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A Member of The IT Group

Supplemental Environmental Investigation

**Tosco Service Station #6380
200 South 36th Street
Bellingham, Washington**

Prepared for

Tosco Marketing Company

April 29, 1999

Prepared by

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Project 504-018.1

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EXECUTIVE SUMMARY

At the request of Tosco Marketing Company (Tosco), IT Corporation (formerly Pacific Environmental Group, Inc. (PEG)) performed a supplemental environmental investigation at Tosco Service Station #6380 located at 200 South 36th Street in Bellingham, Washington. Four groundwater monitoring wells were installed at the site during this investigation.

Environmental activities were performed between March 2 and 11, 1999. The four soil borings were installed approximately along the property boundary at the site. Activities performed by IT are summarized below:

- Drill four exploratory soil borings and install two-inch diameter groundwater monitoring wells (MW-1 through MW-4) in each boring.
- Screen soil samples for organic vapors using a portable photoionization detector (PID).
- Develop the newly installed monitoring wells.
- Survey the elevations for the four newly installed wells.
- Collect groundwater samples from the four newly installed monitoring wells.
- Submit selected soil and groundwater samples for laboratory analyses.
- Treat steam cleaner rinseate, development, and purge water using an activated carbon filter.

Project findings are summarized below:

- Soil encountered during this investigation consisted primarily of clay and silt to the total explored depth of 26.5 feet below grade.
- Groundwater was first encountered between 11.0 and 13.0 feet below grade during drilling. Following installation of the monitoring wells, the static water level ranged from approximately five feet to eight feet below grade.

- Concentrations of total petroleum hydrocarbons as gasoline (TPH-gasoline) were detected in one soil sample from boring MW-3 at levels above Washington State Model Toxics Control Act (MTCA) Method A cleanup levels. Concentrations of TPH-oil were detected above the MTCA Method A cleanup level in the stockpile soil sample submitted for analysis. Concentrations of TPH-gasoline, TPH-diesel, TPH-oil, total lead, and benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds were not detected above MTCA Method A cleanup levels in any other soil samples submitted for analysis.
- Concentrations of TPH-gasoline, TPH-diesel, TPH-oil, and BTEX compounds were not detected above laboratory reporting limits in the groundwater samples collected from monitoring wells MW-1 through MW-4. Concentrations of total lead were detected above the MTCA Method A cleanup level in the groundwater samples collected from wells MW-2 through MW-4.

This summary is provided as an introduction to the site investigation report. The information presented should only be used in conjunction with the entire report document. A detailed description of the investigation including site conditions, investigative procedures, findings and conclusions are presented in this report.

1.0 INTRODUCTION

1.1 Purpose

This report documents the results of supplemental investigative activities performed by IT Corporation (IT) at Tosco Service Station #6380 located at 200 South 36th Street in Bellingham, Washington (Figure 1). The purpose of this investigation was to further assess and document soil and groundwater quality with respect to petroleum hydrocarbons at the site.

1.2 Scope of Services

The scope of services for this project consisted of the following tasks:

- Update the Site Safety Plan.
- Drill four exploratory soil borings (MW-1 through MW-4).
- Install a two-inch diameter groundwater monitoring well in each of the soil borings (MW-1 through MW-4).
- Collect soil samples from selected intervals in the borings.
- Field screen soil samples using a photo-ionization detector (PID).
- Collect groundwater samples from the four newly installed wells.
- Survey the elevations of the newly installed wells.
- Submit soil and groundwater samples and appropriate documentation to a Tosco approved laboratory for analysis.
- Prepare this report.

1.3 Site Location/Description

Tosco Service Station #6380 is located at 200 South 36th Street in Bellingham, Washington. Two gasoline underground storage tanks (USTs) are located in a common excavation on the northwest corner of the site. Four pump islands are located on the east central portion of the

site. The building is situated in the central portion of the site, and the former waste oil and heating oil USTs were located behind the station building to the west.

1.4 Previous Investigations

Pacific Environmental Group, Inc. (PEG) performed a soil gas survey at the site on September 17, 1997. Findings of this investigation were presented to Tosco in a letter report titled "Soil Gas Survey Results", on October 29, 1997. During the soil gas survey, soil vapor samples were collected from areas adjacent to the dispenser islands, product lines, and UST complex. Vapor concentrations above background levels were detected through field screening methods in these areas. Concentrations of total petroleum hydrocarbons as gasoline (TPH-gasoline) and one or more BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) were confirmed through laboratory analysis of soil vapor samples in these areas.

PEG performed a soil investigation during the removal of the waste oil and heating oil USTs on August 18, 1998. Findings of this investigation were presented to Tosco in a letter report titled "Environmental Investigation", on October 9, 1998. During this previous environmental investigation, detected concentrations of TPH-diesel and TPH-oil in the soil samples collected from the south and east sidewalls of the excavation exceeded Washington State Model Toxics Control Act (MTCA) Method A cleanup levels. Detected concentrations of TPH-diesel in the soil sample collected from beneath the waste oil UST also exceeded the MTCA Method A cleanup level.

PEG performed a soil probe investigation at the site in September of 1998. Findings of this investigation were presented to Tosco in a letter report titled "Environmental Investigation", on December 23, 1998. This investigation was conducted in an effort to establish baseline soil and groundwater conditions with respect to petroleum hydrocarbons in the area of the dispenser islands and the gasoline underground storage tanks (USTs), and to perform additional assessment in the area of the former waste oil and heating oil USTs. Concentrations of TPH-gasoline, TPH-diesel, and one or more BTEX compounds were detected above MTCA Method A cleanup levels in soil and or groundwater during this investigation.

2.0 SITE CONDITIONS

2.1 Local Setting

The area surrounding the site is predominantly retail. The Interstate 5 Freeway is located approximately 300 feet to the east of the site. Bellingham Bay is located approximately 1.2 miles northwest of the site. The topography across the site is relatively flat, but immediately drops off to the west into the parking area of the Bellingham Mall Shopping Center. According the owner of the service station, the shopping area to the west of the site typically floods every year, and was built on an area referred to as a bog.

2.2 Subsurface Conditions

Soils encountered during this investigation consisted predominantly of clay and silt to depths ranging to 26.5 feet below grade. Groundwater was encountered in the borings at depths ranging from approximately 5 to 8 feet below grade.

3.0 TECHNICAL DATA

3.1 Exploratory Soil Borings and Sampling

Four exploratory soil borings (MW-1 through MW-4) were installed by Cascade Drilling, Inc. (Cascade) of Woodinville, Washington on March 2, 1999. Boring MW-1 was completed at 26.5 feet below grade. Borings MW-2 through MW-4 were completed at 21 feet below grade. The exploratory soil borings were located in accordance with IT's workplan dated December 4, 1998. Eight-inch outside diameter hollow-stem auger drilling equipment was used and the borings were logged by an IT geologist using the Unified Soil Classification System. Investigative procedures are presented in Appendix A.

Initial soil samples were collected at five feet below grade, and sampling continued thereafter at approximately five-foot intervals to the total depth explored. Soil samples retained for chemical analyses were placed in laboratory supplied sample jars with Teflon[®] lined lids. The soil samples were placed on ice for transport and submitted to North Creek Analytical, Inc. (NCA) in Bothell, Washington for chemical analyses. Sample preservation techniques are described in Appendix A.

Soil samples were field screened for the presence of organic vapors using a Thermo Environmental Instruments Inc. Model 580B photoionization detector (PID) with a 10.0 eV lamp. PID test procedures are described in Appendix A. It should be noted that the PID measurements are considered semi-quantitative data since the instrument detects all organic compounds with ionization potentials less than 10 electron volts. The results of this screening are recorded on the exploratory boring logs in Appendix B.

3.2 Monitoring Well Installation

The four borings were converted to groundwater monitoring wells (MW-1 through MW-4) by the installation of 2-inch diameter, Schedule 40 PVC casing with 0.010-inch factory slotted screen. The well screen was placed across the saturated zone and extended from approximately eight feet to 23 feet below grade in Well MW-1, and from six feet to 21 feet below grade in Wells MW-2, MW-3, and MW-4. Please refer to the boring logs in Appendix B for specific information on well construction. The annular space of each well was packed with a graded #2/12 Colorado silica sand. The sand pack was placed across the entire screened interval, extending approximately two feet above the top of the screens. The annular space of each well was then sealed with hydrated bentonite chips to approximately two feet below grade. A plug-type locking device and waterproof monument set in concrete were installed at the top of each monitoring well.

The elevations of Wells MW-1 through MW-4 were surveyed to the nearest 0.01 foot with respect to the elevation of an arbitrary datum. A survey reference mark was scribed on the lip of each monitoring well casing with a permanent marker. The arbitrary datum used was the north end of the west dispenser island. The arbitrary datum was assigned an elevation of 100.00 feet. Surveyed elevations are presented in Table 1. The survey field data sheet is presented in Appendix B.

3.3 Monitoring Well Development

Monitoring Wells MW-1 through MW-4 were developed on March 2, 1999 by surging and pumping. Well development procedures and records are presented in Appendix B.

3.4 Groundwater Sampling

Water level measurements and groundwater sampling were performed on March 11, 1999. Depths to groundwater in the wells on this date are presented in Table 1. Groundwater samples were collected from Monitoring Wells MW-1 through MW-4. Well locations are shown on Figure 2.

Prior to sampling, each well was visually checked for the presence of sheens using a clear single-use disposable polyethylene bailer. No sheens were observed in the wells. The wells were then purged of a minimum of three casing volumes of water by centrifugal pump. Groundwater samples were collected after the wells recovered to at least 60 percent of the pre-purge static water level. Samples were collected with a single-use disposable bailer. Groundwater sampling procedures are described in detail in Appendix A. Field sampling data sheets are presented in Appendix B.

3.5 Analytical Parameters

Select soil and groundwater samples were analyzed for the following parameters:

<u>PARAMETER</u>	<u>METHOD</u>
TPH as gasoline	Washington Method WTPH-G
Benzene, Toluene, Ethylbenzene, and Xylenes compounds (BTEX)	EPA Method 8021B
TPH as diesel and oil	Washington Method WTPH-D plus Extended with Silica Gel Cleanup
Total Lead	EPA 6000/7000 Series Methods

The samples were analyzed by North Creek Analytical, Inc., of Bothell, Washington.

3.6 Exploratory Analytical Results

3.6.1 Soil Analytical Results

Concentrations of TPH-gasoline in the soil samples submitted for analysis ranged from non-detectable levels to 190 parts per million (ppm). Concentrations of TPH-diesel and TPH-oil were not detected in the soil samples submitted from the soil borings. Diesel and oil were detected in the stockpile sample at concentrations of 19.4 ppm and 220 ppm, respectively. Concentrations of BTEX compounds ranged from non-detectable levels to 0.391 ppm. Soil analytical results are presented in Table 2. Laboratory methods, analytical reports, and chain-of-custody documentation are contained in Appendix C.

3.6.2 Groundwater Analytical Results

Concentrations of TPH-gasoline, TPH-diesel, TPH-oil, and BTEX compounds were not detected in the groundwater samples submitted for analysis from Wells MW-1 through MW-4. Concentrations of total lead ranged from 2.41 parts per billion (ppb) to 162 ppb in the groundwater samples. Laboratory methods, analytical reports, and chain-of-custody documentation are contained in Appendix C.

4.0 CONCLUSIONS

Soil encountered during investigative activities at the site consisted primarily of clay and silt to approximately 26.5 feet below grade. Clayey sand, clayey gravel, and silty sand were also observed at the site. Groundwater was first encountered in the borings at approximately 11 feet below grade, and stabilized in the wells between approximately 5 feet and 8 feet below grade. Groundwater contours for the March 11, 1999 sampling date are shown on Figure 2. The inferred direction of groundwater migration is towards the southwest.

Analytical results indicate that concentrations of TPH-gasoline above MTCA Method A cleanup levels were detected in the soil sample collected from Boring MW-1 at a depth of 6.5 feet below grade. Concentrations of TPH-diesel above MTCA Method A cleanup levels were detected in the stockpile soil sample.

Analytical results indicate that concentrations of TPH-gasoline, TPH-diesel, TPH-oil, and BTEX compounds were not detected above laboratory reporting limits in the groundwater samples submitted for analysis from Wells MW-1 through MW-4. Concentrations of total lead above the MTCA Method A cleanup level were detected in the groundwater samples collected from Wells MW-2, MW-3, and MW-4.

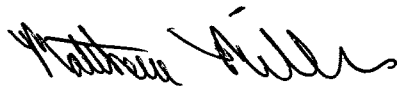
5.0 PROFESSIONAL CERTIFICATION

Based on site conditions at the time work was initiated, all tasks were performed in accordance with generally accepted professional practices. IT Corporation staff has prepared this environmental site assessment report under the professional supervision of the person(s) whose signature appears hereon.

If you have any questions regarding the contents of this report, please call.

Sincerely,

IT Corporation



Matthew Miller
Project Geologist



Ronald J. Hicks, Ph.D.
Project Manager

cc: Mr. Steve Bremer, Department of Ecology

REFERENCES

Pacific Environmental Group. 1997. "Soil Gas Survey Results". October.

Pacific Environmental Group. 1998. "Environmental Investigation". October.

Pacific Environmental Group. 1998. "Environmental Investigation". December.

TABLE 1
GROUNDWATER ELEVATION DATA

Tosco 6380 - 200 South 36th Street
Bellingham, Washington

Well Number	Top of Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)	Separate-Phase Hydrocarbons (yes/no)
MW-1	98.49	4.96	93.53	No
MW-2	100.74	7.93	92.81	No
MW-3	97.84	4.93	92.91	No
MW-4	99.44	6.39	93.05	No

Elevations, in feet, are based on an arbitrary project datum of 100.00 feet assigned to the north end of the west pump island.
Depth to groundwater measured on 3/11/99.

TABLE 2
SOIL ANALYTICAL RESULTS
Sample Date - March 2, 1999
Tosco 6380 - 200 South 36th Street
Bellingham, Washington

Sample I.D.	Depth (feet)	TPH-Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	TPH-Diesel (ppm)	TPH-Oil (ppm)	Total Lead (ppm)
MW1-6.5	6.5	ND	ND	ND	ND	ND	ND	ND	NA
MW2-6.5	6.5	ND	ND	ND	ND	ND	ND	ND	NA
MW3-6.5	6.5	190	ND*	ND*	0.391	ND*	ND	ND	NA
MW4-6.5	6.5	ND	ND	ND	ND	ND	ND	ND	NA
SP1	-	ND	ND	ND	ND	ND	19.4	220	16.6
MTCA Method A Cleanup Levels:		100	0.5	40	20	20	200	200	250
Laboratory Reporting Limits:		5.00	0.0500	0.0500	0.0500	0.100	10	25	0.500
Concentrations in ppm (mg/kg) ND = Not detected at the laboratory reporting limits NA - Not Analyzed * = Reporting limits for benzene = 0.1 ppm; toluene = 0.2 ppm; xylenes = 0.6 ppm. Boring locations are shown on Figure 1 Certified Analytical Results are attached TPH as Gasoline - Analysis by Washington Method WTPH-G BTEX Compounds - Analysis by EPA Method 8021B TPH as Diesel and Heavy Oil - Analysis by Washington Method WTPH-D + Extended with Silica Gel Cleanup Total Lead - Analysis by EPA 6000/7000 Series Methods									

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
 Tosco 6380 - 200 South 36th Street
 Bellingham, Washington

Sample I.D.	Sample Date	TPH-Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)	TPH-Diesel (ppb)	TPH-Oil (ppb)	Total Lead (ppb)	screen ft bgs	depth to gw
MW-1	3/11/99	ND	ND	ND	ND	ND	ND	ND	2.41	8-23	4.96
MW-2	3/11/99	ND	ND	ND	ND	ND	ND	ND	162	6-21	7.93
MW-3	3/11/99	ND	ND	ND	ND	ND	ND	ND	6.35	6-21	4.93
MW-4	3/11/99	ND	ND	ND	ND	ND	ND	ND	29.0	6-21	6.39
MTCA Method A Cleanup Levels:		1,000	5	40	30	20	1,000	1,000	5.0		
Laboratory Reporting Limits:		50	0.500	0.500	0.500	1.00	250	750	1.00		
Concentrations in ppb (ug/l) ND = Not detected at the laboratory reporting limits Well locations are shown on Figure 1 Certified Analytical Results are attached TPH as Gasoline - Analysis by Washington Method WTPH-G BTEX Compounds - Analysis by EPA Method 8021B TPH as Diesel and Heavy Oil - Analysis by Washington Method WTPH-D + Extended with Silica Gel Cleanup Total Lead - Analysis by EPA 6000/7000 Series Methods											



ITT CORPORATION



SCALE:

0 FEET 2000

SITE LOCATION MAP

CLIENT:

TOSCO SERVICE STATION 6380

DATE:

3/31/99

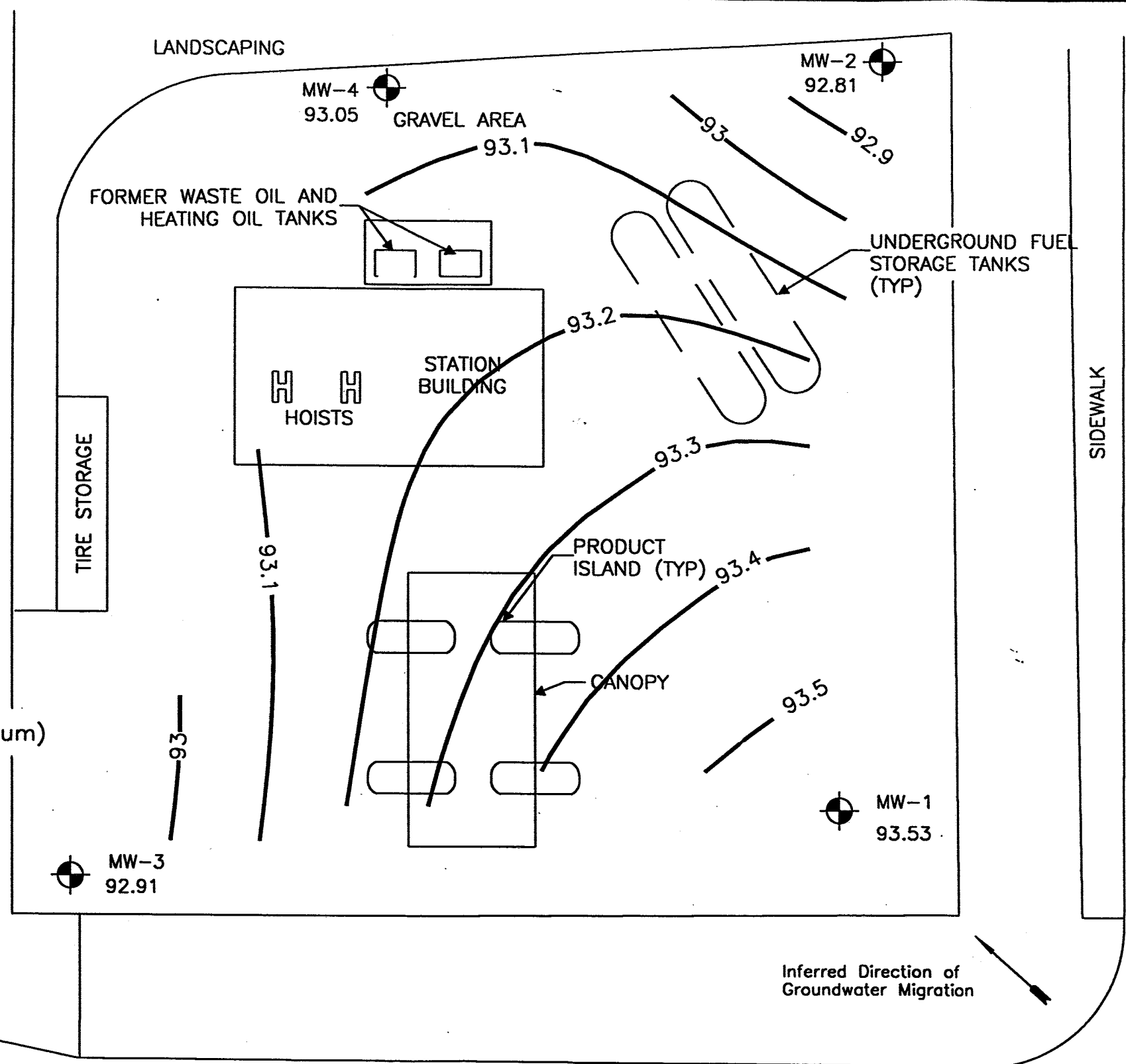
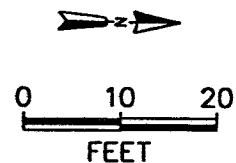
LOCATION:

200 South 36th Street
Bellingham, WA


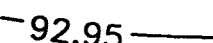
FIGURE:

1

SOURCE: U.S.G.S. 7.5' QUAD SHEET
BELLINGHAM SOUTH, WASHINGTON
PHOTOREVISED 1972



Legend

-  MW-3 Monitoring Well with GW Elev. in feet (Arbitrary Datum) 92.91
-  92.95 Groundwater Contour (Contour Interval = 0.05 feet)

MW-3
92.91

MW-1
93.53

Inferred Direction of Groundwater Migration 

36th STREET

SIDEWALK
BYRON STREET



TITLE: Groundwater Elevation - 3/11/99
TOSCO SERVICE STATION 6380
200 South 36th Street
Bellingham, Washington

DWN: CLD	DES.: CLD
CHKD:	APPD:
DATE: 3/30/99	REV.: 1

PROJECT NO.: 504-018.1C
FIGURE NO.: 2

APPENDIX A
INVESTIGATIVE PROCEDURES

APPENDIX A

Soil Sampling

Borings MW-1 through MW-4 were drilled by Cascade Drilling of Woodinville, Washington. The borings were drilled using eight-inch outside diameter hollow-stem auger drilling equipment. The borings were logged by an IT geologist using the Unified Soil Classification System and standard geologic techniques. Boring logs are presented in Appendix B. Samples were collected by advancing a 1.5-inch inside diameter split-spoon sampler into undisturbed soil beyond the tip of the auger. The sampler was driven a maximum of 18 inches using a 140-pound hammer falling from a height of 30-inches. One sample taken from the bottom of the split-spoon sampler at each sampling interval was retained for laboratory analysis. Soil samples for chemical analysis were retained in laboratory supplied glass jars with Teflon lined lids. The samples were then placed on ice for transport to the lab accompanied by chain-of-custody documentation. Each sample was affixed with a waterproof label showing project identification, boring designation, approximate depth, date, and the sampler's initials. The split-spoon sampler was cleaned between samples by washing in a trisodium phosphate detergent solution followed by a potable water rinse and distilled water rinse. All drilling equipment was steam-cleaned between each boring location. Wash water was treated on site by filtering the water through granular activated carbon, and subsequently discharged.

Organic Vapor Screening

Soil samples were screened in the field for ionizable organic compounds using a Thermo Environmental Instruments Inc. Model 580B photo-ionization detector with a 10.0 electron volts (eV) lamp. The test procedure involved measuring approximately 30 grams from an undisturbed soil sample and placing this sub-sample in a zip-lock bag. The bag was allowed to warm to ambient temperature for approximately twenty minutes, then the bag was pierced and the head-space within the bag was tested for total organic vapor, measured in parts per million, (ppm; volume/volume). The instrument was calibrated daily using a 100 ppm isobutylene standard (in air) and a sensitivity factor which relates the photo-ionization sensitivity of benzene to the sensitivity of isobutylene. The detection limit of the instrument ranges from 0.1 ppm to 2,000 ppm. The results of these tests are recorded on the boring logs in Appendix B. It should be noted that the PID measurements are considered semi-

quantitative data since the instrument detects all organic compounds with ionization potentials less than 10 eV.

Well Development

The development procedure for groundwater monitoring wells MW-1 through MW-4 consisted of pushing a surge block up and down through the well. The action of the surge block produces an outward surge of water that is forced from the borehole through the well screen and into the formation. This tends to break up any bridging that has developed within the formation. As the water is pumped out of the well, the surging action created in the borehole causes the particulate matter outside the well intake to flow into the well. Continued pumping removes the particulate matter from the well. Groundwater was treated on site by filtering the water through granular activated carbon, and subsequently discharged. Well development data sheets are included in Appendix B.

Groundwater Sampling

The groundwater sampling procedure employed by IT consisted of first measuring the water level and visually checking for the presence of sheens using a clear disposable polyethylene bailer. Each well was then purged of a minimum of three casing volumes of water (or until dry) by centrifugal pump or bailing. Groundwater samples were collected using disposable polyethylene bailers after the wells recovered to at least 60 percent of the pre-purge static water level. The samples were placed into appropriate EPA-approved containers, labeled, logged onto chain-of-custody documents, and transported on ice to Northcreek Analytical Inc. laboratory. Purge water was treated on site by filtering the water through granular activated carbon, and subsequently discharged. Chain-of-Custody documentation and field data sheets are presented in Appendix C.

APPENDIX B
BORING LOGS
FIELD DATA SHEETS



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Drilling Log

Site ID: MW-1

Project Name: Tosco
 Location: Bellingham, Washington
 Surface Elevation: 0.00'
 Borehole Diameter: 8.00in
 Blank Casing:
 type: PVC dia: 2.00in fm: 0.0' to: 8.00'
 Screens:
 type: Slotted size: 0.010in dia: 2.00in fm: 8.00' to: 23.00'
 Drilling Company: Cascade Drilling
 Logged By: Matthew Miller
 Checked By:

Project Number: 504-018.1C
 Total Hole Depth: 26.50'
 Top of Casing: 98.49'
 Static Water Level: 93.53 on 3/11/99
 Annular Fill:
 type: Concrete fm: 0.00' to: 2.00'
 type: Grout fm: 2.00' to: 6.00'
 type: Sand Filter fm: 6.00' to: 26.50'
 Method: Hollow Stem Auger
 Date Started: 03/02/99
 Permit #:

See Site Map For Boring Location

Comments:

Depth (ft)	Well Completion	PID	Sample ID	Recovery	Graphic Log	USCS Code	Water Level	Description
1						AS ML		Asphalt
2								Silt, dark greenish gray, moderate plasticity, 20% very fine sand, organic, stiff, no hydrocarbon odor
3								
4								
5		0	MW-1 @ 6'					
6								
7								
8								
9						CL		
10		0	MW-1 @ 11'					Clay, light olive brown, moderate plasticity, 10% very fine to coarse-grained sand, iron oxide staining, hard, no hydrocarbon odor
11								
12								
13								Water encountered @ 13'
14						SC		
15		0	MW-1 @ 16'					Cloey Sand, light olive-brown, 30% fines, very fine to fine-grained sand, 5% medium to coarse-grained sand, 10% gravel, iron oxide staining, hard, no hydrocarbon odor
16								
17								
18								
19						GC		
20		0	MW-1 @ 21'					Cloey Gravel, brown, 10% fines, 10% fine to coarse-grained sand, weathered gravel, dense, no HC odor
21								
22								
23								
24						ML		
25		0	MW-1 @ 26'					Silt, dark greenish gray, low plasticity, hard, no hydrocarbon odor
26								
27								Bottom of Boring @ 26.5'

Project Name: Tosco

Project Number: 504-018.1C

Location: Billingham, Washington

Total Hole Depth: 21.00'

Surface Elevation: 0.00'

Top of Casing: 100.74'

Borehole Diameter: 8.00in

Static Water Level: 92.81' on 3/11/99

Blank Casing:

Annular Fill:

type: PVC dia: 2.00in fm: 0.0' to: 6.00'

type: Concrete fm: 0.00' to: 2.00'

Screens: type: Grout fm: 2.00' to: 4.00'

type: Sand Filter fm: 4.00' to: 21.00'

type: Slotted size: 0.010in dia: 2.00in fm: 6.00' to: 21.00'

Drilling Company: Cascade Drilling

Method: Hollow Stem Auger

Logged By: Matthew Miller

Date Started: 03/02/99

Checked By:

Permit #:

See Site Map For Boring Location

Comments:

Depth (ft)	Well Completion	PID	Sample ID	Recovery	Graphic Log	USCS Code	Water Level	Description
1						AS		Asphalt Clay, mottled olive brown/grey, low plasticity, 20% very fine to coarse-grained sand, trace gravel, iron oxide staining, very stiff, no hydrocarbon odor
2						CL		
3								
4								
5			MW-2 @ 6'					
6		0						
7								
8								
9								
10		0	MW-2 @ 10.5'					Water encountered @ 10'
11								As above, minimal sample recovery
12								
13						GC		
14								Clayey Gravel, 30% fines, 30% fine to coarse-grained sand, weathered gravel, burnt wood debris, hard, no hydrocarbon odor
15			MW-2 @ 16'					
16		0						
17								
18								
19								
20		0	MW-2 @ 20'			ML		Silt, dark greenish-grey, low plasticity, hard, no hydrocarbon odor
21								Bottom of Boring @ 21'
22								
23								
24								
25								
26								
27								



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Drilling Log

Site ID: MW-3

Project Name: Tosco

Project Number: 504-018.1C

Location: Bellingham, Washington

Total Hole Depth: 21.00'

Surface Elevation: 0.00'

Top of Casing: 97.84'

Borehole Diameter: 8.00in

Static Water Level: 92.91' on 3/11/99

Blank Casing:

Annular Fill:

type: dia: 2.00in fm: 0.0' to: 6.00'

type: Concrete fm: 0.00' to: 2.00'

Screens: type: Slotted size: 0.000in dia: 2.00in fm: 6.00' to: 21.00'

type: Grout fm: 2.00' to: 4.00'

type: Sand Filter fm: 4.00' to: 21.00'

Drilling Company: Cascade Drilling

Method: Hollow Stem Auger

Logged By: Matthew Miller

Date Started: 03/02/99

Checked By:

Permit #:

See Site Map For Boring Location

Comments:

Depth (ft)	Well Completion	PID	Sample ID	Recovery	Graphic Log	USCS Code	Water Level	Description
1						AS CL		Asphalt Clay, dark gray to black, moderate plasticity, trace fine-grained sand, highly organic, very stiff, organic odor
2								
3								
4								
5			MW-3 @ 6'				▼	
6		27						
7								
8								
9								
10			MW-3 @ 11.5'					
11		0						Water encountered @ 11'
12								mottled gray/light olive brown, moderate plasticity, trace very fine to fine-grained sand, very stiff, no hydrocarbon odor
13								
14								
15			MW-3 @ 16.5'					gray, 40% very fine to coarse-grained sand, low plasticity, trace gravel, very stiff, no hydrocarbon odor
16		0						
17								
18								
19								
20			MW-2 @ 20'			ML		Silt, gray, low plasticity, trace very fine to coarse-grained sand, very hard, no hydrocarbon odor
21		0						Bottom of Boring @ 21'
22								
23								
24								
25								
26								
27								

Project Name: Tosco
 Location: Bellingham, Washington
 Surface Elevation: 0.00'
 Borehole Diameter: 8.00in
 Blank Casing:
 type: dia: 2.00in fm: 0.0' to: 6.00'
 Screens:
 type: Slotted size: 0.000in dia: 2.00in fm: 6.00' to: 21.00'
 Drilling Company: Cascade Drilling
 Logged By: Matthew Miller
 Checked By:

Project Number: 504-018.1C
 Total Hole Depth: 21.00'
 Top of Casing: 99.44'
 Static Water Level: 93.05' on 3/11/99
 Annular Fill:
 type: Concrete fm: 0.00' to: 2.00'
 type: Grout fm: 2.00' to: 4.00'
 type: Sand Filter fm: 4.00' to: 21.00'
 Method: Hollow Stem Auger
 Date Started: 03/02/99
 Permit #:

See Site Map For Boring Location

Comments:

Depth (ft)	Well Completion	FTD	Sample ID	Recovery	Graphic Log	USCS Code	Water Level	Description
1						CL		Clay, mottled gray, light olive brown, moderate plasticity, trace fine to coarse-grained sand, trace gravel, iron oxide staining, very stiff, no hydrocarbon odor As above, trace very fine-grained sand as above Silty Sand, gray, 40% fines, very fine to fine-grained sand, dense, no hydrocarbon odor Bottom of Boring @ 21'
2								
3								
4								
5			MW-4 @ 6'					
6		0						
7								
8								
9								
10			MW-4 @ 11.5'					
11		0						
12								
13								
14								
15			MW-4 @ 15'					
16		0						
17								
18						SM		
19								
20		0	MW-4 @ 20'					
21								
22								
23								
24								
25								
26								
27								

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 504-018-1C LOCATION: Bellingham WELL ID #: MW-2

CLIENT/STATION No.: Tosco - #6380 FIELD TECHNICIAN: Matt Miller

WELL INFORMATION

Depth to Liquid: _____ TOB _____ TOC _____
 Depth to water: 7.9 TOB 7.93 TOC _____
 Total depth: _____ TOB _____ TOC _____
 Date: 3/11/99 Time (2400): _____

Probe Type and I.D. #
 Oil/Water interface _____
 Electronic indicator _____
 Other: _____

CASING

DIAMETER	GAL/ LINEAR FT.
<input checked="" type="checkbox"/> 2	_____ 0.17
<input type="checkbox"/> 3	_____ 0.38
<input type="checkbox"/> 4	_____ 0.66
<input type="checkbox"/> 4.5	_____ 0.83
<input type="checkbox"/> 5	_____ 1.02
<input type="checkbox"/> 6	_____ 1.5
<input type="checkbox"/> 8	_____ 2.6

SAMPLE TYPE

Groundwater
 Duplicate
 Extraction well
 Trip blank
 Field blank
 Equipment blank
 Other: _____

TD 2117 - DTW = $\frac{13.24 \text{ Gal/Linear Foot} \times 0.17}{2.25} \times 3$ Casings = 3 Calculated Purge 6.8

DATE PURGED: 3/11/99 START: 1334 END (2400 hr): 1312 PURGED BY: MM

DATE SAMPLED: 3/11/99 START: _____ END (2400 hr): 1420 SAMPLED BY: MM

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR
Pumped dry Yes / <u>No</u>					Cobalt 0-100 Clear Cloudy Yellow Brown	NTU 0-200 Heavy Moderate Light Trace	Strong Moderate Faint None
FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:							
DTW: _____ TOB/TOC _____							
PURGING EQUIPMENT/I.D. #				SAMPLING EQUIPMENT/I.D. #			
<input type="checkbox"/> Bailer: _____		<input type="checkbox"/> Airlift: _____		<input checked="" type="checkbox"/> Bailer: _____		<input type="checkbox"/> Dedicated: _____	
<input checked="" type="checkbox"/> Centrifugal: _____		<input type="checkbox"/> Dedicated: _____		<input type="checkbox"/> Dedicated: _____		<input type="checkbox"/> Other: _____	
<input type="checkbox"/> Other: _____				<input type="checkbox"/> Other: _____			

SAMPLE I.D.	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-2</u>	<u>3/11/99</u>	<u>1420</u>	<u>2</u>	<u>40ml</u>	<u>VOA</u>	<u>HCl</u>	<u>Gas/BTEX</u>
			<u>1</u>	<u>1dr</u>	<u>Glass</u>	<u>NP</u>	<u>Diesel + Oil</u>
			<u>1</u>	<u>500ml</u>	<u>Poly</u>	<u>Nitr.</u>	<u>lead</u>

WELL INTEGRITY: Good Fair Poor

REMARKS: Purged

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 504-018-1C LOCATION: Bellingham WELL ID #: MW-3

CLIENT/STATION No.: Toxco - #6380 FIELD TECHNICIAN: Matt Miller

WELL INFORMATION

Depth to Liquid: _____ TOB _____ TOC _____
 Depth to water: 4.93 TOB 4.93 TOC _____
 Total depth: _____ TOB _____ TOC _____
 Date: 3/11/99 Time (2400): _____

Probe Type and I.D. #
 Oil/Water interface _____
 Electronic indicator _____
 Other: _____

CASING

DIAMETER	GAL/ LINEAR FT.
<input checked="" type="checkbox"/> 2	0.17
<input type="checkbox"/> 3	0.38
<input type="checkbox"/> 4	0.66
<input type="checkbox"/> 4.5	0.83
<input type="checkbox"/> 5	1.02
<input type="checkbox"/> 6	1.5
<input type="checkbox"/> 8	2.6

SAMPLE TYPE

Groundwater
 Duplicate
 Extraction well
 Trip blank
 Field blank
 Equipment blank
 Other: _____

TD 2040 - DTW = 15.47 Gal/Linear x Foot 0.17 = 2.63 Number of Casings 3 Calculated = Purge 7.9

DATE PURGED: 3/11/99 START: 1255 END (2400 hr): 1310 PURGED BY: MM
 DATE SAMPLED: 3/11/99 START: _____ END (2400 hr): 1405 SAMPLED BY: MM

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR
_____	_____	_____	_____	_____	<u>clear</u>	_____	<u>none</u>
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Pumped dry Yes / No

FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:

DTW: _____ TOB/TOC _____

PURGING EQUIPMENT/I.D. # <input type="checkbox"/> Bailer: _____ <input checked="" type="checkbox"/> Centrifugal: _____ <input type="checkbox"/> Other: _____	SAMPLING EQUIPMENT/I.D. # <input checked="" type="checkbox"/> Bailer: _____ <input type="checkbox"/> Dedicated: _____ <input type="checkbox"/> Other: _____
--	---

SAMPLE I.D.	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-3</u>	<u>3/11/99</u>	<u>14:05</u>	<u>2</u>	<u>40ml</u>	<u>VOA</u>	<u>HCl</u>	<u>Gas/BTEX</u>
_____	_____	_____	<u>1</u>	<u>1ltr</u>	<u>Glass</u>	<u>NP</u>	<u>Diesel + Oil</u>
_____	_____	_____	<u>1</u>	<u>500ml</u>	<u>Polg</u>	<u>Nitr:</u>	<u>lead</u>

WELL INTEGRITY: Good Fair Poor

REMARKS: Purged 8 gallons

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 504-018-1C LOCATION: Bellingham WELL ID #: MW-4

CLIENT/STATION No.: Toxco - #6380 FIELD TECHNICIAN: Matt Miller

WELL INFORMATION

Depth to Liquid: _____ TOB _____ TOC _____
 Depth to water: _____ TOB 6.39 TOC _____
 Total depth: _____ TOB _____ TOC _____
 Date: 3/11/99 Time (2400): _____

Probe Type and I.D. #
 Oil/Water interface _____
 Electronic indicator _____
 Other: _____

CASING DIAMETER

<input checked="" type="checkbox"/>	2	_____	0.17
<input type="checkbox"/>	3	_____	0.38
<input type="checkbox"/>	4	_____	0.66
<input type="checkbox"/>	4.5	_____	0.83
<input type="checkbox"/>	5	_____	1.02
<input type="checkbox"/>	6	_____	1.5
<input type="checkbox"/>	8	_____	2.6

GAL/ LINEAR FT.

SAMPLE TYPE

Groundwater
 Duplicate
 Extraction well
 Trip blank
 Field blank
 Equipment blank
 Other: _____

TD 21.3 - DTW = 14.74 Gal/Linear x Foot 0.17 = 2.5 Number of x Casings 3 Calculated = Purge 7.5

DATE PURGED: 3/11/99 START: 1326 END (2400 hr): 1332 PURGED BY: MM
 DATE SAMPLED: 3/11/99 START: _____ END (2400 hr): 1425 SAMPLED BY: MM

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR

Pumped dry Yes / No

FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:

DTW: _____ TOB/TOC _____

PURGING EQUIPMENT/I.D. #

Bailer: _____
 Centrifugal: _____
 Other: _____
 Airlift: _____
 Dedicated: _____

SAMPLING EQUIPMENT/I.D. #

Bailer: _____
 Dedicated: _____
 Other: _____

SAMPLE I.D.	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-4</u>	<u>3/11/99</u>	<u>1425</u>	<u>2</u>	<u>40ml</u>	<u>VOA</u>	<u>HCl</u>	<u>Gas/BTEX</u>
			<u>1</u>	<u>100ml</u>	<u>Glass</u>	<u>NP</u>	<u>Diesel + Oil</u>
			<u>1</u>	<u>500ml</u>	<u>Poly</u>	<u>Nitric</u>	<u>lead</u>

WELL INTEGRITY: Good Fair Poor

REMARKS: Purged 7.5 gallons

APPENDIX C

LABORATORY ANALYTICAL METHODS AND REPORTS

QUALITY CONTROL SUMMARY

CHAIN-OF-CUSTODY DOCUMENTATION

APPENDIX C

Laboratory Analytical Methods

Analysis for TPH-gasoline was performed according to Washington Method WTPH-G. Analysis for TPH-diesel and TPH-oil was performed according to Washington Method WTPH-D Extended with Silica Gel Clean-up. Benzene, toluene, ethylbenzene, and xylenes analysis was performed in accordance with EPA Method 8021B. A methanol solvent extraction was used for the WTPH-G analysis with final detection by gas chromatography using a flame-ionization detector. A headspace or purge and trap technique was utilized for BTEX analysis. Final detection was by gas chromatography using a photoionization detector. Analysis for total lead was performed according to EPA 6000/7000 Series Methods.

Quality Control Summary

Soil and groundwater samples collected on March 2 and 11, 1999 were submitted to NCA for chemical analysis. The samples were kept in cold storage until removed for preparation and/or analysis.

Included with the laboratory sample results were QA/QC data for laboratory method blanks, matrix spikes, and matrix spike duplicates. A detailed description of the laboratory QA/QC data is presented below.

- **Method Blank:** An organic or aqueous solution that is as free of analyte as possible and contains all the reagents in the same volume as used in the processing of the environmental samples. The method blank is carried through the complete preparation procedure and is used to correct for possible errors in extraction procedure or contamination.
- **Matrix Spike and Matrix Spike Duplicates:** A technique used to provide a measure of accuracy for the method in a given matrix by adding predetermined quantities of analytes prior to sample extraction/digestion and analysis. The spike concentration should be at the regulatory level or near the Practical Quantitation Limit for the method. When performed in duplicate, the percent recovery and relative percent deviation between the

MS and MSD is calculated and used to interpret the precision of the analyses.

Upper and lower control limits, relative difference, and maximum relative percent difference (RPD) are also included on the North Creek Analytical Quality Control Data Report with the laboratory results.

The samples submitted were all extracted and analyzed within the recommended holding times. Correct procedures for chain of custody documentation were followed throughout the project.



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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/11/99 Received: 3/12/99 Reported: 3/18/99 13:02
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ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-1	B903280-01	Water	3/11/99
MW-2	B903280-02	Water	3/11/99
MW-3	B903280-03	Water	3/11/99
MW-4	B903280-04	Water	3/11/99

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North Creek Analytical - Bothell

*The results in this report apply to the samples analyzed in accordance with the chain of custody document.
This analytical report must be reproduced in its entirety.*


Joy B Chang, Project Manager

**North Creek Analytical, Inc.
Environmental Laboratory Network**



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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8021B
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-1				<u>B903280-01</u>			<u>Water</u>	
Gasoline Range Hydrocarbons	0390412	3/15/99	3/15/99		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		88.1	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		98.1	"	
MW-2				<u>B903280-02</u>			<u>Water</u>	
Gasoline Range Hydrocarbons	0390412	3/15/99	3/15/99		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		87.5	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		98.5	"	
MW-3				<u>B903280-03</u>			<u>Water</u>	
Gasoline Range Hydrocarbons	0390412	3/15/99	3/15/99		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		87.5	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		97.7	"	
MW-4				<u>B903280-04</u>			<u>Water</u>	
Gasoline Range Hydrocarbons	0390412	3/15/99	3/15/99		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		89.0	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		97.3	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.


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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/11/99 Received: 3/12/99 Reported: 3/18/99 13:02
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**Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended) with Silica Gel Clean-up
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-1				<u>B903280-01</u>				<u>Water</u>
Diesel Range Hydrocarbons	0390434	3/16/99	3/17/99		0.250	ND	mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		72.2	%	
MW-2				<u>B903280-02</u>				<u>Water</u>
Diesel Range Hydrocarbons	0390434	3/16/99	3/18/99		0.250	ND	mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		82.8	%	
MW-3				<u>B903280-03</u>				<u>Water</u>
Diesel Range Hydrocarbons	0390434	3/16/99	3/17/99		0.250	ND	mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		74.9	%	
MW-4				<u>B903280-04</u>				<u>Water</u>
Diesel Range Hydrocarbons	0390434	3/16/99	3/17/99		0.250	ND	mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		79.2	%	

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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/11/99 Received: 3/12/99 Reported: 3/18/99 13:02
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**Total Metals by EPA 6000/7000 Series Methods
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-1				<u>B903280-01</u>				
Lead	0390386	3/13/99	3/15/99	EPA 6020	0.00100	0.00241	Water mg/l	
MW-2				<u>B903280-02</u>				
Lead	0390386	3/13/99	3/15/99	EPA 6020	0.00100	0.162	Water mg/l	
MW-3				<u>B903280-03</u>				
Lead	0390386	3/13/99	3/15/99	EPA 6020	0.00100	0.00635	Water mg/l	
MW-4				<u>B903280-04</u>				
Lead	0390386	3/13/99	3/15/99	EPA 6020	0.00100	0.0290	Water mg/l	

Joy B Chang, Project Manager



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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/11/99 Received: 3/12/99 Reported: 3/18/99 13:02
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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by W/PH-G and EPA 8021B/Quality Control
 North Creek Analytical - Bothell**

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Units	Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390412		Date Prepared: 3/15/99		Extraction Method: EPA 5030B (P/T)						
Blank		0390412-BLK1								
Gasoline Range Hydrocarbons	3/15/99			ND	ug/l	50.0				
Benzene	"			ND	"	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB (FID)	"	48.0		42.5	"	50.0-150	88.5			
Surrogate: 4-BFB (PID)	"	48.0		46.4	"	50.0-150	96.7			
LCS		0390412-BS1								
Gasoline Range Hydrocarbons	3/15/99	500		472	ug/l	70.0-130	94.4			
Surrogate: 4-BFB (FID)	"	48.0		44.2	"	50.0-150	92.1			
Duplicate		0390412-DUP2		B903280-02						
Gasoline Range Hydrocarbons	3/16/99		ND	ND	ug/l				25.0	
Surrogate: 4-BFB (FID)	"	48.0		41.5	"	50.0-150	86.5			
Matrix Spike		0390412-MS1		B903280-04						
Benzene	3/16/99	10.0	ND	9.81	ug/l	70.0-130	98.1			
Toluene	"	10.0	ND	9.40	"	70.0-130	94.0			
Ethylbenzene	"	10.0	ND	9.65	"	70.0-130	96.5			
Xylenes (total)	"	30.0	ND	28.5	"	70.0-130	95.0			
Surrogate: 4-BFB (PID)	"	48.0		46.8	"	50.0-150	97.5			
Matrix Spike Dup		0390412-MSD1		B903280-04						
Benzene	3/16/99	10.0	ND	9.92	ug/l	70.0-130	99.2	15.0	1.12	
Toluene	"	10.0	ND	9.28	"	70.0-130	92.8	15.0	1.28	
Ethylbenzene	"	10.0	ND	9.57	"	70.0-130	95.7	15.0	0.832	
Xylenes (total)	"	30.0	ND	28.4	"	70.0-130	94.7	15.0	0.316	
Surrogate: 4-BFB (PID)	"	48.0		46.8	"	50.0-150	97.5			

Joy B Chang, Project Manager



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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/11/99 Received: 3/12/99 Reported: 3/18/99 13:02
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Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended) with Silica Gel Clean-up/Quality Control
 North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Limit Units	Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390434			Date Prepared: 3/16/99			Extraction Method: EPA 3520C/600 Series				
Blank										
Diesel Range Hydrocarbons	3/17/99			ND	mg/l	0.250				
Heavy Oil Range Hydrocarbons	"			ND	"	0.750				
Surrogate: 2-FBP	"	0.326		0.254	"	50.0-150	77.9			
LCS										
0390434-BS1										
Diesel Range Hydrocarbons	3/17/99	2.00		1.67	mg/l	50.0-150	83.5			
Surrogate: 2-FBP	"	0.326		0.290	"	50.0-150	89.0			
Duplicate										
0390434-DUPI B903280-01										
Diesel Range Hydrocarbons	3/17/99		ND	ND	mg/l				44.0	
Heavy Oil Range Hydrocarbons	"		ND	ND	"				44.0	
Surrogate: 2-FBP	"	0.622		0.474	"	50.0-150	76.2			

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Total Metals by EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390386	Date Prepared: 3/13/99			Extraction Method: EPA 3020A						
Blank	0390386-BLK1									
Lead	3/15/99			ND	mg/l	0.00100				
LCS	0390386-BS1									
Lead	3/15/99	0.200		0.220	mg/l	80.0-120	110			
Matrix Spike	0390386-MS1		B903281-02							
Lead	3/15/99	0.200	0.00171	0.221	mg/l	75.0-125	110			
Matrix Spike Dup	0390386-MSD1		B903281-02							
Lead	3/15/99	0.200	0.00171	0.225	mg/l	75.0-125	112	20.0	1.80	


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Notes and Definitions

#	Note
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- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- Recov. Recovery
- RPD Relative Percent Difference

 Joy B Chang, Project Manager



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 (503) 906-9200 FAX 906-9210

CHAIN OF CUSTODY REPORT

Work Order # **B903280**

REPORT TO: **IT Group**
 ATTENTION: **Matt Miller**
 ADDRESS: **333 S. Renton Village Place Ste 200**
Renton WA 98035
 PHONE: **425 225-9645** FAX: **425 225-9793**

INVOICE TO: **Tim Johnson @ Tosco**
 ATTENTION:
 ADDRESS:
 P.O. NUMBER: NCA QUOTE #:

TURNAROUND REQUEST in Business Days *

Organic & Inorganic Analyses
 10 7 5 4 3 2 1 Same Day
 Standard

Fuels & Hydrocarbon Analyses
 5 3-4 2 1 Same Day
 Standard

PROJECT NAME: **Tesco #6380**
 PROJECT NUMBER: **504-518-16**
 SAMPLED BY: **Matt Miller**

Analysis Request:
MT-PHCs/BTEX
W5W-CuSec
TPH-Diesel/Btu
Total Lead

OTHER Specify:
 * Turnaround Requests less than standard may incur Rush Charges.

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NCA SAMPLE ID (Laboratory Use Only)	Analysis Request																	
1. MW-1	3/11/99	B903280-01	X	X	X															
2. MW-2	↓	02	X	X	X															
3. MW-3	↓	03	X	X	X															
4. MW-4	↓	04	X	X	X															
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				

MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
W	4	
↓	↓	
↓	↓	

RELINQUISHED BY (Signature): **Matthew Miller** DATE: **3/12/99**
 PRINT NAME: **Matthew Miller** FIRM: **IT** TIME:
 RELINQUISHED BY (Signature): **S. Wideen** DATE: **3/12/99**
 PRINT NAME: **S. Wideen** FIRM: **NCA** TIME: **12:15**

RECEIVED BY (Signature): **S. Wideen** DATE: **3/12/99**
 PRINT NAME: **S. Wideen** FIRM: **NCA** TIME: **10:35**
 RECEIVED BY (Signature): **Adar Reed** DATE: **3/12/99**
 PRINT NAME: **Adar Reed** FIRM: **NCA-B** TIME: **12:15**

ADDITIONAL REMARKS: **Tosco #6380**
200 South 36th Street, Bellingham WA
W0 / 9.2°C

PAGE: OF



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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/2/99 Received: 3/5/99 Reported: 3/15/99 11:30
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ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW1-6.5	B903137-01	Soil	3/2/99
MW2-6.5	B903137-02	Soil	3/2/99
MW3-6.5	B903137-03	Soil	3/2/99
MW4-6.5	B903137-04	Soil	3/2/99
SP1	B903137-05	Soil	3/2/99

..


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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8021B
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW1-6.5				B903137-01		Soil		
Gasoline Range Hydrocarbons	0390224	3/9/99	3/10/99		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	ND	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		89.8	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		94.7	"	
MW2-6.5				B903137-02		Soil		
Gasoline Range Hydrocarbons	0390224	3/9/99	3/10/99		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	ND	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		88.5	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		92.4	"	
MW3-6.5				B903137-03		Soil		
Gasoline Range Hydrocarbons	0390224	3/9/99	3/10/99		10.0	190	mg/kg dry	1
Benzene	"	"	"		0.100	ND	"	
Toluene	"	"	"		0.200	ND	"	2
Ethylbenzene	"	"	"		0.100	0.391	"	
Xylenes (total)	"	"	"		0.600	ND	"	2
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		184	%	3
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		107	"	
MW4-6.5				B903137-04		Soil		
Gasoline Range Hydrocarbons	0390224	3/9/99	3/10/99		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	ND	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		88.5	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		95.0	"	
SP1				B903137-05		Soil		
Gasoline Range Hydrocarbons	0390224	3/9/99	3/10/99		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	

North Creek Analytical - Bothell

*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

North Creek Analytical, Inc.
 Environmental Laboratory Network



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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8021B
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
SPI (continued)				B903137-05			Soil	
Toluene	0390224	3/9/99	3/10/99		0.0500	ND	mg/kg dry	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		89.1	%	
Surrogate: 4-BFB (PID)	"	"	"	50.0-150		92.4	"	


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**Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended) with Silica Gel Clean-up
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
				B903137-01				
MW1-6.5 Diesel Range Hydrocarbons	0390236	3/9/99	3/10/99		10.0	ND	Soil mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		25.0	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		72.6	%	
				B903137-02				
MW2-6.5 Diesel Range Hydrocarbons	0390236	3/9/99	3/10/99		10.0	ND	Soil mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		25.0	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		60.3	%	
				B903137-03				
MW3-6.5 Diesel Range Hydrocarbons	0390236	3/9/99	3/10/99		10.0	ND	Soil mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		25.0	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		80.8	%	
				B903137-04				
MW4-6.5 Diesel Range Hydrocarbons	0390236	3/9/99	3/10/99		10.0	ND	Soil mg/kg dry	
Heavy Oil Range Hydrocarbons	"	"	"		25.0	ND	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		63.6	%	
				B903137-05				
SP1 Diesel Range Hydrocarbons	0390236	3/9/99	3/10/99		10.0	19.4	Soil mg/kg dry	4
Heavy Oil Range Hydrocarbons	"	"	"		25.0	220	"	
<i>Surrogate: 2-FBP</i>	"	"	"	50.0-150		77.5	%	

Joy B Chang, Project Manager



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**Total Metals by EPA 6000/7000 Series Methods
 North Creek Analytical - Bothell**

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
SPI				B903137-05			Soil	
Lead	0390314	3/11/99	3/12/99	EPA 6020	0.500	16.6	mg/kg dry	

Joy B Chang  Project Manager



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**Dry Weight Determination
 North Creek Analytical - Bothell**

Sample Name	Lab ID	Matrix	Result	Units
MW1-6.5	B903137-01	Soil	81.6	%
MW2-6.5	B903137-02	Soil	82.0	%
MW3-6.5	B903137-03	Soil	72.0	%
MW4-6.5	B903137-04	Soil	79.2	%
SP1	B903137-05	Soil	87.1	%

North Creek Analytical - Bothell

Joy B Chang, Project Manager 

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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by W/PH-C and EPA 8021B/Quality Control
 North Creek Analytical - Bothell**

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390224			Date Prepared: 3/9/99		Extraction Method: EPA 5030B (MeOH)					
Blank			0390224-BLK1							
Gasoline Range Hydrocarbons	3/9/99			ND	mg/kg dry	5.00				
Benzene	"			ND	"	0.0500				
Toluene	"			ND	"	0.0500				
Ethylbenzene	"			ND	"	0.0500				
Xylenes (total)	"			ND	"	0.100				
Surrogate: 4-BFB (FID)	"	4.00		3.63	"	50.0-150	90.8			
Surrogate: 4-BFB (PID)	"	4.00		3.93	"	50.0-150	98.3			
LCS			0390224-BS1							
Gasoline Range Hydrocarbons	3/9/99	25.0		23.4	mg/kg dry	70.0-130	93.6			
Surrogate: 4-BFB (FID)	"	4.00		3.92	"	50.0-150	98.0			
Duplicate			0390224-DUP1	B903134-02						
Gasoline Range Hydrocarbons	3/10/99		437	218	mg/kg dry			50.0	66.9	5
Surrogate: 4-BFB (FID)	"	4.38		6.51	"	50.0-150	149			
Duplicate			0390224-DUP2	B903199-01						
Gasoline Range Hydrocarbons	3/10/99		ND	ND	mg/kg dry			50.0		
Surrogate: 4-BFB (FID)	"	4.51		4.52	"	50.0-150	100			
Matrix Spike			0390224-MS1	B903134-01						
Benzene	3/10/99	0.569	ND	0.478	mg/kg dry	60.0-140	84.0			
Toluene	"	0.569	ND	0.483	"	60.0-140	84.9			
Ethylbenzene	"	0.569	ND	0.517	"	60.0-140	90.9			
Xylenes (total)	"	1.71	0.119	1.62	"	60.0-140	87.8			
Surrogate: 4-BFB (PID)	"	4.55		4.27	"	50.0-150	93.8			
Matrix Spike Dup			0390224-MSD1	B903134-01						
Benzene	3/10/99	0.569	ND	0.490	mg/kg dry	60.0-140	86.1	20.0	2.47	
Toluene	"	0.569	ND	0.493	"	60.0-140	86.6	20.0	1.98	
Ethylbenzene	"	0.569	ND	0.526	"	60.0-140	92.4	20.0	1.64	
Xylenes (total)	"	1.71	0.119	1.64	"	60.0-140	88.9	20.0	1.25	
Surrogate: 4-BFB (PID)	"	4.55		4.09	"	50.0-150	89.9			



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Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by W/PH-D (extended) with Silica Gel Clean-up/Quality Control
 North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390236		Date Prepared: 3/9/99		Extraction Method: EPA 3550B						
Blank										
Diesel Range Hydrocarbons	3/10/99			ND	mg/kg dry	10.0				
Heavy Oil Range Hydrocarbons	"			ND	"	25.0				
Surrogate: 2-FBP	"	10.9		7.83	"	50.0-150	71.8			
LCS										
0390236-BS1										
Diesel Range Hydrocarbons	3/10/99	66.7		49.4	mg/kg dry	50.0-150	74.1			
Surrogate: 2-FBP	"	10.9		7.68	"	50.0-150	70.5			
Duplicate										
0390236-DUP1		B903137-05								
Diesel Range Hydrocarbons	3/10/99		19.4	14.6	mg/kg dry			56.0	28.2	
Heavy Oil Range Hydrocarbons	"		220	132	"			56.0	50.0	
Surrogate: 2-FBP	"	12.5		8.40	"	50.0-150	67.2			

Joy B Chang, Project Manager



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IT Corporation - Renton 555 South Renton Village Place, Ste 700 Renton, WA 98055	Project: TOSCO #6380 Project Number: 504-018.1C Project Manager: Matt Miller	Sampled: 3/2/99 Received: 3/5/99 Reported: 3/15/99 11:30
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**Total Metals by EPA 6000/7000 Series Methods/Quality Control
 North Creek Analytical - Bothell**

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Reporting Units	Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0390314	Date Prepared: 3/11/99				Extraction Method: EPA 3050B					
Blank	0390314-BLK1									
Lead	3/12/99			ND	mg/kg dry	0.500				
Blank	0390314-BLK2									
Lead	3/12/99			ND	mg/kg dry	0.500				
LCS	0390314-BS1									
Lead	3/12/99	25.0		25.2	mg/kg dry	80.0-120	101			
LCS	0390314-BS2									
Lead	3/12/99	25.0		25.5	mg/kg dry	80.0-120	102			
Matrix Spike	0390314-MS1		B903200-26							
Lead	3/12/99	14.3	4.23	18.6	mg/kg dry	70.0-130	100			
Matrix Spike	0390314-MS2		B903200-25							
Lead	3/12/99	17.3	3.59	23.0	mg/kg dry	70.0-130	112			
Matrix Spike Dup	0390314-MSD1		B903200-26							
Lead	3/12/99	16.7	4.23	21.1	mg/kg dry	70.0-130	101	20.0	0.995	
Matrix Spike Dup	0390314-MSD2		B903200-25							
Lead	3/12/99	17.5	3.59	22.1	mg/kg dry	70.0-130	106	20.0	5.50	

Joy B Chang / Project Manager



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Notes and Definitions

#	Note
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- 1 The chromatogram for this sample does not resemble a typical gasoline pattern.
 - 2 The reporting limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample.
 - 3 The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.
 - 4 Results in the diesel organics range are primarily due to overlap from a heavy oil range product.
 - 5 Visual examination indicates the RPD and/or matrix spike recovery is outside the control limit due to a non-homogeneous sample matrix.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- Recov. Recovery
- RPD Relative Percent Difference

Joy B Chang Project Manager



TOSCO CHAIN OF CUSTODY REPORT *B90313X7*

TOSCO INFORMATION

Facility Number: *Tosco # 6380*

Site Address: *200 South 36th Street*

City, State, ZIP: *Bellingham WA*

Site Release Number: *7763802511-212-481-030-01000*

Tosco Manager: *Tim Johnson - 256380*

CERT INFO: (check one) Evaluation Remediation
 Detection Demolition Closure Miscellaneous

CONSULTANT INFORMATION

Firm: *IT Corp.* Project# *504-018.1C*

Address: *335 South Renton Village Place Suite 700*
Renton WA 98055

Phone: *(425) 228-9645* Fax: *(425) 228-9793*

Project Manager: *Matt Miller*

Sample Collection by: *Matt Miller*

Chain of Custody Record #:

Quality Assurance Data Level:
 A B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days:
 10 5 3 2 1

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W.S.O)	# OF CON-TAINERS
1. <i>MW1-6.5</i>	<i>3/2/99</i>	<i>S</i>	<i>1</i>
2. <i>MW2-6.5</i>	↓	↓	<i>1</i>
3. <i>MW3-6.5</i>	↓	↓	<i>1</i>
4. <i>MW4-6.5</i>	↓	↓	<i>1</i>
5. <i>SPI</i>	↓	↓	<i>1</i>
6.			
7.			
8.			
9.			
10.			

OR		WA		AK		NW Series						
TPH-HCID	TPH-Gas	BTEX EPA 8021 Mod. TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-Diesel-Ext. w/SG Cleanup	Halogen. Volatiles EPA 8021	Pesticides/PCBs or PCBs Only	GC/MS Volatiles EPA 8260	GC/MS Semi Vols. EPA 8270	PAH's 8270 SIM or 8310	Lead: Total or Dissolved TCLP or RCRA	Metals (8)
		X			X							
		X			X							
		X			X							
		X			X						X	
		X			X							

7
NCA SAMPLE NUMBER
B90313X-01
↓
-02
-03
-04
-05

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. <i>[Signature]</i>	<i>IT</i>	<i>3/5/99</i>	<i>S. Wideen</i>	<i>NCA</i>	<i>2/5/99 1002</i>
2. <i>S. Wideen</i>	<i>NCA</i>	<i>3/5/99 1240</i>	<i>Alan Reed</i>	<i>NCA</i>	<i>3/5/99 1240</i>
3.					

Final Report Approval

Were all requested results provided? yes no Define

Were results within requested turnaround? yes no "No"

Final Approval Signature: _____ on back

Firm: _____ Date: _____



ENTERED
SEK
11-10-99

LUST# 417259
TOSCO Service Stat. #6380

IT Corporation

555 South Renton Village Place, Suite 700
Renton, WA 98055-3295
Tel. 425.228.9645
Fax. 425.228.9793

A Member of The IT Group

RECEIVED

APR 30 1999

Letter of Transmittal

To: WDOE
L.U.S.T. Group NW
3190 160th Avenue SE
Bellevue, WA 98008-5452

Date: April 29, 1999

DEPT OF ECOLOGY

Attn: Steve Bremer

Re: Tosco Service Station #6380
at 200 S 36th Street, Bellingham

We are sending you:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Technical literature |
| <input type="checkbox"/> Copy of Letter | <input type="checkbox"/> Samples |
| <input type="checkbox"/> Proposal/Contract | <input type="checkbox"/> Change order |
| <input type="checkbox"/> Plans | <input type="checkbox"/> Specifications |
| <input type="checkbox"/> Under separate cover, the following: _____ | |

Enclosure(s): Supplemental Environmental Investigation for the above referenced site.

These are transmitted as checked below:

- | | |
|--|---|
| <input type="checkbox"/> As requested | <input type="checkbox"/> For approval |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> For review and comment |
| <input type="checkbox"/> For bids due: _____ | |

Comments: _____

If enclosures received are not as listed above, please notify at once.

Signed:  (425) 228-9645