 p.m. 05/27/93
Landowner: Flying J Corporation	Surface Elev.	-----	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: hNu Units: ppm	Observations Comments
					0	Asphalt Concrete and Gravel Base		
SS	1	1 3 2	2.5-4.0	6	3	SANDY SILT; medium grey, damp	173 ppm	
SS	2	3 2 4	5.0-6.5	6	5	CLAYEY SILT; dark grey, moist	259 ppm	
SS	3	1 2 1	7.5-9.0	6	8	CLAY; trace silt, medium grey, damp	57 ppm	
SS	4	1 2 1	10.0-11.0	6	10	CLAY; trace silt, dark grey, damp	0	
SS	5	6 9 46	12.5-14.0	6	13	SANDY SILT; dark grey, wet	0	
SS	6	6 4 7	15.0-16.5	6	15	SAND; dark grey, fine-medium sand, wet	0	
					16	End of boring at 16.5 feet below ground surface. Monitoring Well MW-3 installed.		

BOREHOLE WATER LEVEL DATA			
Date	06/18/93		
Time	1:55 p.m.		
GWL	7.0 feet		
Casing Depth	15.0 feet		

Delta Environmental Consultants, Inc.

PROJECT NAME/LOCATION:		Project Number	43-93-011	Boring Number	MW-4
Jiffy Lube Internation Store #1012 17869 S.E.McLoughlin Boulevard Milwaukie, OR		Contractor	Geotech Explorations	Drilling Method	6 1/4" Hollow Stem Auger
		Driller	Mike	Drilling Rig	B-61
		Start	2:45 p.m. 06/18/93	Completed	3:23 p.m. 06/18/93
Landowner:	Flying J Corporation	Surface Elev.	------	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: hNu Units: ppm	Observations Comments
					0	Asphalt Concrete and Gravel Base		
SS	1	6 5 3	2.5-4.0	6	3	SILTY CLAY; dark grey, damp	33 ppm	
SS	2	4 3 1	5.0-6.5	6	5	CLAYEY SILT; dark grey, moist	83 ppm	
SS	3	2 4 5	7.5-9.0	6	8	CLAY; trace silt with organics, medium grey, moist	2.5 ppm	
SS	4	3 4 5	10.0-11.0	6	10	CLAY; trace silt, dark grey, moist	0	
SS	5	6 4 5	12.5-14.0	6	13	FINE-MEDIUM SAND; dark grey, wet	0	
SS	6	3 5 8	15.0-16.5	6	15	FINE-MEDIUM SAND; dark grey, wet	0	
					17	End of Soil Boring at 16.5 feet below ground surface. Monitoring Well MW-4 installed.		

BOREHOLE WATER LEVEL DATA			
Date	06/18/93		
Time	3:35 p.m.		
GWL	7.0 feet		
Casing Depth	15.0 feet		

Delta Environmental Consultants, Inc.

Sheet 1 of 1

Rev. July 8, 1993

PROJECT NAME/LOCATION:	Project Number	43-93-011	Boring Number	MW-5
Jiffy Lube International Store #1012 17869 S.E. McLoughlin Boulevard Milwaukie, OR	Contractor	Geotech Exploration	Drilling Method	6 1/4" Hollow Stem Auger
	Driller	Mike Reneker	Drilling Rig	B-61
	Start	9:00 a.m. 06/19/93	Completed	9:37 a.m. 06/19/93
Landowner: Flying J Corporation	Surface Elev.	-----	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: hNu Units: ppm	Observations Comments
					0	Asphalt Concrete and Gravel Base		
SS	1	5 9 5	2.5-4.0	6	3	SILT; trace clay, dark grey, damp	0	
SS	2	2 3 5	5.0-6.5	6	5	CLAYEY SILT; dark grey, damp	0	
SS	3	2 3 4	7.5-9.0	6	8	SILTY CLAY; medium grey, moist	0	
SS	4	5 5 5	10.0-11.0	6	10	CLAY; trace silt, dark grey, moist	0	
SS	5	2 5 10	12.5-14.0	6	13	FINE-MEDIUM SAND; trace organics, dark grey/brown, wet	0	
SS	6	5 7 4	15.0-16.5	6	15	FINE-MEDIUM SAND; dark grey, wet	0	
					16	End of boring at 16.5 feet below ground surface. Monitoring Well MW-5 installed.		

BOREHOLE WATER LEVEL DATA			
Date	06/19/93		
Time	9:45 a.m.		
GWL	7.0 feet		
Casing Depth	15.0 feet		

Delta Environmental Consultants, Inc.

Sheet 1 of 1

Rev. July 8, 1991

PROJECT NAME/LOCATION:		Project Number	43-93-011	Boring Number	MW-6
Jiffy Lube International Store #1012 17869 S.E. McLoughlin Boulevard Milwaukie, OR		Contractor	Geotech Exploration	Drilling Method	6 1/4" Hollow Stem Auger
		Driller	Mike Reneker	Drilling Rig	B-61
		Start	11:05 a.m. 06/19/93	Completed	11:56 a.m. 06/19/93
Landowner: Flying J Corporation		Surface Elev.	----	Logged By	Mark Underhill

Sample Type	Sample No.	Blow Count	Sample Interval (ft)	Sample Recovery (in.)	Depth Scale 1" = 4'	Descriptions of Materials and Conditions	Observations Instrument: hNu Units: ppm	Observations Comments
					0	Asphalt Concrete and Gravel Base		
SS	1	4 6 18	2.5-4.0	6	3	SANDY SILT; dark grey, damp	0	
					7	SILT CLAY; trace organics, medium grey, damp		
SS	2	3 5 6	7.5-9.0	6			0	
SS	3	2 4 5	10.0-11.0	6	10	SILTY SAND; medium grey, moist	0	
SS	4	3 7 10	12.5-14.0	6	13	FINE-MEDIUM SAND; dark grey, wet	0	
SS	5	3 2 3	15.0-16.5	6	15	FINE-MEDIUM SAND; dark grey, wet	0	
					16	End of boring at 16.5 feet below ground surface. Monitoring Well MW-6 installed.		

BOREHOLE WATER LEVEL DATA			
Date	06/19/93		
Time	12:05 p.m.		
GWL	7.0 feet		
Casing Depth	14.5 feet		

Delta Environmental Consultants, Inc.

APPENDIX B

APPENDIX B

Monitoring Well Construction Details

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

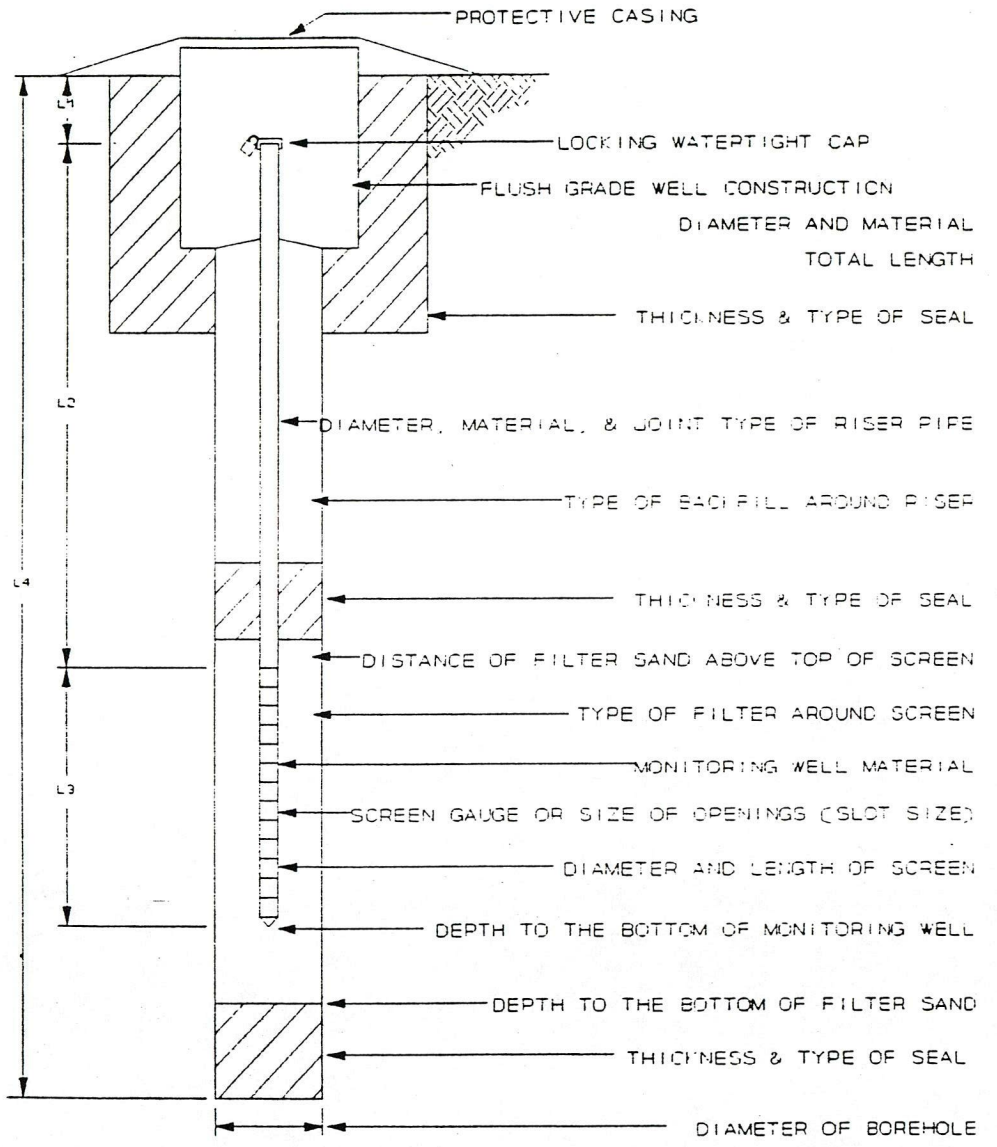
Delta No. 43-92-011

Monitoring Well No. MW-1

Elevations:

Top of Riser: 99.67

Ground Level: ----



DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 10.0 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	15.0 feet
DEPTH TO THE BOTTOM OF FILTER SAND	15.0 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = --- FT
L2 = 2.8 FT
L3 = 10.0 FT
L4 = 16.5 FT

Installation Completed
Date: 06/18/93
Time: 9:25 a.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	5:58 p.m.	94.65 feet

* Measure Point: Top of casing

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

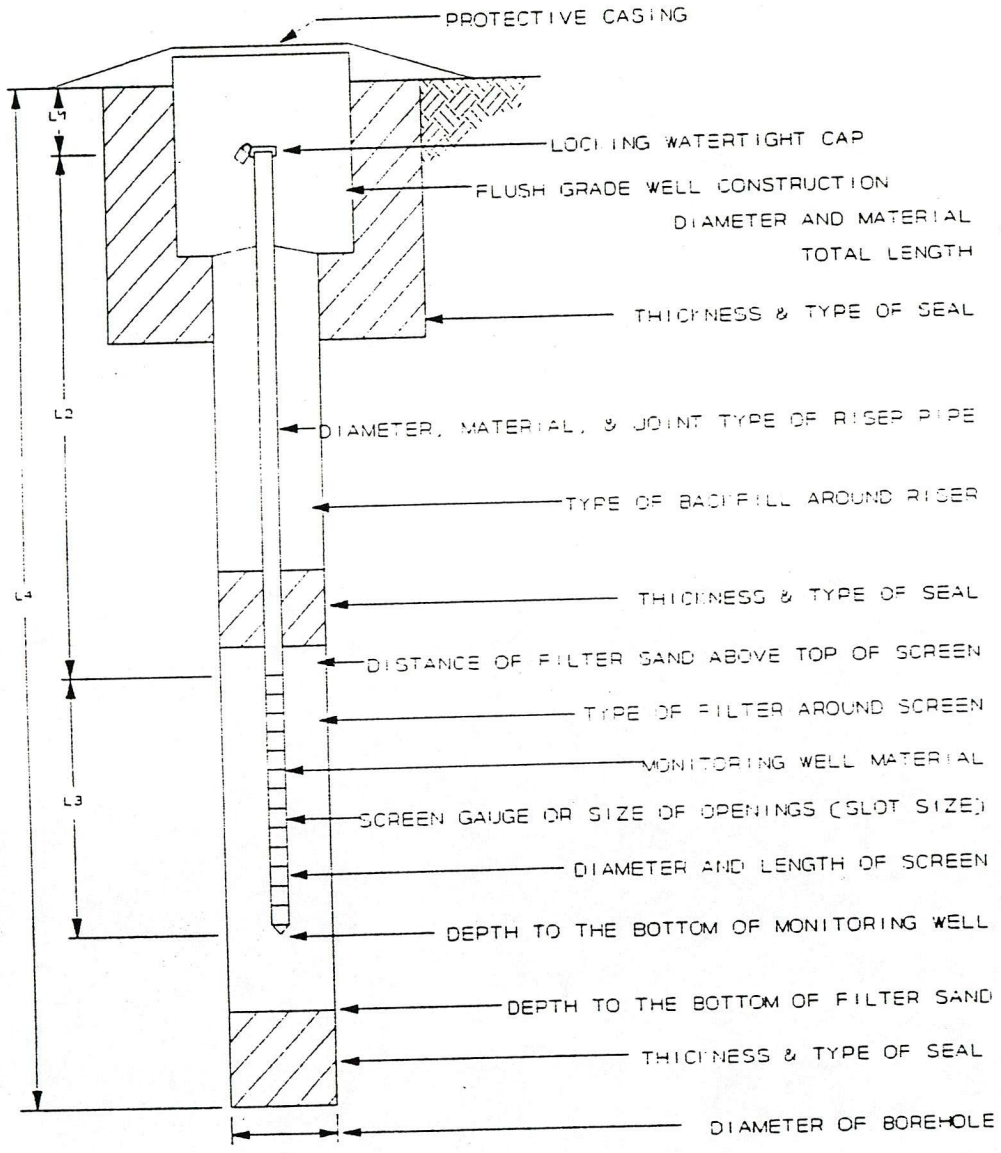
Delta No. 43-92-011

Monitoring Well No. MW-2

Elevations:

Top of Riser: 98.79

Ground Level: ----



DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 10 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	14.0 feet
DEPTH TO THE BOTTOM OF FILTER SAND	14.0 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = ---- FT
L2 = 4.5 FT
L3 = 10.0 FT
L4 = 15.5 FT

Installation Completed
Date: 06/18/93
Time: 11:25 a.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	6:17 p.m.	94.59 feet

* Measure Point: Top of casing

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

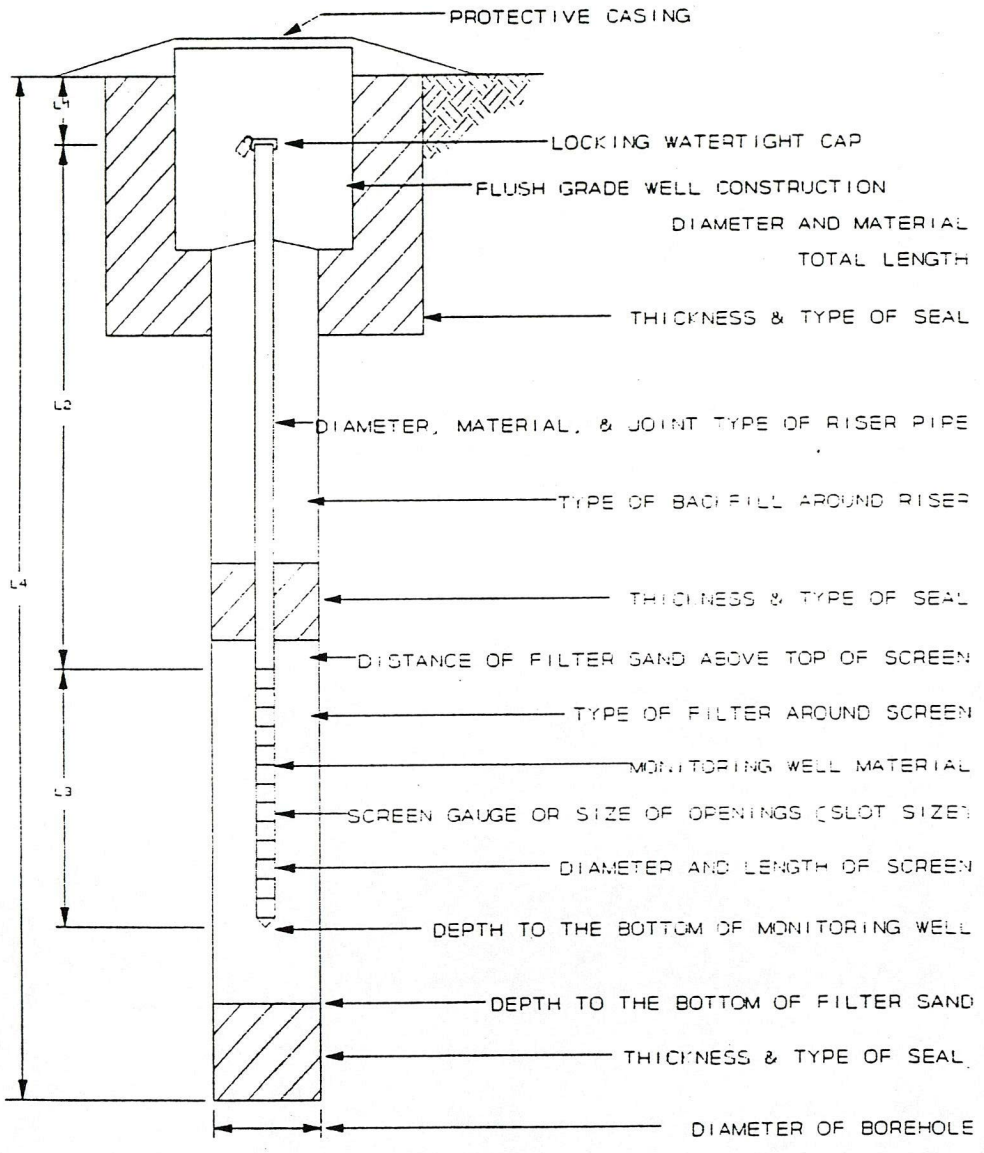
Delta No. 43-92-011

Monitoring Well No. MW-3

Elevations:

Top of Riser: 98.57

Ground Level: ----



DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 10 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	15.0 feet
DEPTH TO THE BOTTOM OF FILTER SAND	15.0 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = ---- FT
L2 = 4.5 FT
L3 = 10.0 FT
L4 = 16.5 FT

Installation Completed
Date: 06/18/93
Time: 1:55 p.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	5:13 p.m.	94.57 feet

* Measure Point Top of casing

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

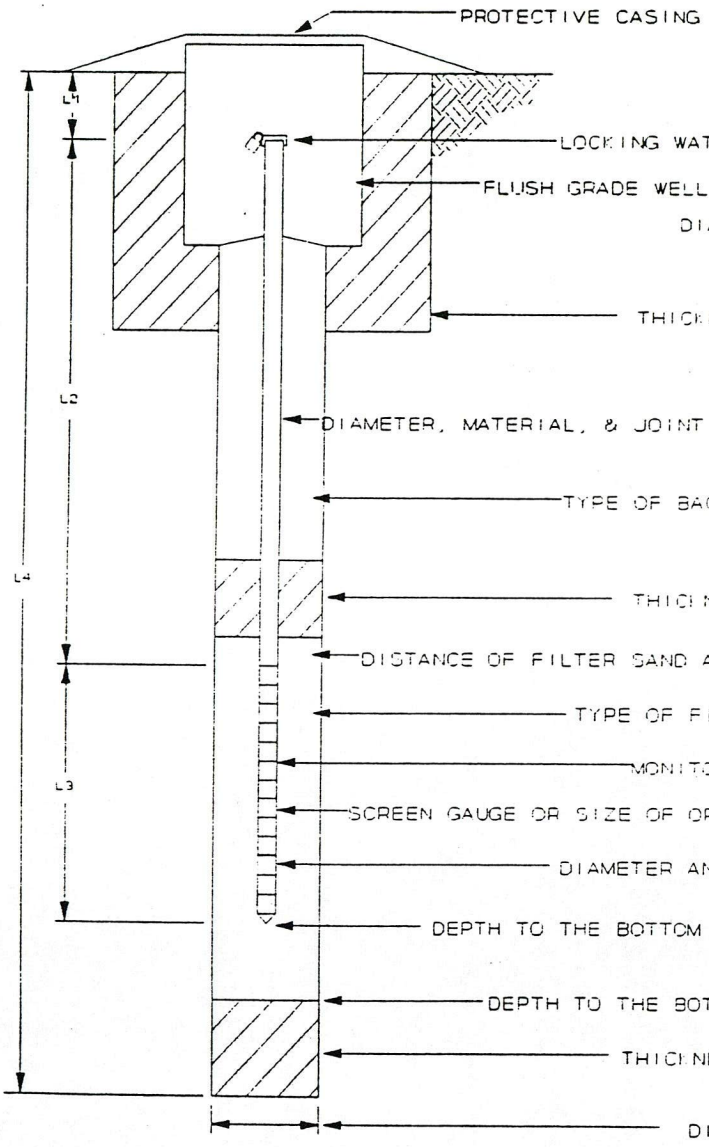
Delta No. 43-92-011

Monitoring Well No. MW-4

Elevations:

Top of Riser: 99.30

Ground Level: ----



DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 10 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	15.0 feet
DEPTH TO THE BOTTOM OF FILTER SAND	15.0 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = ---- FT
L2 = 4.5 FT
L3 = 10.0 FT
L4 = 16.5 FT

Installation Completed
Date: 06/18/93
Time: 3:35 p.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	5:09 p.m.	94.54 feet

* Measure Point: Top of casing

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

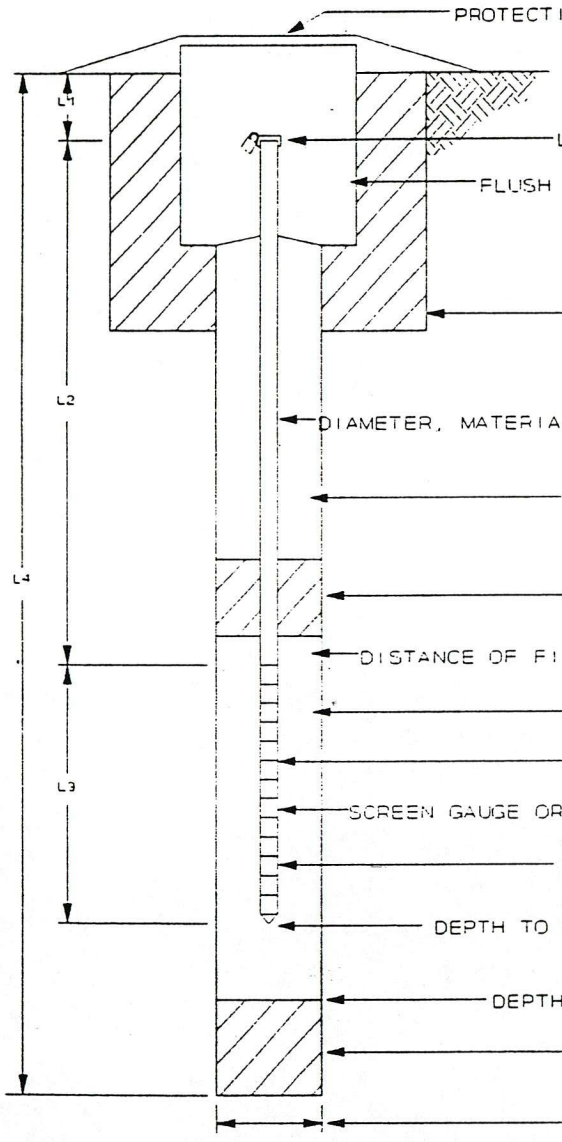
Delta No. 43-92-011

Monitoring Well No. MW-5

Elevations:

Top of Riser: 100.66

Ground Level: ----



DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 10 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	15.0 feet
DEPTH TO THE BOTTOM OF FILTER SAND	15.0 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = ---- FT
L2 = 4.5 FT
L3 = 10.0 FT
L4 = 16.5 FT

Installation Completed
Date: 06/19/93
Time: 9:45 a.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	5:05 p.m.	94.52 feet

* Measure Point: Top of casing

INSTALLATION OF FLUSH GRADE MONITORING WELL

Project: Jiffy Lube International
17869 S.E. McLoughlin Blvd.
Milwaukie, OR

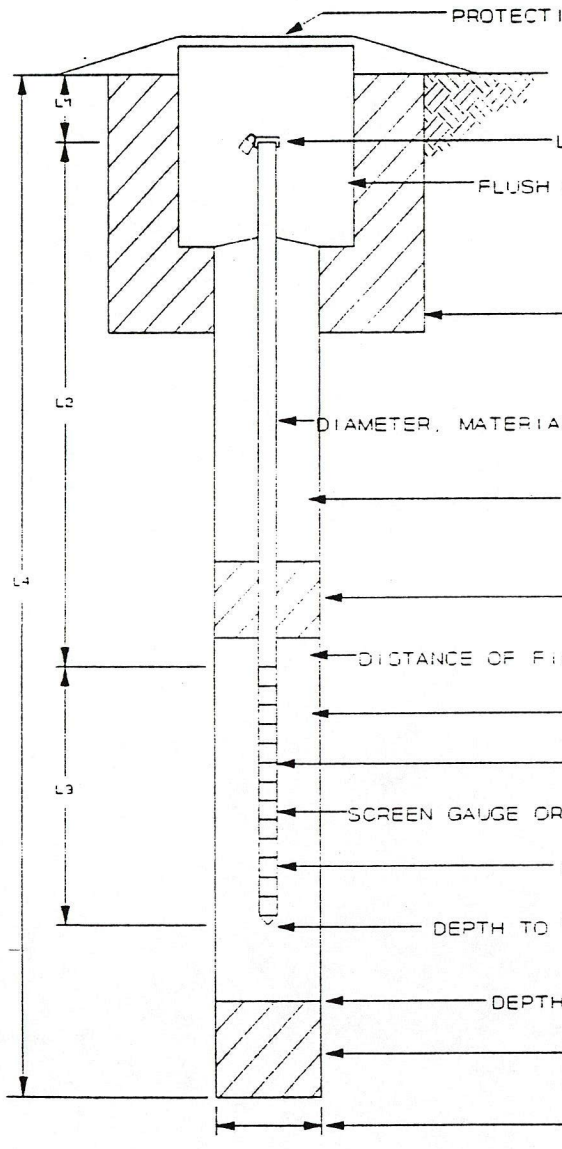
Delta No. 43-92-011

Monitoring Well No. MW-6

Elevations:

Top of Riser: 100.29

Ground Level: ----



FLUSH GRADE WELL CONSTRUCTION	
DIAMETER AND MATERIAL	8-inch steel well box
TOTAL LENGTH	12 inches
THICKNESS & TYPE OF SEAL	1 foot concrete
DIAMETER, MATERIAL, & JOINT TYPE OF RISER PIPE	2-inch SCH 40 PVC flush threaded
TYPE OF BACKFILL AROUND RISER	Bentonite
THICKNESS & TYPE OF SEAL	1 foot bentonite
DISTANCE OF FILTER SAND ABOVE TOP OF SCREEN	1 foot
TYPE OF FILTER AROUND SCREEN	10/20 Silica sand
MONITORING WELL MATERIAL	SCH 40 PVC
SCREEN GAUGE OR SIZE OF OPENINGS (SLOT SIZE)	0.010 inch
DIAMETER AND LENGTH OF SCREEN	2 inch x 9.5 feet
DEPTH TO THE BOTTOM OF MONITORING WELL	1 feet
DEPTH TO THE BOTTOM OF FILTER SAND	14.5 feet
THICKNESS & TYPE OF SEAL	NA
DIAMETER OF BOREHOLE	8 inches

L1 = ---- FT
L2 = 4.5 FT
L3 = 10.0 FT
L4 = 15.5 FT

Installation Completed
Date: 06/19/93
Time: 12:05 p.m.

Delta Environmental Consultants, Inc.

Monitoring Well Water Level Measurements		
Date	Time	Water Level*
06/21/93	5:53 p.m.	94.58 feet

* Measure Point: Top of casing

APPENDIX C

APPENDIX C

Laboratory Analytical Reports

Alden Analytical
Laboratories, Inc.

July 14, 1993

Delta Environmental Consultants, Inc.
Attn: Dan Whitman
3150 Richards Road, Suite 100
Bellevue, WA 98005

RE: ALDEN PROJECT NUMBERS 9306047/1 and 9306047/2
(DELTA PROJECT NUMBER 43-93-011.03)

Dear Dan:

Enclosed are the analytical results for the soil samples submitted to Alden Labs June 23, 1993. The samples were analyzed for TPH using Oregon State Methods TPH-ID, TPH-G, and TPH-418.1 Modified and BTEX using Method 8240. Four samples were further quantified following the Leaking Underground Storage Tank Decision Tree using Oregon State Method TPH-D. This is outlined on the next page.

There was slight blank contamination for the TPH-D analyses and is reported above the detection limit. All samples met Alden's internal QA/QC criteria.

It is Alden's policy to dispose of all samples and extracts after the expiration of their hold time unless notified otherwise. If you have any questions, please do not hesitate to call me at the number below.

Sincerely,

John A. Weakland
Project Manager

Enclosures

1001 SW Klickitat Way
Seattle, WA 98134
Telephone (206) 623-3660
Facsimile (206) 624-8778

Alden Analytical
Laboratories, Inc.

TPH-ID DECISION TREE

Client: Delta (43-93-011.03) *Alden Project Number: 9306047/1*

Client ID Number	*Alden Lab ID*	*TPH-G*	*TPH-D*
MW-1/S-2	4137	X	
MW-2/S-1	4138	X	X
MW-3/S-2	4139	X	X
MW-4/S-2	4140	X	X
MW-5/S-2	4141	X	
MW-6/S-2	4142	X	X

Based on the TPH-ID results, the following samples require further analysis. These analyses are indicated with an X in the above table.

Soil Samples

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: N/A	*Alden Sample Number: Blank*
Date of Sample Receipt: N/A	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	< RL
Diesel	C_{10} - C_{28}	50	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	123	50 - 150
Bromofluorobenzene	116	50 - 150
Fluorobiphenyl	130	50 - 150
o-Terphenyl	121	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-1/S-2	*Alden Sample Number: 4137*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	114	50 - 150
Bromofluorobenzene	116	50 - 150
Fluorobiphenyl	129	50 - 150
o-Terphenyl	126	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-2/S-1
Date of Sample Receipt: 06/23/93
Date of Sample Extraction: 06/23/93
Date of Sample Analysis: 06/24/93

Alden Project Number: 9306047/1
Alden Sample Number: 4138
Analysis Method: TPH-ID
Matrix: Soil
Reporting Units: mg/kg

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	> 50

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	115	50 - 150
Bromofluorobenzene	124	50 - 150
Fluorobiphenyl	131	50 - 150
o-Terphenyl	117	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-3/S-2	*Alden Sample Number: 4139*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	> 50

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	105	50 - 150
Bromofluorobenzene	143	50 - 150
Fluorobiphenyl	103	50 - 150
o-Terphenyl	122	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: Duplicate	*Alden Sample Number: 4139 Dup*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	> 50

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	98	50 - 150
Bromofluorobenzene	128	50 - 150
Fluorobiphenyl	92	50 - 150
o-Terphenyl	116	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-4/S-2	*Alden Sample Number: 4140*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	> 50

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	95	50 - 150
Bromofluorobenzene	120	50 - 150
Fluorobiphenyl	98	50 - 150
o-Terphenyl	124	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-5/S-2	*Alden Sample Number: 4141*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	<RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	115	50 - 150
Bromofluorobenzene	118	50 - 150
Fluorobiphenyl	125	50 - 150
o-Terphenyl	103	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-6/S-2	*Alden Sample Number: 4142*
Date of Sample Receipt: 06/23/93	*Analysis Method: TPH-ID*
Date of Sample Extraction: 06/23/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Product Identification	*Range*	*Reporting Limits(RL)*	*Reporting Results*
Gasoline	C_6 - C_{10}	20	> 20
Diesel	C_{10} - C_{28}	50	> 50

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	106	50 - 150
Bromofluorobenzene	117	50 - 150
Fluorobiphenyl	133	50 - 150
o-Terphenyl	124	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: N/A
Date of Sample Receipt: N/A
Date of Sample Extraction: N/A
Date of Sample Analysis: 06/24/93

Alden Project Number: 9306047/1
Alden Sample Number: Blank
Analysis Method: TPH-G
Matrix: Soil
Reporting Units: mg/kg

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	78	50 - 150
Bromofluorobenzene	78	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-1/S-2
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: N/A
Date of Sample Analysis: 06/24/93

Alden Project Number: 9306047/1
Alden Sample Number: 4137
Analysis Method: TPH-G
Matrix: Soil
Reporting Units: mg/kg

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	87

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	70	50 - 150
Bromofluorobenzene	77	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-2/S-1
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: N/A
Date of Sample Analysis: 06/24/93

Alden Project Number: 9306047/1
Alden Sample Number: 4138
Analysis Method: TPH-G
Matrix: Soil
Reporting Units: mg/kg

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	29

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	150	50 - 150
Bromofluorobenzene	78	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-3/S-2	*Alden Sample Number: 4139*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-G*
Date of Sample Extraction: N/A	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	40	62

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	75	50 - 150
Bromofluorobenzene	72	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-4/S-2
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: N/A
Date of Sample Analysis: 06/24/93

Alden Project Number: 9306047/1
Alden Sample Number: 4140
Analysis Method: TPH-G
Matrix: Soil
Reporting Units: mg/kg

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	79	50 - 150
Bromofluorobenzene	73	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-5/S-2	*Alden Sample Number: 4141*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-G*
Date of Sample Extraction: N/A	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	13

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	80	50 - 150
Bromofluorobenzene	78	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-6/S-2	*Alden Sample Number: 4142*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-G*
Date of Sample Extraction: N/A	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	92	50 - 150
Bromofluorobenzene	97	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: Duplicate	*Alden Sample Number: 4142 Dup*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-G*
Date of Sample Extraction: N/A	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: mg/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	N/A	10	< RL

Surrogates	*Percent Recovery*	*Recovery Limits*
Trifluorotoluene	88	50 - 150
Bromofluorobenzene	87	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/2*
Client Sample Number: N/A	*Alden Sample Number: Blank*
Date of Sample Receipt: N/A	*Analysis Method: TPH-D*
Date of Sample Extraction: 07/02/93	*Matrix: Soil*
Date of Sample Analysis: 07/07/93	*Reporting Units: mg/kg*

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	20	21

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	120	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/2*
Client Sample Number: MW-1/S-2	*Alden Sample Number: 4138*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-D*
Date of Sample Extraction: 07/02/93	*Matrix: Soil*
Date of Sample Analysis: 07/08/93	*Reporting Units: mg/kg*

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	200	550

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	130	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/2*
Client Sample Number: MW-2/S-1	*Alden Sample Number: 4139*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-D*
Date of Sample Extraction: 07/02/93	*Matrix: Soil*
Date of Sample Analysis: 07/08/93	*Reporting Units: mg/kg*

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	200	1200

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	130	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/2*
Client Sample Number: MW-3/S-2	*Alden Sample Number: 4140*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-D*
Date of Sample Extraction: 07/02/93	*Matrix: Soil*
Date of Sample Analysis: 07/08/93	*Reporting Units: mg/kg*

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	20	180

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	110	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-6/S-2
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: 07/02/93
Date of Sample Analysis: 07/08/93

Alden Project Number: 9306047/2
Alden Sample Number: 4142
Analysis Method: TPH-D
Matrix: Soil
Reporting Units: mg/kg

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	20	23

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	118	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/2*
Client Sample Number: Duplicate	*Alden Sample Number: 4142 Dup*
Date of Sample Receipt: 06/21/93	*Analysis Method: TPH-D*
Date of Sample Extraction: 07/02/93	*Matrix: Soil*
Date of Sample Analysis: 07/08/93	*Reporting Units: mg/kg*

Compound Name	*Reporting Limits(RL)*	*Reporting Results*
Total Petroleum Hydrocarbons	20	43

Surrogates	*Percent Recovery*	*Recovery Limits*
o-Terphenyl	119	50 - 150

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: See Below
Date of Sample Receipt: 06/21/93
Matrix: Soil

Alden Project Number: 9306047/1
Alden Sample Number: See Below
Analysis Method: TPH-418.1 Mod.
Reporting Units: mg/kg

Client Sample ID	*Alden Sample Number*	*Extraction Date*	*Analysis Date*	*TPH*
N/A	Blank	06/28/93	06/28/93	5.8
MW-1/S-2	4137	06/28/93	06/28/93	110
MW-2/S-1	4138	06/28/93	06/28/93	1100
MW-3/S-2	4139	06/28/93	06/28/93	680
Duplicate	4139 Dup	06/28/93	06/28/93	620
MW-4/S-2	4140	06/28/93	06/28/93	120
MW-5/S-2	4141	06/28/93	06/28/93	210
MW-6/S-2	4142	06/28/93	06/28/93	160

Note: Results are reported to two significant figures.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: N/A	*Alden Sample Number: BLANK1*
Date of Sample Receipt: N/A	*Analysis Method: EPA 8240**
Date of Sample Extraction:	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	<RL
Toluene	108-88-3	1	<RL
Ethylbenzene	100-41-4	1	<RL
m,p-Xylene**	1330-20-7	1	<RL
o-Xylene	1330-20-7	1	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	97	70-121
d8-Toluene	250 ng	102	81-117
Bromofluorobenzene	250 ng	101	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: N/A	*Alden Sample Number: BLANK2*
Date of Sample Receipt: N/A	*Analysis Method: EPA 8240**
Date of Sample Extraction: N/A	*Matrix: Soil*
Date of Sample Analysis: 06/25/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	<RL
Toluene	108-88-3	1	<RL
Ethylbenzene	100-41-4	1	<RL
m,p-Xylene**	1330-20-7	1	<RL
o-Xylene	1330-20-7	1	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	99	70-121
d8-Toluene	250 ng	106	81-117
Bromofluorobenzene	250 ng	110	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-1/S-2	*Alden Sample Number: 4137*
Date of Sample Receipt: 06/21/93	*Analysis Method: EPA 8240**
Date of Sample Extraction: 06/24/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	40	510
Toluene	108-88-3	40	44
Ethylbenzene	100-41-4	40	150
m,p-Xylene**	1330-20-7	40	900
o-Xylene	1330-20-7	40	150

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	98	70-121
d8-Toluene	250 ng	93	81-117
Bromofluorobenzene	250 ng	97	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-2/S-1	*Alden Sample Number: 4138*
Date of Sample Receipt: 06/21/93	*Analysis Method: EPA 8240**
Date of Sample Extraction: 06/24/93	*Matrix: Soil*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	680	23000
Toluene	108-88-3	34	320
Ethylbenzene	100-41-4	680	9800
m,p-Xylene**	1330-20-7	680	40000
o-Xylene	1330-20-7	34	470

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	98	70-121
d8-Toluene	250 ng	95	81-117
Bromofluorobenzene	250 ng	115	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-3/S-2	*Alden Sample Number: 4139*
Date of Sample Receipt: 06/21/93	*Analysis Method: EPA 8240**
Date of Sample Extraction: 06/25/93	*Matrix: Soil*
Date of Sample Analysis: 06/25/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	2300	3800
Toluene	108-88-3	2300	49000
Ethylbenzene	100-41-4	2300	51000
m,p-Xylene**	1330-20-7	2300	200000
o-Xylene	1330-20-7	2300	89000

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	100	70-121
d8-Toluene	250 ng	106	81-117
Bromofluorobenzene	250 ng	114	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-4/S-2	*Alden Sample Number: 4140*
Date of Sample Receipt: 06/21/93	*Analysis Method: EPA 8240**
Date of Sample Extraction: 06/25/93	*Matrix: Soil*
Date of Sample Analysis: 06/25/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	250	4600
Toluene	108-88-3	250	520
Ethylbenzene	100-41-4	250	6000
m,p-Xylene**	1330-20-7	250	9500
o-Xylene	1330-20-7	250	1000

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	99	70-121
d8-Toluene	250 ng	104	81-117
Bromofluorobenzene	250 ng	108	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)
Client Sample Number: MW-5/S-2
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: 06/25/93
Date of Sample Analysis: 06/25/93

Alden Project Number: 9306047/1
Alden Sample Number: 4141
*Analysis Method: EPA 8240**
Matrix: Soil
Reporting Units: ug/kg

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	66	2900
Toluene	108-88-3	66	84
Ethylbenzene	100-41-4	66	1300
m,p-Xylene**	1330-20-7	66	3000
o-Xylene	1330-20-7	66	250

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	103	70-121
d8-Toluene	250 ng	106	81-117
Bromofluorobenzene	250 ng	108	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011.03)	*Alden Project Number: 9306047/1*
Client Sample Number: MW-6/S-2	*Alden Sample Number: 4142*
Date of Sample Receipt: 06/21/93	*Analysis Method: EPA 8240**
Date of Sample Extraction: 06/25/93	*Matrix: Soil*
Date of Sample Analysis: 06/25/93	*Reporting Units: ug/kg*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	30	<RL
Toluene	108-88-3	30	<RL
Ethylbenzene	100-41-4	30	<RL
m,p-Xylene**	1330-20-7	30	<RL
o-Xylene	1330-20-7	30	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	96	70-121
d8-Toluene	250 ng	110	81-117
Bromofluorobenzene	250 ng	115	74-121

* Please note that sample results have been corrected for moisture content.

** m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Volatiles Matrix Spike/Matrix Spike Duplicate Recoveries

Client: Delta (43-93-011.03)
Client Sample Number: MW-5/S-2
Date of Sample Receipt: 06/21/93
Date of Sample Extraction: 06/25/93
Date of Sample Analysis: 06/25/93

Alden Project Number: 9306047/1
Alden Sample Number: 4141
Analysis Method: EPA 8240
Matrix: Soil
Reporting Units: ug/kg

Compound	*Spike Added (ug/kg)*	*Sample Concentration (ug/kg)*	*MS Concentration (ug/kg)*	*MS % Rec.*	*QC Limits Rec.*
1,1-Dichloroethene	50	0	45.47	91	59 - 172
Trichloroethene	50	0	46.73	93	62 - 137
Benzene	50	44	91.00	93	66 - 142
Toluene	50	1	48.70	95	59 - 139
Chlorobenzene	50	0	49.59	99	60 - 133

Compound	*Spike Added (ug/kg)*	*MSD Concentration (ug/kg)*	*MSD % Rec.*	*% RPD*	*QC Limits*	
					RPD	*REC.*
1,1-Dichloroethene	50	47.66	95	4.7	14	59 - 172
Trichloroethene	50	50.78	102	8.3	14	62 - 137
Benzene	50	95.55	102	9.3	11	66 - 142
Toluene	50	54.76	107	12.0	13	59 - 139
Chlorobenzene	50	55.09	110	10.5	13	60 - 133

1001 S.W. Klickitat way Suite 108 Seattle, WA 98134 (206) 623-3660 Fax (206) 624-8778

Project/PO Number 43-93-011.03

Contact: DAN WHITMAN

Company/Address DELTA

Phone: _____ Fax: _____

Samplers: _____

Alden Project Number: 9306047|1

Analyses Requested

Sample Date/Time	Sample ID #	Matrix	# Containers	~~WTPH-HCID~~ TPH-ID.	TPH-G	BTEX 8240	TPH-418.1 MOD.	TAT	Lab ID #	Remarks
6/18/93	~~MW-1~~ B-4 S-2	SOIL	3	X	X	X	X	E	4137A-C	
	~~MW-5~~ B-5 S-1								4138 A-C	
	~~MW-3~~ B-6 S-2								4139 A-C	
	~~MW-4~~ B-7 S-2								4140 A-C	
6/19/93	~~MW-2~~ B-8 S-2								4141 A-C	
	~~MW-6~~ B-9 S-2								4142 A-C	

Relinquished By:

Signature

Date Time

Received By:

Signature

Date Time

Relinquished By:

Signature

Date Time

Received By:

Signature

Date Time

Special Instructions/Comments:

OREGON METHODS !

TAT Codes

A Standard B 24hr

C 48 hr D 72hr

Delta Environmental Consultants, Inc.
3900 Northwoods Dr., Suite 200
St. Paul, MN 55112

CHAIN–OF–CUSTODY RECORD

DELTA PROJECT NO. 43-93-611.03 | INVOICE CODE | PAGE 1 OF

PROJECT MANAGER: Dan Whitman

PROJECT NAME: Jiffy Lube

PROJECT LOCATION: Milwaukee OR

SAMPLER'S SIGNATURE: [signature] for M. Underhill

TURN AROUND REQUESTED: ☑ NORMAL 1 week ☐ RUSH ☐ OTHER

LAB NAME: Alden Analytical

LAB USE ONLY — LABORATORY PROJECT NO.

SAMPLE CONDITION AS RECEIVED: CHILLED YES/NO SEALED YES/NO

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	DATE/TIME SAMPLED		SAMPLE MATRIX: SOIL(S): AIR(A): BULK(B): AQUEOUS(Q): SLUDGE(L): OTHER(O)	HCID	TPH-G/BTEX	418.1	~~[illegible]~~			NUMBER OF CONTAINERS	ACCEPT (A) REJECT (R)	SAMPLE CONDITION/ COMMENTS	LABORATORY SAMPLE NUMBER
MW-1 ~~B-3~~/S-2	Change sample ID B-4 to MW-1.5 [illegible] 6/19/93	6-18-93	8:42	S	X	X	X				3			
MW-2 ~~B-5~~/S-1			10:23	S	X	X	X				3			
MW-3 ~~B-6~~/S-2			1:12	S							3			
MW-4 ~~B-7~~/S-2			2:52	S							3			
MW-5 ~~B-8~~/S-2		6/19/93	9:05	S							3			
MW-6 ~~B-9~~/S-2		6/19/93	11:34	S							3			

GENERAL COMMENTS:

TOTAL NUMBER OF CONTAINERS

1 RELINQUISHED BY (SIGNATURE)	DATE	3 RELINQUISHED BY (SIGNATURE)	DATE	5 RELINQUISHED BY (SIGNATURE)	DATE
[signature]	6/21/93				
COMPANY: Delta Env.	TIME: 2:15	COMPANY	TIME	COMPANY	TIME
2 RECEIVED BY (SIGNATURE)	DATE	4 RECEIVED BY (SIGNATURE)	DATE	6 RECEIVED BY (SIGNATURE)	DATE
[signature]	6/21/93				
COMPANY: Alden Labs	TIME: 2:15 PM	COMPANY	TIME	COMPANY	TIME

Original - Return with Report • Yellow - Lab Copy • Pink - Sampler Copy

Groundwater Samples

Alden Analytical
Laboratories, Inc.

July 14, 1993

Delta Environmental Consultants, Inc.
Attn: Dan Whitman
3150 Richards Road, Suite 100
Bellevue, WA 98005

RE: ALDEN PROJECT NUMBER 9306049/1
(DELTA PROJECT NUMBER 43-93-011)

Dear Dan:

Enclosed are the analytical results for the water samples submitted to Alden Labs June 22, 1993. The samples were analyzed for BTEX using Method 8240.

All samples met Alden's internal QA/QC criteria.

It is Alden's policy to dispose of all samples and extracts after the expiration of their hold time unless notified otherwise. If you have any questions, please do not hesitate to call me at the number below.

Sincerely,

John A. Weakland
Project Manager

Enclosures

1001 SW Klickitat Way
Seattle, WA 98134
Telephone (206) 623-3660
Facsimile (206) 624-8778

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: N/A	*Alden Sample Number: BLANK1*
Date of Sample Receipt: N/A	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/23/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	<RL
Toluene	108-88-3	1	<RL
Ethylbenzene	100-41-4	1	<RL
m,p-Xylene*	1330-20-7	1	<RL
o-Xylene	1330-20-7	1	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	98	76-114
d8-Toluene	250 ng	100	88-110
Bromofluorobenzene	250 ng	97	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: N/A	*Alden Sample Number: BLANK2*
Date of Sample Receipt: N/A	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	<RL
Toluene	108-88-3	1	<RL
Ethylbenzene	100-41-4	1	<RL
m,p-Xylene*	1330-20-7	1	<RL
o-Xylene	1330-20-7	1	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	97	76-114
d8-Toluene	250 ng	102	88-110
Bromofluorobenzene	250 ng	101	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Volatiles Matrix Spike/Matrix Spike Duplicate Recoveries

Client: Delta (43-93-011)
Client Sample Number: N/A
Date of Sample Receipt: N/A
Date of Sample Extraction: N/A
Date of Sample Analysis: 06/18/93

Alden Project Number: 9306049/1
Alden Sample Number: 4089
Analysis Method: EPA 8240
Matrix: Water
Reporting Units: ug/L

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS % Rec.	QC Limit Rec.
1,1-Dichloroethene	50	0	55.20	110	61 - 1
Trichloroethene	50	0	57.45	115	71 - 1
Benzene	50	0	54.10	108	76 -
Toluene	50	0	50.45	101	76 -
Chlorobenzene	50	0	48.65	97	75 -

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD % Rec.	% RPD	QC Limit RPD	QC Limit R
1,1-Dichloroethene	50	51.53	103	6.9	14	61
Trichloroethene	50	53.28	107	7.5	14	71
Benzene	50	50.60	101	6.7	11	76
Toluene	50	51.99	104	3.0	13	76
Chlorobenzene	50	51.42	103	5.5	13	75

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-1	*Alden Sample Number: 4146*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/23/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	50	910
Toluene	108-88-3	50	1300
Ethylbenzene	100-41-4	50	470
m,p-Xylene*	1330-20-7	50	1500
o-Xylene	1330-20-7	50	590

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	102	76-114
d8-Toluene	250 ng	95	88-110
Bromofluorobenzene	250 ng	102	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-2	*Alden Sample Number: 4147*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/23/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	140
Toluene	108-88-3	1	13
Ethylbenzene	100-41-4	1	20
m,p-Xylene*	1330-20-7	1	61
o-Xylene	1330-20-7	1	14

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	102	76-114
d8-Toluene	250 ng	98	88-110
Bromofluorobenzene	250 ng	104	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-3	*Alden Sample Number: 4148*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/23/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	200	1600
Toluene	108-88-3	200	3800
Ethylbenzene	100-41-4	200	1900
m,p-Xylene*	1330-20-7	200	7200
o-Xylene	1330-20-7	200	2900

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	95	76-114
d8-Toluene	250 ng	93	88-110
Bromofluorobenzene	250 ng	105	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-4	*Alden Sample Number: 4149*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/23/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	100	3500
Toluene	108-88-3	100	1500
Ethylbenzene	100-41-4	100	420
m,p-Xylene*	1330-20-7	100	1800
o-Xylene	1330-20-7	100	560

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	99	76-114
d8-Toluene	250 ng	92	88-110
Bromofluorobenzene	250 ng	91	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-5	*Alden Sample Number: 4150*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	50	500
Toluene	108-88-3	50	750
Ethylbenzene	100-41-4	50	180
m,p-Xylene*	1330-20-7	50	780
o-Xylene	1330-20-7	50	310

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	102	76-114
d8-Toluene	250 ng	96	88-110
Bromofluorobenzene	250 ng	95	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: Delta (43-93-011)	*Alden Project Number: 9306049/1*
Client Sample Number: MW-6	*Alden Sample Number: 4151*
Date of Sample Receipt: 06/22/93	*Analysis Method: EPA 8240*
Date of Sample Extraction: N/A	*Matrix: Water*
Date of Sample Analysis: 06/24/93	*Reporting Units: ug/L*

Compound Name	*CAS No.*	*Reporting Limits(RL)*	*Reporting Results*
Benzene	71-43-2	1	<RL
Toluene	108-88-3	1	<RL
Ethylbenzene	100-41-4	1	<RL
m,p-Xylene*	1330-20-7	1	<RL
o-Xylene	1330-20-7	1	<RL

Surrogates	*Amount Added*	*Percent Recovery*	*Recovery Limits*
d4-1,2-Dichloroethane	250 ng	102	76-114
d8-Toluene	250 ng	100	88-110
Bromofluorobenzene	250 ng	103	86-115

* m-Xylene and p-Xylene cannot be separated and are reported here as a total of the two isomers.

1001 S.W. Klickitat way Suite 108 Seattle, WA 98134 (206) 623-3660 Fax (206) 624 0778

Date: 6/22/93 Page 1 of 1

Project/PO Number 43.93.011

Contact: Dan Whitman

Company/Address 3150 Richards Rd. Suite 100 Bellevue, WA 98005

Phone: 6499663 Fax: 6490409

Samplers: C. Andersen

Analyses Requested

Alden Project Number: 9306049 | 1

Sample Date/Time	Sample ID #	Matrix	# Containers	BTEX	8015 mod.	TAT	Lab ID #	Remarks
6/22/93 2115	MW-1	Water	3	X	X	E	4146 A-C	
2055	MW-2		3	X	X		4147 A-C	
2030	MW-3		3	X	X		4148 A-C	
2000	MW-4		3	X	X		4149 A-C	
1930	MW-5		3	X	X		4150 A-C	
1910	MW-6		3	X	X		4151 A-C	

Relinquished By: Carl R. Andersen
Signature
6/22/93 1130
Date Time

Received By: DJ
Signature
6/22/93 4:00PM
Date Time

Relinquished By:
Signature
Date Time

Received By:
Signature
Date Time

Please note that samples received after 3PM are considered received 8AM the following business day.

Special Instructions/Comments:

TAT Codes
A Standard B 24hr
C 48 hr D 72hr
E 1 Week F Other:

TABLE 2

LABORATORY RESULTS AND CHAIN OF CUSTODY

LABORATORY REPORT

Northwest Envirocon
7410 Deleware Lane
Vancouver WA 98664

PROJECT NAME/SITE: Delco Milwaukee
PROJECT NUMBER: 16122
EXTRACTION DATE: 7-20-94
REPORT NUMBER: 13366
REPORT DATE: 7-22-94

EPA 8020
Analyte: BTEX for water (Benzene, Toluene, Ethylbenzene, Xylenes)

Field ID	Lab ID	Identification & Quantification µg/L (ppb)				Surrogate Recovery (%)
		Benzene	Toluene	Ethyl-Benzene	Xylenes	
MW 1	15874	**770**	**14**	**264**	**272**	78
MW 2	15875	**25**	**ND**	**ND**	**ND**	78
MW 3	15876	**226**	**141**	**58**	**286**	81
MW 4	15877	**7460**	**134**	**2730**	**8120**	61
MW 5	15878	**237**	**24**	**ND**	**187**	118
MW 6	15879	**14**	**7**	**7**	**26**	58
BLANK	-	ND	ND	ND	ND	-
Quantification Limits	-	2	2	2	2	-

Surrogate is p-Bromofluorobenzene
ND = Not Detected (below reporting limit or detection limit)

Wy'East
Environmental Sciences, Inc.

013366

Research and Laboratory Services

CHAIN OF CUSTODY

2415 SE 11th Ave. • Portland, Oregon 97214 • (503) 231-9320 • FAX (503) 231-9344

PROJECT # 16122	PROJECT NAME / SITE DeCo Milwaukie	STATE OR	PURCHASE ORDER #
COMPANY NW Enviro con	REPORT ATTENTION Scott Borders	PHONE NUMBER 230-0702	FAX NUMBER
SAMPLES COLLECTED BY L. Brown / S. Borders	DATE COLLECTED 7-19-94	TIME COLLECTED 8pm to 9pm	SAMPLES CHILLED TO 4° C? Yes
PRESERVATIVE USED? (HCl, etc.) NO			

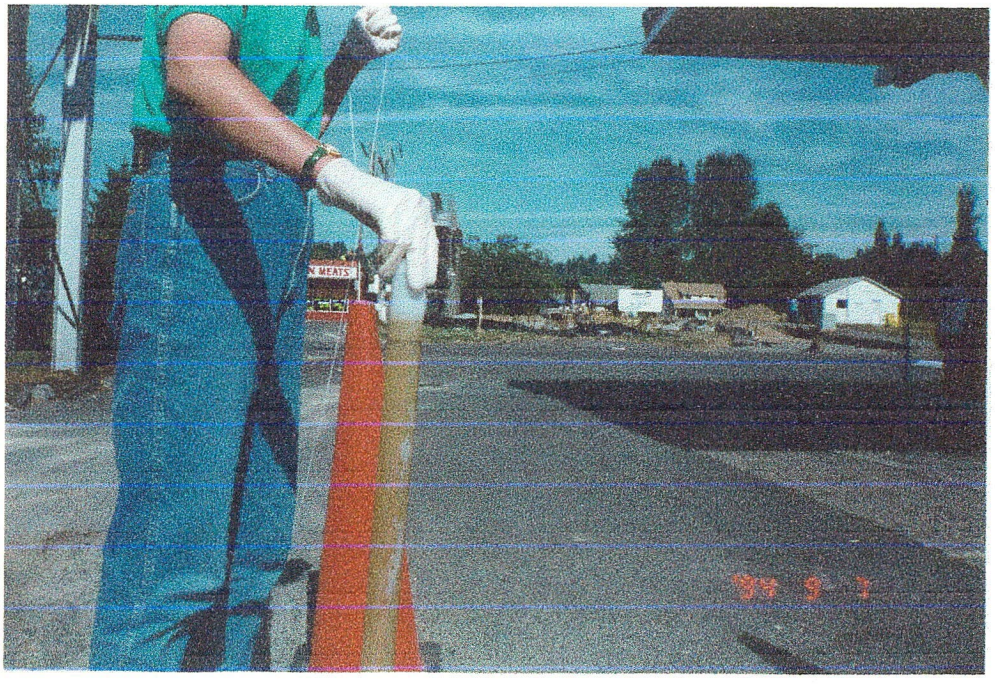
FIELD ID	MEDIA	CONTAINER	ANALYSIS REQUIRED	LAB ID
MW1	water	40mL glass	BTEX	15874
MW1		2-vials		–
MW2				15875
MW2				–
MW3				15876
MW3				–
MW4				15877
MW4				–
MW5				15878
MW5				–
MW6				15879
MW6				–

RELINQUISHED BY L. Brown DATE / TIME 7-20-94	RELINQUISHED BY DATE / TIME
RELINQUISHED BY DATE / TIME	RECEIVED BY LAB Chris Baugh DATE / TIME 7/20/94 9:40 AM
REMARKS	SHIPPED BY

Wy'East will return white copy to client with laboratory report and keep yellow copy for files. Client keeps pink copy.

PHOTOGRAPHS

Free product in MW 3 the week of July 31, 1994



Free product in MW 3 the week of September 4, 1994

Northwest Envirocon, Inc.
Delco ground water monitoring
Milwaukie, Oregon

ENVIRONMENTAL ENGINEERING

INDUSTRIAL HYGIENE

CONSTRUCTION MANAGEMENT

LABORATORY SERVICES

MAINTENANCE ENGINEERING

ASBESTOS SERVICES/TRAINING

ENVIRONMENTAL TRAINING

OFFICES NATIONWIDE
1-800-395-0852