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June 18, 1997
Project 1105-003.2B

Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97204

Re: December 1996 - February 1997 Quarterly Report
RI/FS Interim Action
Willbridge Facility
Portland, Oregon
Consent Order WMCSR-NWR-94-06

Dear Ms. Kiernan:

Pacific Environmental Group, Inc. (PACIFIC) is pleased to present the first quarter 1997 progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Tosco (formerly Unocal), and GATX (formerly Shell) terminals which compose the Willbridge Facility in Portland, Oregon. This letter presents a summary of the following:

- Actions taken under the Consent Order from December 1996 to February 1997.
- First Quarter 1997 sampling, test results, and other data generated between December 1996 and February 1997.

This progress report fulfills the requirement of Section 7F of Oregon Department of Environmental Quality (DEQ) Consent Order WMCSR-NWR-94-06.

ACTIVITIES PERFORMED FIRST QUARTER 1997

The following work was performed during December 1996 through February 1997:

- Performed quarterly groundwater sampling at the Chevron, GATX, and Tosco facilities.

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- Initiated RCRA Metals analysis of groundwater samples.
- Performed monthly separate-phase hydrocarbon (SPH) removal from wells located on the Tosco and GATX terminals.

FIRST QUARTER 1997 MONITORING ANALYSIS

Interim action monitoring activities performed during the first quarter included water level and SPH thickness measurements and groundwater sampling from selected wells, as outlined in the Field Coordination Plan (FCP) dated April 1995.

Hydrogeological Analysis

Water level measurements were performed in January 1997. Measurements were corrected for SPH where encountered. A groundwater table contour map using the January 1997 data is shown on Figures 1A and 1B. The January 1997 groundwater elevation data is presented in Table 1. Water elevation and SPH recovery data for January 1997 and historic water elevation measurements are presented in Table 5.

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the river front. During the first quarter (December 1996 through February 1997), water table elevations in the vicinity of the river increased from fourth quarter levels by approximately two feet, while water table elevations in upgradient facility wells rose by approximately 0.8 to 1.5 feet. These changes are likely in response to a rise in river stage combined with upgradient recharge from rainfall infiltration.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX south tank farm, and apparent elongated groundwater depressions (troughs) in the vicinity of Doane Avenue and the Saltzman Creek flume. These troughs may be caused by groundwater drainage through the backfill associated with the Doane Avenue storm sewer conduit and the Saltzman Creek flume. The groundwater mound in the south GATX tank farm may be caused by the difference in hydraulic conductivity of the stratigraphic units beneath the GATX south tank farm (silt/clay) and the remainder of the site (sandy fill) or may represent a historic hydraulic divide between the Saltzman Creek drainage and the Holbrook Slough drainage.

Hydrological Analysis

The Willamette River stage (measured at the Morrison Bridge river gauge and converted to City of Portland datum) ranged from a quarterly high of 25.65 feet in January 1997 to

a low of 11.12 feet in February. The river stage measured approximately 12.28 feet on January 29-31, 1997, the dates of first quarter groundwater monitoring.

Groundwater Analytical Results

Groundwater samples collected from selected facility monitoring wells were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds by EPA Method 8020, polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270 modified (GS/MS-SIM), and RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA Methods 6010A/7000 Series. The groundwater sampling protocol is presented in Attachment A.

The January 1997 BTEX results are presented in Table 2 and historic BTEX results are presented in Table 6. The January 1997 PAH results are presented in Table 3 and PAH results for the previous four quarters are presented in Tables 7, 8, 9, and 10. The January 1997 metals results are presented in Tables 4A and 4B. Certified analytical results for all analyses are presented in Attachment A. Samples were not collected from wells containing SPH (SPH is designated by NS/F in the Tables).

BTEX Compounds

The January 1997 BTEX testing results appear to be consistent with the October 1996 results. Concentrations of BTEX in Well B-17 decreased over the past three quarters. BTEX concentrations in Well B-14 increased in January 1997, after a decrease in October 1996. Concentrations of BTEX in Well B-10 have increased over the last two quarters. Concentrations in Wells B-35, CR-11, and MW-8 have decreased from last quarters results. Concentrations in Wells B-28, B-30, CR-8, MW-10, MW-22, MW-26, MW-37 and U-2 have increased from the last quarter results.

The BTEX levels have remained both unchanged and non-detect since last quarter in Wells B-7, B-9, B-18, B-36, B-37, U-3, MW-32, MW-33, and MW-36. Concentrations in Wells U-5, MW-28, and MW-31 decreased from detected levels during the fourth quarter 1996 to non-detectable levels.

PAH Compounds

The January 1997 polynuclear aromatic hydrocarbon (PAH) analytical results report increased detected PAH compounds with respect to previous results. The PAH compounds were not detected at or above method detection limits in Wells B-6, B-7, B-10, B-11, B-30, B-36, U-2, U-3, MW-28, MW-31, MW-36, and MW-37 during the fourth quarter. During first quarter, PAH compounds were present at detectable concentrations within these wells. The increase in detected PAH compounds is likely attributable to the change in the analytical method from EPA method 8310 (HPLC) to

EPA method 8270 modified (GC/MS-SIM), which has lower and more stable detection limits. A comparison of method reporting limits (MRLs) is presented below:

Analyte	Method Reporting Limit (ppb)	
	EPA 8310	EPA 8270-SIM
Acenaphthene	5.0	0.100
Acenaphthylene	5.0	0.100
Anthracene	5.0	0.100
Benzo (a) anthracene	0.10	0.100
Benzo (a) pyrene	0.10	0.100
Benzo (b) fluoranthene	0.10	0.100
Benzo (ghi) perylene	0.10	0.100
Benzo (k) fluoranthene	0.10	0.100
Chrysene	0.10	0.100
Dibenzo (a,h) anthracene	0.10	0.200
Fluoranthene	0.10	0.100
Fluorene	5.0	0.100
Indeno (1,2,3-cd) pyrene	0.10	0.100
Naphthalene	5.0	0.100
Phenanthrene	5.0	0.100
Pyrene	0.5	0.100

Reported concentrations of PAH compounds, particularly carcinogenic PAHs (CPAHs), were generally below 1 part per billion (ppb) with the exception of naphthalene, phenanthrene, and fluorine. Wells B-35 and U-3 reported concentrations of CPAHs above 1 ppb. Reported concentrations of acenaphthene, fluorine, fluoranthene, and phenanthrene increased up to 10 ppb, and reported concentrations of naphthalene increased up to 10 times in some wells. Wells MW-10, MW-21, MW-32, and MW-33 were reported as non-detect for all PAH compounds at laboratory detection limits.

Metals

Samples for RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) were collected from selected wells. Samples were analyzed for total (unfiltered) metal concentrations. A selection (approximately 10 percent of the total) of wells sampled for total metals were additionally analyzed for dissolved

(filtered) metal concentrations. Dissolved metal samples were field-filtered using a 0.45-micron filter capsule.

Total metals analytical results report concentrations of arsenic, barium, chromium, and lead in the majority of sampled wells. Of the 28 wells sampled for total metals, cadmium was detected in five wells, selenium in eight, silver in one, and mercury in twelve. The majority of wells reporting concentrations of total cadmium and mercury were located on the Chevron terminal. Only Well U-3 reported concentrations of analyzed total metals above 1 parts per million (ppm) of barium, chromium, and lead.

Dissolved metals analytical results for selected wells report reduced or non detect concentrations of chromium, lead, and selenium when compared to the respective total metal results. Dissolved cadmium and silver results are inconclusive when compared to total results; non detect results for dissolved cadmium and silver were also non detect for total cadmium and silver. Results for dissolved arsenic, barium, and mercury analyses are comparable to the respective total metals analyses; no significant reduction in reported concentrations are seen between dissolved and total metals analyses for these metals. This first round of metals data may indicate that arsenic, barium, and mercury are present in a dissolved state, while chromium, lead and silver concentrations are the result of suspended solids in the sample.

Separate-Phase Hydrocarbon Analysis

Separate-phase hydrocarbon thicknesses were measured at selected wells on a monthly basis (Tables 1 and 5). Apparent SPH thickness data for January, April, July, October 1996, and January 1997 are shown on Figures 2A and 2B.

Separate-phase hydrocarbon near the riverfront area is historically concentrated in the current and former alignments of the Doane Avenue stormwater outfall and possibly the Holbrook Slough. Wells B-1, B-4, B-17, and B-35 are located in the dock area nearest the old Doane Avenue storm drain alignment. Wells B-38, B-39, B-40, and U-5 are adjacent to the new Doane Avenue storm drain in the riverfront area. Well B-7 is located nearest the historic Holbrook Slough outfall. Well RES-N is constructed in the backfill of the storm drain in the riverfront area. Well B-20 is located upgradient of the Holbrook Slough recovery trench.

The January 1997 product measurements generally show SPH thicknesses similar to last quarter measurements in the wells located in the general riverfront area of the site (Table 2) with the exception of Wells B-4, B-20, and B-40. Separate-phase hydrocarbon thickness in Well B-4 decreased from approximately one foot in October 1996 to approximately 0.5 foot in January 1997. Separate-phase hydrocarbon was not detected in Well B-20 during January water level measurements. A SPH

thickness of approximately 0.5 foot was measured in Well B-40 in January 1997, increasing from no measurable SPH in October 1996. Additionally, SPH was detected in Wells B-1, B-22, B-38, B-39, RES-N, and IT-E

Separate-phase hydrocarbon was detected in Wells U-5A, U-4, and B-27 located in the Tosco tank farm area. No SPH was measured in Well CR-11, east of the Chevron lube oil tank farm. No SPH was observed in wells CR-6, CR-7 and CR-10, along the perimeter of the Chevron tank farm. Separate-phase hydrocarbon was observed in Well MW-7 in the GATX facility.

SEPARATE-PHASE HYDROCARBON RECOVERY

The IA SPH recovery program began in May 1995. Automated and passive SPH recovery was discontinued in December 1996; monthly manual recovery of SPH was initiated in early February 1997. Approximately 115 gallons of SPH were recovered from late May 1995 to August 1996 by the automatic and passive product recovery program. Approximately 100 gallons of SPH were removed by manual pumping in January and February 1997.

Separate-phase hydrocarbon recovery by pumping was performed February 4 and 28, 1997. Approximately 70 gallons of SPH were removed from Well MW-7 at the GATX terminal. Approximately 32 gallons of SPH were removed from Wells B-4, B-27, B-38, B-39, B-40, RES-N, U-4, and U-5A at the Tosco terminal. The SPH recovery data is presented in Table 5.

Holbrook Recovery Trench

The Holbrook Trench recovery system is not operational at the site. The trench, installed in 1988, was designed to be submerged under high water river stage approximately four months of the year. During the high water season, the trench was not operational. During 1995 and 1996, the river submerged the trench for approximately nine months of the year. The piping and electrical connections of the system were apparently watertight. However, during high water periods of the year, several water related problems occurred. According to Chevron personnel, the trench rarely worked effectively due to electrical problems and equipment failures. During low water conditions, when the trench should have been operational, equipment was being replaced or repaired. The operation and maintenance of the trench was extensive compared to the recovery of SPH. Approximately 700 gallons of SPH were recovered from the Holbrook recovery trench since its construction in 1988.

Seep and Sheen Monitoring

Containment booms currently encompass the shoreline between the Chevron and Tosco docks, and from the south edge of the Tosco dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). Additionally, secondary containment booms are located inside of the first boom around the new Doane Avenue outfall pipe. Seeps and sheens are monitored by terminal personnel; significant sheens are reported to PACIFIC for further evaluation. No significant sheens were reported during the first quarter.

PROBLEMS ENCOUNTERED DURING FIRST QUARTER 1997

No problems were encountered during December 1996 through February 1997.

ACTIVITIES SCHEDULED FOR SECOND QUARTER 1997 (MARCH - MAY 1997)

The following actions are scheduled for Second Quarter 1997:

- Monthly SPH removal from identified "hot-spot" wells.
- Gauging of water level elevations and SPH in all facility wells during the Second Quarter sampling event, scheduled for April 1997.

PACIFIC appreciates the opportunity to be of service. If you have any questions regarding this letter, please call.

Sincerely,

Pacific Environmental Group, Inc.

Kevin M. Freeman
Senior Staff Hydrogeologist

Lance Geselbracht, P.E.
Senior Engineer

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Pacific Environmental Group, Inc.

Kevin M. Freeman
Senior Staff Hydrogeologist

Lance Geselbracht, P.E.
Senior Engineer

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Attachments: Figure 1A - Groundwater Elevation Contour Map (January 1997)
Figure 1B - Groundwater Elevation Contour Map (January 1997)
Figure 2A - Apparent Separate-Phase Hydrocarbon Thickness (January 1995 to January 1997)
Figure 2B - Apparent Separate-Phase Hydrocarbon Thickness (January 1995 to January 1997
Table 1 - Groundwater Elevation Data
Table 2 - Groundwater Analytical Results (First Quarter BTEX)
Table 3 - Groundwater Analytical Results (First Quarter PAHs)
Table 4A - Groundwater Analytical Results (First Quarter Total Metals)
Table 4B - Groundwater Analytical Results (First Quarter Dissolved Metals)
Table 5 - Groundwater Elevation and SPH Recovery Data (March 1995 to April 1997)
Table 6 - Groundwater Analytical Results (January 1995 to January 1997 BTEX)
Table 7 - Groundwater Analytical Results (October 1996 PAHs)
Table 8 - Groundwater Analytical Results (July 1996 PAHs)
Table 9 - Groundwater Analytical Results (April 1996 PAHs)
Table 10 - Groundwater Analytical Results (January 1996 PAHs)
Attachment A - Sampling Protocal, Certified Analytical Reports and Chain-of-Custody Documentation

cc: Mr. Irv Jenkins, Shell Oil Products Company
Mr. Rene White, Chevron Products Company
Mr. Marty Cramer, Tosco Northwest Company
Mr. Eric Conard, GATX Terminals Corporation

Table 1
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		CHEVRON			
B-7 (33.96)	01/29/97	17.24	NP	16.72	0.00
B-8 (34.17)	01/29/97	15.99	NP	18.18	0.00
B-9 (33.95)	01/29/96	15.31	NP	18.64	0.00
B-10 (34.74)	01/29/96	13.80	NP	20.94	0.00
B-11 (34.95)	01/29/96	15.65	NP	19.30	0.00
B-12 (35.11)	01/29/96	14.18	NM	20.93	0.00
B-13 (34.76)	01/29/96	14.35	NP	20.41	0.00
B-14 (36.59)	01/29/96	16.05	NP	20.54	0.00
B-15 (35.55)	01/29/96	15.26	NP	20.29	0.00
B-19 (34.71)	01/29/96	14.81	NP	19.90	0.00
B-20 (33.40)	01/29/96	15.93	NP	17.47	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		CHEVRON (continued)			
B-21 (34.79)	01/29/96	15.23	NP	19.56	0.00
B-24 (34.70)	01/29/96	NM	NM	NM	NM
B-26 (35.30)	01/29/96	14.18	NP	21.12	0.00
B-28 (35.25)	01/29/96	14.36	NP	20.89	0.00
B-29 (35.97)	01/29/96	NL	NL	NL	NL
B-30 (35.35)	01/29/96	13.48	NP	21.87	0.00
B-31 (33.86)	01/29/96	14.75	NP	19.11	0.00
B-32 (34.23)	01/29/96	15.46	NP	18.77	0.00
B-33 (34.36)	01/29/96	14.86	NP	19.50	0.00
CR-1 (20.03)	01/29/96	1.63	NP	18.40	0.00
CR-3 (34.32)	01/29/96	12.52	NP	21.80	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		CHEVRON (continued)			
CR-4 (34.93)	01/29/96	4.99	NP	29.94	0.00
CR-6 (35.61)	01/29/96	11.15	NP	24.46	0.00
CR-7 (35.57)	01/29/96	11.11	NP	24.46	0.00
CR-8 (33.14)	01/29/96	5.94	NP	27.20	0.00
CR-9 (33.58)	01/29/96	4.56	NP	29.02	0.00
CR-10 (35.57)	01/29/96	3.76	NP	31.81	0.00
CR-11 (34.43)	01/29/96	1.55	NP	32.88	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		GATX			
MW-1 (35.43)	01/30/96	3.92	NP	31.51	0.00
MW-2 (35.77)	01/30/96	4.88	NP	30.89	0.00
MW-3 (36.02)	01/30/96	6.40	NP	29.62	0.00
MW-4 (36.39)	01/30/96	5.40	NP	30.99	0.00
MW-5 (33.52)	01/30/96	5.01	NP	28.51	0.00
MW-6 (33.34)	01/30/96	2.77	NP	30.57	0.00
MW-7 (34.12)	01/30/96	10.24	7.13	25.74	3.11
MW-8 (33.95)	01/30/96	6.38	NP	27.57	0.00
MW-9 (36.53)	01/30/96	8.94	NP	27.59	0.00
MW-10 (35.82)	01/30/96	7.40	NP	28.42	0.00
MW-11 (36.47)	01/30/96	5.20	NP	31.27	0.00
MW-12 (35.95)	01/30/96	4.26	NP	31.69	0.00
MW-13 (37.89)	01/30/96	4.22	NP	33.67	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		GATX (continued)			
MW-14 (36.28)	01/30/96	3.28	NP	33.00	0.00
MW-15 (37.50)	01/30/96	4.28	NP	33.22	0.00
MW-16 (34.93)	01/30/96	3.15	NP	31.78	0.00
MW-17 (36.05)	01/30/96	4.27	NP	31.78	0.00
MW-18 (33.76)	01/30/96	1.24	NP	32.52	0.00
MW-19 (33.39)	01/30/96	1.86	NP	31.53	0.00
MW-20 (34.76)	01/30/96	8.03	NP	26.73	0.00
MW-21 (34.33)	01/30/96	1.15	NP	33.18	0.00
MW-22 (35.65)	01/30/96	3.72	NP	31.93	0.00
MW-23 (36.06)	01/30/96	3.46	NP	32.60	0.00
MW-24 (35.15)	01/30/96	5.10	NP	30.05	0.00
MW-25 (34.73)	01/30/96	9.37	NP	25.36	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		GATX (continued)			
MW-26 (34.78)	01/30/96	10.35	NP	24.43	0.00
MW-27 (35.67)	01/30/96	4.37	NP	31.30	0.00
MW-28 (34.39)	01/30/96	3.71	NP	30.68	0.00
MW-29 (35.77)	01/30/96	13.41	NP	22.36	0.00
MW-30 (36.39)	01/30/96	4.43	NP	31.96	0.00
MW-31 (37.55)	01/30/96	5.45	NP	32.10	0.00
MW-32 (37.01)	01/30/96	4.73	NP	32.28	0.00
MW-33 (39.34)	01/30/96	18.92	NP	20.42	0.00
MW-34 (39.67)	01/30/96	18.78	NP	20.89	0.00
MW-35 (33.39)	01/30/96	2.08	NP	31.31	0.00
MW-36 (34.88)	01/30/96	13.02	NP	21.86	0.00
MW-37 (34.86)	01/30/96	13.44	NP	21.42	0.00
MW-38 (NA)	01/30/96	3.98	NP	-	0.00
MW-39 (35.02)	01/30/96	NM	NM	NM	NM
MW-40 (33.65)	01/30/96	12.74	NP	20.91	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		TOSCO			
B-1 (34.79)	01/31/97	16.10	15.94	18.83	0.16
B-2 (35.35)	01/31/97	15.69	NP	19.66	0.00
B-3 (34.91)	01/31/97	17.26	NP	17.65	0.00
B-4 (34.79)	01/31/97	17.48	17.00	17.72	0.48
B-5 (34.83)	01/31/97	15.30	NP	19.53	0.00
B-6 (35.41)	01/31/97	15.47	NP	19.94	0.00
B-16 (35.82)	01/31/97	15.75	NP	20.07	0.00
B-17 (35.59)	01/31/97	15.86	NP	19.73	0.00
B-18 (35.79)	01/31/97	18.09	NP	17.70	0.00
B-22 (34.67)	01/31/97	17.93	17.92	16.75	0.01
B-25 (35.83)	01/31/97	18.05	NP	17.78	0.00

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
TOSCO (continued)					
B-27 (35.74)	01/31/97	18.63	16.43	18.98	2.20
B-35 (33.58)	01/31/97	14.84	NP	18.74	0.00
B-36 (30.97)	01/31/97	13.44	NP	17.53	0.00
B-37 (35.24)	01/31/97	19.29	NP	15.95	0.00
B-38 (34.75)	01/31/97	19.25	18.80	15.88	0.45
B-39 (33.92)	01/31/97	19.18	18.27	15.51	0.91
B-40 (33.19)	01/31/97	17.30	16.76	16.35	0.54
B-41 (34.85)	01/31/97	18.31	NP	16.54	0.00
RES-N (38.58)	01/31/97	22.54	22.45	16.12	0.09
RES-O (36.03)	01/31/97	16.20	0.00	19.83	0.00
U-2 (35.02)	01/31/97	13.86	NP	21.16	0.00
U-3 (35.25)	01/31/97	11.86	NP	23.39	0.00
U-4 (34.46)	01/31/97	17.05	14.80	19.32	2.25

Table 1 (continued)
Groundwater Elevation Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)
		TOSCO (continued)			
U-5A (33.77)	01/31/97	4.86	4.59	29.14	0.27
U-5 (34.20)	01/31/97	18.01	NP	16.19	0.00
IT-W (35.91)	01/31/97	16.65	NP	19.26	0.00
IT-E (36.44)	01/31/97	19.47	18.85	17.06	0.62

Notes:
SPH = Separate-phase hydrocarbons
NP = No SPH measured
NM = Not measured

Table 2
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xyicnes (ppb)
		TOSCO			
B-17	01/31/97	280	12.1	9.69	10.1
B-18	01/31/97	ND	ND	ND	ND
B-35	01/31/97	3.35	3.81	ND	2.17
(duplicate)	01/31/97	3.87	4.72	ND	2.73
B-36	01/31/97	ND	ND	ND	ND
B-37	01/31/97	ND	ND	ND	ND
U-2	01/31/97	8.91	ND	42.5	ND
U-3	01/31/97	ND	ND	ND	ND
U-5	01/31/97	ND	ND	ND	ND
		GATX			
MW-8	01/30/97	134	3.48	37.8	107
MW-10	01/30/97	5.05	0.647	ND	1.03
MW-21	01/30/97	ND	ND	ND	ND
MW-22	01/30/97	2,130	3,650	4,680	14,400
MW-26	01/30/97	1.73	2.00	9.18	8.66
MW-28	01/30/97	ND	ND	ND	ND
MW-31	01/30/97	ND	ND	ND	ND
MW-32	01/30/97	ND	ND	ND	ND
MW-33	01/30/97	ND	ND	ND	ND
(duplicate)	01/30/97	ND	ND	ND	ND
MW-36	01/30/97	ND	ND	ND	ND
MW-37	01/30/97	697	56.7	12.6	49.6

Table 2 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		CHEVRON			
B-7	01/29/97	ND	ND	ND	ND
B-9	01/29/97	ND	ND	ND	ND
B-10	01/29/97	172	6.16	1.27	10.5
B-11	01/29/97	243	ND	411	79.0
B-14	01/29/97	1,340	35.5	498	94.5
(duplicate)	01/29/97	2,180	50.0	835	198
B-28	01/29/97	26.4	1.50	160	62.5
B-30	01/29/97	97.5	12.4	8.45	15.4
CR-8	01/29/97	ND	ND	8.94	19.1
CR-11	01/29/97	50.4	ND	13.3	47.9

Notes:
ppb = Parts per billion
ND = Not detected
BTEX by EPA Method 8020

Table 3
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
1/29-30-31/97

Willbridge Terminal
Portland, Oregon

Parameters	B-7 (ppb)	B-9 (ppb)	B-10 (ppb)	B-11 (ppb)	B-14 (ppb)	B-14 (ppb) Duplicate	B-28 (ppb)	B-30 (ppb)	CR-8 (ppb)	CR-11 (ppb)
					CHEVRON					
Acenaphthene	1.80	1.38	1.35	0.758	1.19	0.788	ND	0.172	ND	0.941
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	0.364	0.325	0.647	0.175	0.254	0.377	ND	ND	ND	0.185
Benzo (a) anthracene	ND	0.208	0.258	0.161	0.225	0.238	ND	ND	0.359	ND
Benzo (b) fluoranthene	ND	0.380	0.481	ND	0.272	0.205	0.110	ND	0.602	ND
Benzo (k) flouranthene	ND	ND	0.409	0.267	0.242	0.187	ND	ND	0.545	ND
Benzo (a) pyrene	ND	0.295	0.334	0.240	0.229	0.205	0.104	ND	0.791	ND
Benzo (g,h,i) perylene	ND	0.413	0.283	0.317	0.262	0.128	0.107	ND	1.24	ND
Chrysene	ND	0.425	0.490	0.297	0.314	0.307	0.109	ND	0.514	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	0.629	0.951	0.398	0.580	0.868	0.127	ND	0.526	ND
Fluorene	6.38	4.72	3.71	1.24	2.54	2.34	0.166	0.219	ND	2.06
Indeno (1,2,3-cd) pyrene	ND	0.349	0.275	0.245	0.198	0.121	ND	ND	0.760	ND
Naphthalene	ND	ND	ND	29.1	68.7	65.8	30.4	0.199	ND	ND
Phenanthrene	2.11	1.13	4.45	1.26	2.39	3.29	0.281	0.440	ND	1.37
Pyrene	ND	0.587	0.924	0.457	0.737	0.941	0.163	ND	0.950	0.109

Notes:
ppb = Parts per billion
ND = Not Detected
PAHs by EPA Method 8270

COPPOR0005957

Table 3 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
1/29-30-31/97

Willbridge Terminal
Portland, Oregon

Parameters	B-17 (ppb)	B-18 (ppb)	B-35 (ppb)	B-35 (ppb) duplicate	B-36 (ppb)	B-37 (ppb)	U-2 (ppb)	U-3 (ppb)	U-5 (ppb)
					TOSCO				
Acenaphthene	10.8	0.559	13.6	19.1	ND	0.206	0.516	0.220	3.12
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	4.46	0.290	9.47	14.4	ND	ND	ND	0.155	1.43
Benzo (a) anthracene	ND	ND	4.38	5.94	ND	ND	ND	0.942	0.122
Benzo (b) fluoranthene	0.142	ND	1.47	2.68	ND	ND	ND	1.41	ND
Benzo (k) flouranthene	ND	ND	1.17	2.22	ND	ND	ND	1.23	ND
Benzo (a) pyrene	0.140	ND	0.978	1.63	ND	ND	ND	1.24	ND
Benzo (g,h,i) perylene	ND	ND	0.106	0.183	ND	0.105	ND	1.21	ND
Chrysene	ND	ND	4.27	5.60	ND	ND	ND	1.20	0.287
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	0.415	ND
Fluoranthene	3.04	0.189	27.4	41.7	ND	ND	0.278	1.84	0.543
Fluorene	38.0	1.36	42.7	56.6	0.221	ND	0.541	0.263	7.73
Indeno (1,2,3-cd) pyrene	ND	ND	0.144	0.237	ND	ND	ND	1.10	ND
Naphthalene	ND	ND	ND	ND	ND	ND	39.8	ND	ND
Phenanthrene	66.6	1.86	77.3	110	0.108	ND	0.111	0.881	8.49
Pyrene	ND	0.215	12.8	16.9	ND	ND	0.250	0.923	0.672

Notes:
ppb = Parts per billion
ND = Not Detected
PAHs by EPA Method 8270

COPPOR00005958

Table 3 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
1/29-30-31/97

Willbridge Terminal
Portland, Oregon

Parameters	MW-8 (ppb)	MW-10 (ppb)	MW-21 (ppb)	MW-22 (ppb)	MW-26 (ppb)	MW-28 (ppb)	MW-31 (ppb)	MW-32 (ppb)	MW-33 (ppb)	MW-33 (ppb) Duplicate	MW-36 (ppb)	MW-37 (ppb)
							GATX					
Acenaphthene	ND	ND	ND	0.298	1.77	0.756	0.651	ND	ND	ND	ND	0.751
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	0.175	0.502	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	ND	ND	0.220	ND	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (k) flouranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	0.517	ND	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	0.299	0.344	ND	ND	ND	ND	ND	0.102
Fluorene	ND	ND	ND	0.456	1.68	2.10	1.65	ND	ND	ND	ND	1.21
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	1.11	ND	ND	352	8.77	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	0.258	1.36	1.74	0.356	ND	ND	ND	0.105	0.156
Pyrene	ND	ND	ND	ND	0.183	0.850	ND	ND	ND	ND	ND	0.166

Notes:
ppb = Parts per billion
ND = Not Detected
PAHs by EPA Method 8270

COPPOR0005959

Table 4A
Groundwater Analytical Results
(Total Metals)

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Arsenic (ppm)	Barium (ppm)	Cadium (ppm)	Chromium (ppm)	Lead (ppm)	Selenium (ppm)	Silver (ppm)	Mercury (ppm)
				TOSCO					
B-2	01/31/97	18	2.9	ND	ND	18	2.9	ND	3.5
B-17	01/31/97	0.0587	0.125	ND	0.00862	0.028	ND	ND	ND
B-18	01/31/97	0.0138	0.0732	ND	0.00469	0.00452	ND	ND	0.000250
B-35	01/31/97	0.0398	0.120	ND	0.00781	0.0203	0.00124	0.00105	ND
(duplicate)	01/31/97	0.0410	0.120	ND	0.00565	0.0159	ND	ND	ND
B-36	01/31/97	0.00382	0.0449	ND	0.00644	0.00354	ND	ND	ND
B-37	01/31/97	0.0451	0.0971	ND	0.00763	0.00342	ND	ND	ND
B-40	01/31/97	0.93	1.2	1.3	1.3	0.93	1.2	1.3	1.2
U-2	01/31/97	0.0219	0.0299	ND	0.00103	0.00174	ND	ND	ND
U-3	01/31/97	0.319	2.27	0.0816	2.41	6.30	ND	ND	0.00420
U-5	01/31/97	0.00830	0.0498	ND	0.00353	0.00220	0.00133	ND	0.000280
				GATX					
MW-8	01/30/97	0.00152	0.0180	ND	ND	0.00171	ND	ND	ND
MW-10	01/30/97	0.00987	0.0413	ND	ND	0.00202	ND	ND	ND
MW-21	01/30/97	0.00255	0.198	ND	0.00116	0.00153	ND	ND	ND
MW-22	01/30/97	0.0896	0.166	ND	0.00204	0.00742	0.00175	ND	ND
MW-26	01/30/97	0.0413	0.0708	ND	ND	ND	ND	ND	ND
MW-28	01/30/97	ND	0.00667	ND	ND	0.00147	ND	ND	ND
MW-31	01/30/97	0.00630	0.0192	ND	ND	ND	ND	ND	ND
MW-32	01/30/97	ND	0.00391	ND	0.00337	0.00166	ND	ND	ND
MW-33	01/30/97	0.00497	0.0421	ND	ND	ND	ND	ND	ND
(duplicate)	01/30/97	0.131	0.749	ND	0.00663	0.00378	0.00121	ND	0.000660
MW-36	01/30/97	0.00153	0.0412	ND	0.00236	0.00511	ND	ND	ND
MW-37	01/30/97	0.0245	0.0459	ND	0.00182	ND	ND	ND	ND

Table 4A (continued)
Groundwater Analytical Results
(Total Metals)

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Arsenic (ppm)	Barium (ppm)	Cadium (ppm)	Chromium (ppm)	Lead (ppm)	Selenium (ppm)	Silver (ppm)	Mercury (ppm)
				CHEVRON					
B-7	01/29/97	0.0108	0.063	ND	0.00468	0.00307	ND	ND	0.000200
B-9	01/29/97	0.0155	0.0706	ND	0.00313	0.00390	ND	ND	ND
B-10	01/29/97	0.0301	0.105	ND	0.00685	0.00709	ND	ND	0.000230
B-11	01/29/97	0.0287	0.0838	0.00193	0.00570	0.00687	ND	ND	0.000270
B-14	01/29/97	0.0374	0.0987	0.00437	0.00362	0.0161	0.00185	ND	0.000340
Duplicate	01/29/97	0.0374	0.0968	0.00358	0.00361	0.0146	0.00145	ND	0.000310
B-28	01/29/97	0.00402	0.0888	0.00443	0.00713	0.0142	0.00132	ND	0.000270
B-30	01/29/97	0.0221	0.0533	0.00506	0.00229	0.00839	ND	ND	0.000200
CR-8	01/29/97	0.0226	0.0917	ND	0.00664	0.0115	0.00104	ND	0.000420
CR-11	01/29/97	0.0521	0.189	ND	0.00642	0.00572	0.00286	ND	0.000540
Reporting Limit:	-	0.00100	0.00200	0.00100	0.00100	0.00100	0.00100	0.00100	0.000200

Notes:
- = Not applicable
ppm = Parts per million
ND = Not detected
Total Metals by EPA Method 6000/7000

Table 4B
Groundwater Analytical Results
(Dissolved Metals)

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Arsenic (ppm)	Barium (ppm)	Cadium (ppm)	Chromium (ppm)	Lead (ppm)	Selenium (ppm)	Silver (ppm)	Mercury (ppm)
				TOSCO					
B-2	01/31/97	18	2.9	ND	ND	18	2.9	ND	3.5
B-17	01/31/97	0.0558	0.0730	ND	ND	0.00191	ND	ND	ND
B-40	01/31/97	0.93	1.2	1.3	1.3	0.93	1.2	1.3	1.2
U-2	01/31/97	0.0207	0.0240	ND	ND	ND	ND	ND	ND
U-5	01/31/97	0.00626	0.0455	ND	ND	ND	ND	ND	ND
				GATX					
MW-10	01/30/97	0.00976	0.0342	ND	ND	ND	ND	ND	ND
MW-32	01/30/97	ND	0.00218	ND	0.00317	ND	ND	ND	0.000240
MW-33	01/30/97	0.00292	0.0255	ND	ND	ND	ND	ND	ND
				CHEVRON					
B-7	01/29/97	0.0108	0.0411	ND	0.00106	ND	ND	ND	0.000200
B-30	01/29/97	0.0200	0.0457	ND	ND	ND	ND	ND	0.000250
CR-8	01/29/97	0.0136	0.0342	ND	ND	ND	ND	ND	0.000210
Reporting Limit:	-	0.00100	0.00200	0.00100	0.00100	0.00100	0.00100	0.00100	0.000200

Notes:
- = Not applicable
ppm = Parts per million
ND = Not detected
Total Metals by EPA Method 6000/7000

Table 5
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON			
B-7	03/24/95	18.07	NP	15.89	0.00	--
(33.96)	04/24/95	18.61	NP	15.35	0.00	--
	05/22/95	18.56	NP	15.40	0.00	--
	06/19/95	18.77	NP	15.19	0.00	--
	07/24/95	19.74	NP	14.22	0.00	--
	08/28/95	20.03	NP	13.93	0.00	--
	09/25/95	19.80	19.79	14.17	0.01	0.00
	10/23/95	19.57	19.56	14.40	0.01	0.00
	11/27/95	18.61	NP	15.35	0.00	--
	12/29/95	17.74	NP	16.22	0.00	--
	01/22/96	15.82	NP	18.14	0.00	--
	02/26/96	14.13	14.09	19.86	0.04	0.00
	03/25/96	17.39	17.38	16.58	0.01	0.00
	04/22/96	17.08	17.07	16.89	0.01	0.00
	05/28/96	16.46	NP	17.50	0.00	--
	06/24/96	17.96	NP	16.00	0.00	--
	07/22/96	18.79	NP	15.17	0.00	--
	08/26/96	19.18	NP	14.78	0.00	--
	09/23/96	19.22	NP	14.74	0.00	--
	10/28/96	19.10	NP	14.86	0.00	--
	11/25/96	17.95	NP	16.01	0.00	--
	01/29/97	17.24	NP	16.72	0.00	--
			SPH Recovered to Date:			**0.00**
B-8	01/29/97	15.99	NP	18.18	0.00	--
(34.17)			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-9	03/24/95	16.01	NP	17.94	0.00	--
(33.95)	04/24/95	16.42	NP	17.53	0.00	--
	05/22/95	16.54	NP	17.41	0.00	--
	06/19/95	16.59	NP	17.36	0.00	--
	07/24/95	17.45	NP	16.50	0.00	--
	08/28/95	17.85	NP	16.10	0.00	--
	09/25/95	17.85	NP	16.10	0.00	--
	10/23/95	17.45	NP	16.50	0.00	--
	11/27/95	16.51	NP	17.44	0.00	--
	12/29/95	15.86	NP	18.09	0.00	--
	01/22/96	15.31	NP	18.64	0.00	--
	02/26/96	13.20	NP	20.75	0.00	--
	03/25/96	15.49	NP	18.46	0.00	--
	04/22/96	15.20	NP	18.75	0.00	--
	05/28/96	15.47	NP	18.48	0.00	--
	06/24/96	16.09	NP	17.86	0.00	--
	07/22/96	16.61	NP	17.34	0.00	--
	08/26/96	17.26	NP	16.69	0.00	--
	09/23/96	17.14	NP	16.81	0.00	--
	10/28/96	17.21	NP	16.74	0.00	--
	11/25/96	16.35	NP	17.60	0.00	--
	01/29/96	15.31	NP	18.64	0.00	--
			SPH Recovered to Date:			**0.00**
B-10	03/24/95	15.08	NP	19.66	0.00	--
(34.74)	04/24/95	15.41	NP	19.33	0.00	--
	05/22/95	15.68	NP	19.06	0.00	--
	06/19/95	15.96	NP	18.78	0.00	--
	07/24/95	16.26	NP	18.48	0.00	--
	08/28/95	16.58	16.26	18.43	0.32	0.00
	09/25/95	16.84	NP	17.90	0.00	--
	10/23/95	16.70	NP	18.04	0.00	--
	11/27/95	15.99	NP	18.75	0.00	--
	12/29/95	15.01	NP	19.73	0.00	--
	01/22/96	14.67	NP	20.07	0.00	--
	02/26/96	12.18	NP	22.56	0.00	--
	03/25/96	13.82	NP	20.92	0.00	--
	04/22/96	14.66	NP	20.08	0.00	--
	05/28/96	14.59	NP	20.15	0.00	--
	06/24/96	15.03	NP	19.71	0.00	--
	07/22/96	15.64	NP	19.10	0.00	--
	08/26/96	16.12	NP	18.62	0.00	--
	09/23/96	16.21	NP	18.53	0.00	--
	10/28/96	16.18	NP	18.56	0.00	--
	11/25/96	15.35	NP	19.39	0.00	--
	01/29/96	13.80	NP	20.94	0.00	--
				SPH Recovered to Date:		**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-11	03/24/95	15.22	NP	19.73	0.00	--
(34.95)	07/24/95	16.08	NP	18.87	0.00	--
	10/23/95	16.64	NP	18.31	0.00	--
	01/22/96	15.73	NP	19.22	0.00	--
	04/22/96	14.44	NP	20.51	0.00	--
	05/28/96	14.46	NP	20.49	0.00	--
	07/22/96	15.40	NP	19.55	0.00	--
	08/26/96	15.91	NP	19.04	0.00	--
	09/23/96	16.08	NP	18.87	0.00	--
	10/28/96	16.14	NP	18.81	0.00	--
	11/25/96	15.53	NP	19.42	0.00	--
	01/29/96	15.65	NP	19.30	0.00	--
			SPH Recovered to Date:			0.00
B-12	08/26/96	16.37	NP	18.74	0.00	--
(35.11)	09/23/96	16.53	NP	18.58	0.00	--
	11/25/96	16.07	NP	19.04	0.00	--
	01/29/96	14.18	NM	20.93	0.00	--
			SPH Recovered to Date:			0.00
B-13	08/26/96	16.36	NP	18.40	0.00	--
(34.76)	09/23/96	16.51	NP	18.25	0.00	--
	10/28/96	16.59	NP	18.17	0.00	--
	11/25/96	16.14	NP	18.62	0.00	--
	01/29/96	14.35	NP	20.41	0.00	--
			SPH Recovered to Date:			0.00
B-14	04/24/95	17.59	NP	19.00	0.00	--
(36.59)	07/24/95	18.35	NP	18.24	0.00	--
	10/23/95	18.84	NP	17.75	0.00	--
	01/22/96	17.21	NP	19.38	0.00	--
	04/22/96	15.80	NP	20.79	0.00	--
	05/28/96	16.82	NP	19.77	0.00	--
	07/22/96	17.70	NP	18.89	0.00	--
	08/26/96	18.15	NP	18.44	0.00	--
	09/23/96	18.31	NP	18.28	0.00	--
	10/28/96	18.40	NP	18.19	0.00	--
	11/25/96	17.94	NP	18.65	0.00	--
	01/29/96	16.05	NP	20.54	0.00	--
			SPH Recovered to Date:			0.00

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			Chevron (continued)			
B-15	08/26/96	17.32	NP	18.23	0.00	--
(35.55)	09/23/96	17.47	NP	18.08	0.00	--
	10/28/96	17.56	NP	17.99	0.00	--
	11/25/96	17.08	NP	18.47	0.00	--
	01/29/96	15.26	NP	20.29	0.00	--
			SPH Recovered to Date:			**0.00**
B-19	03/24/95	16.01	NP	18.70	0.00	--
(34.71)	04/24/95	16.21	NP	18.50	0.00	--
	05/22/95	16.45	NP	18.26	0.00	--
	06/19/95	16.70	NP	18.01	0.00	--
	07/24/95	17.09	NP	17.62	0.00	--
	08/28/95	17.37	NP	17.34	0.00	--
	09/25/95	17.56	NP	17.15	0.00	--
	10/23/95	17.45	NP	17.26	0.00	--
	11/27/95	16.86	NP	17.85	0.00	--
	12/29/95	15.75	NP	18.96	0.00	--
	01/22/96	15.54	NP	19.17	0.00	--
	02/26/96	12.95	NP	21.76	0.00	--
	03/25/96	14.80	NP	19.91	0.00	--

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
B-19	04/22/96	15.39	NP	19.32	0.00	--
(continued)	05/28/96	15.31	NP	19.40	0.00	--
	06/24/96	15.79	NP	18.92	0.00	--
	07/22/96	16.35	NP	18.36	0.00	--
	08/26/96	16.84	NP	17.87	0.00	--
	09/23/96	16.97	NP	17.74	0.00	--
	10/28/96	17.03	NP	17.68	0.00	--
	11/25/96	16.43	NP	18.28	0.00	--
	01/29/96	14.81	NP	19.90	0.00	--
			SPH Recovered to Date:			**0.00**
B-20	03/24/95	16.55	NP	16.85	0.00	--
(33.40)	04/24/95	16.93	NP	16.47	0.00	--
	05/22/95	16.96	NP	16.44	0.00	--
	06/19/95	17.20	NP	16.20	0.00	--
	07/24/95	18.14	17.95	15.42	0.19	0.00
	08/28/95	18.67	18.30	15.04	0.37	0.00
	09/25/95	18.27	18.26	15.14	0.01	0.00
	10/23/95	18.04	NP	15.36	0.00	--
	11/27/95	17.12	17.11	16.29	0.01	0.00
	12/29/95	16.18	16.17	17.23	0.01	0.00
	01/22/96	15.20	NP	18.20	0.00	--
	02/26/96	13.56	13.55	19.85	0.01	0.00
	03/25/96	15.99	NP	17.41	0.00	--
	04/22/96	15.88	NP	17.52	0.00	--
	05/28/96	15.59	NP	17.81	0.00	--
	06/24/96	16.29	NP	17.11	0.00	--
	07/22/96	17.13	NP	16.27	0.00	--
	08/26/96	17.62	NP	15.78	0.00	--
	09/23/96	18.64	17.59	15.65	1.05	0.00
	10/28/96	17.93	17.50	15.84	0.43	0.00
	11/25/96	16.62	16.57	16.82	0.05	0.00
	01/29/96	15.93	NP	17.47	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-21	03/24/95	16.23	NP	18.56	0.00	--
(34.79)	04/24/95	16.42	NP	18.37	0.00	--
	05/22/95	16.63	NP	18.16	0.00	--
	06/19/95	16.83	NP	17.96	0.00	--
	07/24/95	17.18	NP	17.61	0.00	--
	08/28/95	17.43	NP	17.36	0.00	--
	09/25/95	17.58	17.57	17.22	0.01	0.00
	10/23/95	17.53	NP	17.26	0.00	--
	11/27/95	17.09	NP	17.70	0.00	--
	12/29/95	16.07	NP	18.72	0.00	--
	01/22/96	15.91	NP	18.88	0.00	--
	02/26/96	13.30	NP	21.49	0.00	--
	03/25/96	15.08	NP	19.71	0.00	--
	04/22/96	15.77	NP	19.02	0.00	--
	05/28/96	15.61	NP	19.18	0.00	--
	06/24/96	16.01	NP	18.78	0.00	--
	07/22/96	16.53	NP	18.26	0.00	--
	08/26/96	16.95	NP	17.84	0.00	--
	09/23/96	17.11	NP	17.68	0.00	--
	10/28/96	17.20	NP	17.59	0.00	--
	11/25/96	16.71	NP	18.08	0.00	--
	01/29/96	15.23	NP	19.56	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-24	03/24/95	15.88	15.87	18.83	0.01	0.00
(34.70)	04/24/95	15.99	15.96	18.74	0.03	0.00
	05/22/95	16.18	16.17	18.53	0.01	0.00
	06/19/95	16.41	16.39	18.31	0.02	0.00
	07/24/95	16.60	16.56	18.13	0.04	0.01
	08/28/95	16.81	NP	17.89	0.00	--
	09/25/95	17.02	NP	17.68	0.00	0.03
	10/23/95	17.05	NP	17.65	0.00	--
	11/27/95	16.75	NP	17.95	0.00	--
	12/29/95	15.90	NP	18.80	0.00	--
	01/22/96	15.71	NP	18.99	0.00	--
	02/26/96	13.98	NP	20.72	0.00	--
	03/25/96	14.62	NP	20.08	0.00	--
	04/22/96	15.28	NP	19.42	0.00	--
	05/28/96	15.25	NP	19.45	0.00	--
	06/24/96	15.57	NP	19.13	0.00	--
	07/22/96	15.95	NP	18.75	0.00	--
	08/26/96	16.35	NP	18.35	0.00	--
	09/23/96	16.52	16.51	18.19	0.01	0.00
	10/28/96	16.54	NP	18.16	0.00	--
	01/29/96	NM	NM	NM	NM	--
			SPH Recovered to Date:			0.04

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-26	04/24/95	15.81	NP	19.49	0.00	--
(35.30)	07/24/95	16.69	NP	18.61	0.00	--
	10/23/95	17.16	NP	18.14	0.00	--
	01/22/96	15.23	NP	20.07	0.00	--
	04/22/96	14.85	NP	20.45	0.00	--
	05/28/96	14.95	NP	20.35	0.00	--
	07/22/96	16.03	NP	19.27	0.00	--
	08/26/96	16.52	NP	18.78	0.00	--
	09/23/96	16.63	NP	18.67	0.00	--
	10/28/96	16.68	NP	18.62	0.00	--
	11/25/96	15.94	NP	19.36	0.00	--
	01/29/96	14.18	NP	21.12	0.00	--
			SPH Recovered to Date:			**0.00**
B-28	04/24/95	15.02	NP	20.23	0.00	--
(35.25)	07/24/95	16.14	NP	19.11	0.00	--
	10/23/95	16.40	NP	18.85	0.00	--
	01/22/96	15.25	NP	20.00	0.00	--
	04/22/96	14.62	NP	20.63	0.00	--
	05/28/96	14.68	NP	20.57	0.00	--
	07/22/96	15.51	NP	19.74	0.00	--
	10/28/96	15.98	NP	19.27	0.00	--
	01/29/96	14.36	NP	20.89	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
CHEVRON (continued)						
B-29	01/29/96	NL	NL	NL	NL	--
(35.97)			SPH Recovered to Date:			**0.00**
B-30	04/24/95	15.60	NP	19.75	0.00	--
(35.35)	07/24/95	15.96	NP	19.39	0.00	--
	10/23/95	16.51	NP	18.84	0.00	--
	01/22/96	14.51	NP	20.84	0.00	--
	04/22/96	14.12	NP	21.23	0.00	--
	05/28/96	14.68	NP	20.67	0.00	--
	07/22/96	15.22	NP	20.13	0.00	--
	10/28/96	15.94	NP	19.41	0.00	--
	01/29/96	13.48	NP	21.87	0.00	--
			SPH Recovered to Date:			**0.00**
B-31	03/24/95	14.49	NP	19.37	0.00	--
(33.86)	04/24/95	15.30	NP	18.56	0.00	--
	05/22/95	15.98	NP	17.88	0.00	--
	06/19/95	16.74	NP	17.12	0.00	--
	07/24/95	16.89	NP	16.97	0.00	--
	08/28/95	17.15	NP	16.71	0.00	--
	09/25/95	16.97	NP	16.89	0.00	--
	10/23/95	16.44	16.52	17.42	0.00	--
	11/27/95	13.42	16.63	20.44	0.00	--
	12/29/95	14.36	14.36	19.50	0.00	--
	01/22/96	15.73	NP	18.13	0.00	--
	02/26/96	12.56	NP	21.30	0.00	--
	03/25/96	16.06	NP	17.80	0.00	--
	04/22/96	12.56	NP	21.30	0.00	--
	05/28/96	14.61	NP	19.25	0.00	--
	06/24/96	14.04	NP	19.82	0.00	--
	07/22/96	15.84	NP	18.02	0.00	--
	08/26/96	16.71	NP	17.15	0.00	--
	09/23/96	16.47	16.52	17.39	0.00	--
	10/28/96	15.90	16.63	17.96	0.00	--
	11/25/96	14.47	NP	19.39	0.00	--
	01/29/96	14.75	NP	19.11	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
B-32	03/24/95	16.03	NP	18.20	0.00	--
(34.23)	04/24/95	16.57	16.31	17.88	0.26	0.00
	05/22/95	16.76	NP	17.47	0.00	--
	06/19/95	17.10	NP	17.13	0.00	--
	07/24/95	17.59	NP	16.64	0.00	--
	08/28/95	17.94	NP	16.29	0.00	--
	09/25/95	18.11	NP	16.12	0.00	--
	10/23/95	17.98	NP	16.25	0.00	--
	11/27/95	17.25	NP	16.98	0.00	--
	12/29/95	16.09	NP	18.14	0.00	--
	01/22/96	15.73	NP	18.50	0.00	--
	02/26/96	12.72	NP	21.51	0.00	--
	03/25/96	15.45	NP	18.78	0.00	--
	04/22/96	15.75	NP	18.48	0.00	--
	05/28/96	15.37	NP	18.86	0.00	--
	06/24/96	16.01	NP	18.22	0.00	--
	07/22/96	16.86	NP	17.37	0.00	--
	08/26/96	17.37	NP	16.86	0.00	--
	09/23/96	17.61	NP	16.62	0.00	--
	10/28/96	17.57	NP	16.66	0.00	--
	11/25/96	16.61	NP	17.62	0.00	--
	01/29/96	15.46	NP	18.77	0.00	--
			SPH Recovered to Date:			**0.00**
B-33	01/29/96	14.86	NP	19.50	0.00	--
(34.36)			SPH Recovered to Date:			**0.00**
CR-1	01/29/96	1.63	NP	18.40	0.00	--
(20.03)			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
CR-3	04/24/95	14.09	NP	20.23	0.00	--
(34.32)	07/24/95	15.25	NP	19.07	0.00	--
	10/23/95	15.81	NP	18.51	0.00	--
	01/22/96	10.42	NP	23.90	0.00	--
	04/22/96	12.68	NP	21.64	0.00	--
	05/28/96	13.61	NP	20.71	0.00	--
	07/22/96	14.62	NP	19.70	0.00	--
	08/26/96	15.13	NP	19.19	0.00	--
	09/23/96	15.28	NP	19.04	0.00	--
	10/28/96	14.79	NP	19.53	0.00	--
	11/25/96	12.45	NP	21.87	0.00	--
	01/29/96	12.52	NP	21.80	0.00	--
			SPH Recovered to Date:			**0.00**
CR-4	04/24/95	5.13	NP	29.80	0.00	--
(34.93)	07/24/95	6.90	NP	28.03	0.00	--
	01/22/96	4.70	NP	30.23	0.00	--
	05/28/96	4.99	NP	29.94	0.00	--
	07/22/96	6.48	NP	28.45	0.00	--
	10/28/96	6.35	NP	28.58	0.00	--
	01/29/96	4.99	NP	29.94	0.00	--
			SPH Recovered to Date:			**0.00**
CR-6	03/24/95	12.08	12.07	23.54	0.01	0.00
(35.61)	04/24/95	12.04	12.03	23.58	0.01	0.00
	05/22/95	12.52	12.51	23.10	0.01	0.00
	06/19/95	10.16	NP	25.45	0.00	--
	07/24/95	14.87	14.86	20.75	0.01	0.02
	08/28/95	14.52	14.51	21.10	0.01	0.02
	09/25/95	15.47	15.46	20.15	0.01	0.05
	10/23/95	15.50	NP	20.11	0.00	--
	12/29/95	8.81	NP	26.80	0.00	--
	01/22/96	12.03	12.02	23.59	0.01	0.04
	02/26/96	10.71	NP	24.90	0.00	--
	03/25/96	11.28	NP	24.33	0.00	--
	05/28/96	11.49	NP	24.12	0.00	--
	06/24/96	11.35	NP	24.26	0.00	--
	07/22/96	12.58	12.57	23.04	0.01	0.01
	08/26/96	13.05	13.03	22.58	0.02	0.02
	09/23/96	13.08	13.05	22.56	0.03	0.00
	10/28/96	12.89	12.85	22.75	0.04	0.00
	11/25/96	12.57	12.55	23.06	0.02	0.00
	01/29/96	11.15	NP	24.46	0.00	--
			SPH Recovered to Date:			**0.17**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
CR-7	03/24/95	10.49	10.01	25.49	0.48	0.00
(35.57)	04/24/95	10.76	10.19	25.29	0.57	0.00
	05/22/95	11.51	10.76	24.70	0.75	0.00
	06/19/95	11.40	11.25	24.30	0.15	0.00
	07/24/95	11.81	11.80	23.77	0.01	0.13
	08/28/95	12.20	NP	23.37	0.00	0.03
	09/25/95	12.48	NP	23.09	0.00	0.03
	10/23/95	11.98	NP	23.59	0.00	--
	11/27/95	10.73	NP	24.84	0.00	--
	12/29/95	10.28	NP	25.33	0.05	0.00
	01/22/96	10.12	9.91	25.63	0.21	0.12
	02/26/96	9.00	8.50	27.00	0.50	0.15
	03/25/96	9.83	9.81	25.76	0.02	0.01
	04/22/96	10.33	10.21	25.34	0.12	0.00
	05/28/96	10.13	9.82	25.70	0.31	0.38
	06/24/96	10.98	10.78	24.76	0.20	0.69
	07/22/96	11.57	11.35	24.19	0.22	0.45
	08/26/96	11.96	11.84	23.71	0.12	0.13
	09/23/96	11.97	11.94	23.63	0.03	0.00
	10/28/96	11.53	11.51	24.06	0.02	0.00
	11/25/96	10.80	NP	24.77	0.00	--
	01/29/96	11.11	NP	24.46	0.00	--
			SPH Recovered to Date:			**2.12**
CR-8	04/24/95	6.41	NP	26.73	0.00	--
(33.14)	07/24/95	8.22	NP	24.92	0.00	--
	10/23/95	8.08	NP	25.06	0.00	--
	01/22/96	6.21	NP	26.93	0.00	--
	04/22/96	6.47	NP	26.67	0.00	--
	05/28/96	6.31	NP	26.83	0.00	--
	07/22/96	7.08	NP	26.06	0.00	--
	10/28/96	7.71	NP	25.43	0.00	--
	01/29/96	5.94	NP	27.20	0.00	--
			SPH Recovered to Date:			**0.00**
CR-9	01/29/96	4.56	NP	29.02	0.00	--
(33.58)			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			CHEVRON (continued)			
CR-10	03/24/95	5.37	5.34	30.23	0.03	0.00
(35.57)	04/24/95	4.35	4.27	31.29	0.08	0.00
	05/22/95	5.40	5.31	30.25	0.09	0.00
	06/19/95	6.38	6.30	29.26	0.08	0.00
	07/24/95	9.22	NP	26.35	0.00	--
	08/28/95	10.15	NP	25.42	0.00	0.40
	09/25/95	10.82	NP	24.75	0.00	--
	10/23/95	9.44	NP	26.13	0.00	--
	12/29/95	7.54	NP	28.03	0.00	--
	01/22/96	7.01	6.96	28.60	0.05	0.00
	02/26/96	6.93	6.76	28.78	0.17	0.13
	03/25/96	7.62	NP	27.95	0.00	5.16
	04/22/96	7.69	NP	27.88	0.00	--
	07/22/96	1.23	1.28	34.38	0.05	0.00
	11/25/96	2.35	NP	33.22	0.00	--
	01/29/96	3.76	NP	31.81	0.00	--
				SPH Recovered to Date:		5.69
CR-11	03/24/95	1.19	NP	33.24	0.00	--
(34.43)	04/24/95	1.34	NP	33.09	0.00	--
	05/22/95	2.49	NP	31.94	0.00	--
	06/19/95	2.94	NP	31.49	0.00	--
	07/24/95	3.68	NP	30.75	0.00	--
	08/28/95	4.18	NP	30.25	0.00	--
	09/25/95	4.83	NP	29.60	0.00	--
	10/23/95	4.59	NP	29.84	0.00	--
	11/27/95	3.61	NP	30.82	0.00	--
	12/29/95	1.83	NP	32.60	0.00	--
	01/22/96	1.78	NP	32.65	0.00	--
	02/26/96	1.13	NP	33.30	0.00	--
	03/25/96	1.27	NP	33.16	0.00	--
	04/22/96	1.40	NP	33.03	0.00	--
	05/28/96	1.45	NP	32.98	0.00	--
	06/24/96	2.39	NP	32.04	0.00	--
	07/22/96	3.35	NP	31.08	0.00	--
	08/26/96	4.10	NP	30.33	0.00	--
	09/23/96	4.35	NP	30.08	0.00	--
	10/28/96	3.14	NP	31.31	0.02	0.00
	11/25/96	2.35	NP	32.08	0.00	--
	01/29/96	1.55	NP	32.88	0.00	--
				SPH Recovered to Date:		**0.00**
				CHEVRON total SPH Recovered to Date:		**8.02**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX			
MW-1	04/24/95	3.55	NP	31.88	0.00	--
(35.43)	07/24/95	6.26	NP	29.17	0.00	--
	10/23/95	5.85	NP	29.58	0.00	--
	01/22/96	2.92	NP	32.51	0.00	--
	04/22/96	4.01	NP	31.42	0.00	--
	07/22/96	6.92	NP	28.51	0.00	--
	10/28/96	5.35	NP	30.08	0.00	--
	01/30/96	3.92	NP	31.51	0.00	--
			SPH Recovered to Date:			**0.00**
MW-2	01/30/96	4.88	NP	30.89	0.00	--
(35.77)			SPH Recovered to Date:			**0.00**
MW-3	03/06/95	6.79	NP	29.23	0.00	--
(36.02)	03/27/95	6.65	NP	29.37	0.00	--
	04/24/95	6.98	NP	29.04	0.00	--
	07/24/95	8.63	NP	27.39	0.00	--
	10/23/95	9.62	NP	26.40	0.00	--
	01/22/96	8.96	NP	27.06	0.00	--
	04/22/96	6.34	NP	29.68	0.00	--
	07/22/96	8.47	NP	27.55	0.00	--
	10/28/96	8.70	NP	27.32	0.00	--
	01/30/96	6.40	NP	29.62	0.00	--
			SPH Recovered to Date:			**0.00**
MW-4	04/24/95	6.35	NP	30.04	0.00	--
(36.39)	07/24/95	8.17	NP	28.22	0.00	--
	10/23/95	9.16	NP	27.23	0.00	--
	01/22/96	5.20	NP	31.19	0.00	--
	04/22/96	5.59	NP	30.80	0.00	--
	07/22/96	7.97	NP	28.42	0.00	--
	10/28/96	8.14	NP	28.25	0.00	--
	11/25/96	6.10	NP	30.29	0.00	--
	01/30/96	5.40	NP	30.99	0.00	--
			SPH Recovered to Date:			**0.00**
MW-5	04/24/95	5.29	NP	28.23	0.00	--
(33.52)	07/24/95	7.12	NP	26.40	0.00	--
	10/23/95	8.56	NP	24.96	0.00	--
	01/22/96	4.32	NP	29.20	0.00	--
	04/22/96	4.73	NP	28.79	0.00	--
	07/22/96	6.98	NP	26.54	0.00	--
	10/28/96	7.60	NP	25.92	0.00	--
	12/23/96	2.35	NP	31.17	0.00	--
	01/30/96	5.01	NP	28.51	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-6	03/06/95	3.54	3.34	29.97	0.20	0.00
(33.34)	03/27/95	3.73	3.05	30.19	0.68	0.00
	04/24/95	4.18	3.29	29.92	0.89	0.00
	05/22/95	3.83	3.80	29.54	0.03	1.50
	06/19/95	4.64	NP	28.70	0.00	1.35
	07/24/95	5.15	NP	28.19	0.00	--
	08/28/95	5.90	NP	27.44	0.00	--
	09/25/95	6.50	NP	26.84	0.00	--
	10/23/95	6.22	NP	27.12	0.00	--
	11/27/95	4.37	NP	28.97	0.00	--
	12/29/95	3.95	3.76	29.55	0.19	0.00
	01/22/96	2.85	2.50	30.79	0.35	0.00
	02/26/96	2.08	2.07	31.27	0.01	0.00
	03/25/96	3.34	NA	30.00	0.00	0.18
	04/22/96	3.18	NP	30.16	0.00	--
	05/28/96	3.23	NA	30.11	0.00	0.06
	06/24/96	4.35	NP	28.99	0.00	--
	07/22/96	5.08	NP	28.26	0.00	--
	08/26/96	5.89	NP	27.45	0.00	--
	09/23/96	5.54	NP	27.80	0.00	--
	10/28/96	5.19	NP	28.15	0.00	--
	11/25/96	3.28	NP	30.06	0.00	--
	12/23/96	3.41	2.98	30.30	0.43	0.00
	01/30/96	2.77	NP	30.57	0.00	--
			SPH Recovered to Date:			**3.09**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-7	03/06/95	8.00	7.96	26.15	0.04	0.00
(34.12)	03/27/95	7.94	7.88	25.45	0.06	0.00
	04/24/95	8.18	NP	25.16	0.00	--
	05/22/95	8.85	8.51	24.78	0.34	0.00
	06/19/95	9.32	8.93	24.35	0.39	0.00
	07/24/95	9.50	9.35	23.97	0.15	0.06
	08/28/95	10.00	9.79	23.52	0.21	0.00
	09/25/95	10.51	10.13	23.15	0.38	0.00
	10/23/95	7.47	7.04	26.24	0.43	0.00
	11/27/95	9.00	NP	24.34	0.00	--
	12/29/95	8.16	8.13	25.21	0.03	0.37
	01/22/96	7.44	NA	25.90	0.00	0.08
	02/26/96	6.20	NP	27.14	0.00	--
	03/25/96	7.70	7.50	25.81	0.20	0.00
	04/22/96	7.95	7.84	25.48	0.11	0.12
	05/28/96	7.80	7.70	25.63	0.10	0.12
	06/24/96	8.48	8.36	24.96	0.12	0.37
	07/22/96	9.28	8.98	24.32	0.30	0.00
	08/26/96	9.82	9.52	23.78	0.30	0.00
	09/23/96	9.93	9.55	23.73	0.38	0.00
	10/28/96	9.78	9.30	23.97	0.48	0.00
	11/25/96	8.91	8.23	25.01	0.68	0.00
	12/23/96	9.50	7.52	25.52	1.98	0.00
	01/30/96	10.24	7.13	25.74	3.11	70.00
			SPH Recovered to Date:			**71.12**
MW-8	04/24/95	7.27	NP	26.68	0.00	--
(33.95)	07/24/95	8.53	NP	25.42	0.00	--
	10/23/95	9.45	NP	24.50	0.00	--
	01/22/96	6.45	NP	27.50	0.00	--
	04/22/96	6.99	NP	26.96	0.00	--
	07/22/96	8.30	NP	25.65	0.00	--
	10/28/96	8.76	NP	25.19	0.00	--
	01/30/96	6.38	NP	27.57	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-9	04/24/95	9.67	NP	26.86	0.00	--
(36.53)	07/24/95	10.85	NP	25.68	0.00	--
	10/23/95	11.86	NP	24.67	0.00	--
	01/22/96	9.57	NP	26.96	0.00	--
	04/22/96	9.47	NP	27.06	0.00	--
	07/22/96	10.34	NP	26.19	0.00	--
	10/28/96	11.32	NP	25.21	0.00	--
	01/30/96	8.94	NP	27.59	0.00	--
			SPH Recovered to Date:			**0.00**
MW-10	04/24/95	8.54	NP	27.28	0.00	--
(35.82)	07/24/95	10.25	NP	25.57	0.00	--
	10/23/95	11.20	NP	24.62	0.00	--
	01/22/96	7.31	NP	28.51	0.00	--
	04/22/96	8.09	NP	27.73	0.00	--
	07/22/96	9.87	NP	25.95	0.00	--
	10/28/96	10.22	NP	25.60	0.00	--
	01/30/96	7.40	NP	28.42	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-11	03/06/95	5.09	NP	31.38	0.00	--
(36.47)	03/27/95	5.25	NP	31.22	0.00	--
	04/24/95	5.36	NP	31.11	0.00	--
	05/22/95	6.11	NP	30.36	0.00	--
	06/19/95	6.52	NP	29.95	0.00	--
	07/24/95	7.10	NP	29.37	0.00	--
	08/28/95	8.00	NP	28.47	0.00	--
	09/25/95	8.12	NP	28.35	0.00	--
	10/23/95	7.39	NP	29.08	0.00	--
	11/27/95	5.25	NP	31.22	0.00	--
	12/29/95	5.65	NP	30.82	0.00	--
	01/22/96	4.50	NP	31.97	0.00	--
	02/26/96	3.69	NP	32.78	0.00	--
	03/25/96	5.50	NP	30.97	0.00	--
	04/22/96	5.15	NP	31.32	0.00	--
	05/28/96	5.29	NP	31.18	0.00	--
	06/24/96	6.27	NP	30.20	0.00	--
	07/22/96	7.04	NP	29.43	0.00	--
	08/26/96	7.86	NP	28.61	0.00	--
	09/23/96	7.20	NP	29.27	0.00	--
	10/28/96	6.33	NP	30.14	0.00	--
	11/25/96	4.94	NP	31.53	0.00	--
	12/23/96	7.68	NP	28.79	0.00	--
	01/30/96	5.20	NP	31.27	0.00	--
			SPH Recovered to Date:			**0.00**
MW-12	04/24/95	5.22	NP	30.73	0.00	--
(35.95)	07/24/95	7.30	NP	28.65	0.00	--
	10/23/95	8.33	NP	27.62	0.00	--
	01/22/96	3.83	NP	32.12	0.00	--
	04/22/96	4.34	NP	31.61	0.00	--
	07/22/96	7.15	NP	28.80	0.00	--
	10/28/96	7.37	NP	28.58	0.00	--
	01/30/96	4.26	NP	31.69	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-13	04/24/95	4.41	NP	33.48	0.00	--
(37.89)	07/24/95	6.29	NP	31.60	0.00	--
	10/23/95	6.67	NP	31.22	0.00	--
	01/22/96	3.65	NP	34.24	0.00	--
	04/22/96	4.18	NP	33.71	0.00	--
	07/22/96	6.28	NP	31.61	0.00	--
	10/28/96	5.61	NP	32.28	0.00	--
	01/30/96	4.22	NP	33.67	0.00	--
			SPH Recovered to Date:			**0.00**
MW-14	04/24/95	3.33	NP	32.95	0.00	--
(36.28)	07/24/95	5.62	NP	30.66	0.00	--
	10/23/95	5.96	NP	30.32	0.00	--
	01/22/96	2.71	NP	33.57	0.00	--
	04/22/96	3.25	NP	33.03	0.00	--
	07/22/96	5.68	NP	30.60	0.00	--
	10/28/96	5.30	NP	30.98	0.00	--
	01/30/96	3.28	NP	33.00	0.00	--
			SPH Recovered to Date:			**0.00**
MW-15	01/30/96	4.28	NP	33.22	0.00	--
(37.50)			SPH Recovered to Date:			**0.00**
MW-16	07/24/95	5.78	NP	29.15	0.00	--
(34.93)	10/23/95	6.73	NP	28.20	0.00	--
	01/22/96	2.44	NP	32.49	0.00	--
	04/22/96	3.46	NP	31.47	0.00	--
	07/22/96	5.63	NP	29.30	0.00	--
	10/28/96	5.90	NP	29.03	0.00	--
	01/30/96	3.15	NP	31.78	0.00	--
			SPH Recovered to Date:			**0.00**
MW-17	01/30/96	4.27	NP	31.78	0.00	--
(36.05)			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-18	04/24/95	1.66	NP	32.10	0.00	--
(33.76)	07/24/95	3.02	NP	30.74	0.00	--
	10/23/95	3.43	NP	30.33	0.00	--
	01/22/96	1.08	NP	32.68	0.00	--
	04/22/96	0.89	NP	32.87	0.00	--
	07/22/96	2.83	NP	30.93	0.00	--
	10/28/96	2.48	NP	31.28	0.00	--
	01/30/96	1.24	NP	32.52	0.00	--
			SPH Recovered to Date:			**0.00**
MW-19	03/06/95	3.26	2.77	30.55	0.49	0.00
(33.39)	03/27/95	3.08	2.57	30.74	0.51	0.00
	04/24/95	3.33	2.79	30.52	0.54	0.00
	05/22/95	3.70	3.19	30.12	0.51	0.00
	06/19/95	4.48	3.87	29.43	0.61	0.00
	07/24/95	4.42	4.41	28.98	0.01	0.31
	08/28/95	5.64	NP	27.75	0.00	0.03
	09/25/95	6.80	NP	26.59	0.00	--
	10/23/95	5.48	NP	27.91	0.00	--
	11/27/95	3.79	NP	29.60	0.00	--
	12/29/95	3.23	NP	30.16	0.00	--
	01/22/96	2.18	NP	31.21	0.00	--
	02/26/96	1.57	NP	31.82	0.00	--
	03/25/96	2.56	NP	30.83	0.00	--
	04/22/96	1.77	NP	31.62	0.00	--
	05/28/96	2.11	NP	31.28	0.00	--
	06/24/96	2.93	NP	30.46	0.00	--
	07/22/96	3.61	NP	29.78	0.00	--
	08/26/96	4.31	NP	29.08	0.00	--
	09/23/96	3.65	NP	29.74	0.00	--
	10/28/96	1.95	NP	31.44	0.00	--
	11/25/96	1.63	NP	31.76	0.00	--
	12/23/96	1.86	NP	31.53	0.00	--
	01/30/96	1.86	NP	31.53	0.00	--
			SPH Recovered to Date:			**0.34**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-20	04/24/95	9.55	NP	25.21	0.00	--
(34.76)	07/24/95	10.73	NP	24.03	0.00	--
	10/23/95	11.35	NP	23.41	0.00	--
	01/22/96	8.50	NP	26.26	0.00	--
	04/22/96	9.53	NP	25.23	0.00	--
	07/22/96	10.41	NP	24.35	0.00	--
	09/23/96	11.08	NP	23.68	0.00	--
	10/28/96	10.74	NP	24.02	0.00	--
	11/25/96	9.19	NP	25.57	0.00	--
	12/23/96	9.05	NP	25.71	0.00	--
	01/30/96	8.03	NP	26.73	0.00	--
			SPH Recovered to Date:			**0.00**
MW-21	04/24/95	1.48	NP	32.85	0.00	--
(34.33)	07/24/95	2.21	NP	32.12	0.00	--
	10/23/95	2.04	NP	32.29	0.00	--
	01/22/96	1.08	NP	33.25	0.00	--
	04/22/96	0.78	NP	33.55	0.00	--
	07/22/96	2.24	NP	32.09	0.00	--
	10/28/96	1.97	NP	32.36	0.00	--
	01/30/96	1.15	NP	33.18	0.00	--
	04/21/97	1.13	NP	33.20	0.00	--
	01/30/96	1.15	NP	33.18	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-22	03/06/95	3.32	NP	32.33	0.00	--
(35.65)	03/27/95	3.23	NP	32.42	0.00	--
	04/24/95	3.25	NP	32.40	0.00	--
	05/22/95	3.93	NP	31.72	0.00	--
	06/19/95	4.34	NP	31.31	0.00	--
	07/24/95	4.83	NP	30.82	0.00	--
	08/28/95	5.35	NP	30.30	0.00	--
	09/25/95	5.94	NP	29.71	0.00	--
	10/23/95	5.24	NP	30.41	0.00	--
	11/27/95	4.04	NP	31.61	0.00	--
	12/28/95	3.26	NP	32.39	0.00	--
	01/22/96	2.77	NP	32.88	0.00	--
	02/26/96	2.42	NP	33.23	0.00	--
	03/25/96	3.47	NP	32.18	0.00	--
	04/22/96	3.32	NP	32.33	0.00	--
	05/28/96	3.06	NP	32.59	0.00	--
	06/24/96	3.93	NP	31.72	0.00	--
	07/22/96	4.55	NP	31.10	0.00	--
	08/26/96	6.85	NP	28.80	0.00	--
	09/23/96	5.66	NP	29.99	0.00	--
	10/28/96	4.80	NP	30.85	0.00	--
	11/25/96	3.96	NP	31.69	0.00	--
	12/23/96	3.20	NP	32.45	0.00	--
	01/30/96	3.72	NP	31.93	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-23	03/27/95	9.42	NP	26.64	0.00	--
(36.06)	04/24/95	3.97	NP	32.09	0.00	--
	05/22/95	4.50	NP	31.56	0.00	--
	06/26/95	4.75	NP	31.31	0.00	--
	07/24/95	5.07	NP	30.99	0.00	--
	08/28/95	5.55	5.44	30.60	0.11	0.00
	09/25/96	6.00	5.78	30.25	0.22	0.00
	10/23/95	5.15	NP	30.91	0.00	--
	11/27/95	3.56	NP	32.50	0.00	--
	12/28/95	4.27	NP	31.79	0.00	--
	01/22/96	3.49	NP	32.57	0.00	--
	02/26/96	3.59	NP	32.47	0.00	--
	03/25/96	4.24	NP	31.82	0.00	--
	04/22/96	3.23	NP	32.83	0.00	--
	05/28/96	3.97	NP	32.09	0.00	--
	06/24/96	4.46	NP	31.60	0.00	--
	07/22/96	5.05	5.02	31.04	0.03	0.00
	08/28/96	5.80	5.80	30.28	0.02	0.00
	09/23/96	5.36	5.30	30.75	0.06	0.00
	10/28/96	4.73	NP	31.33	0.00	--
	11/25/96	3.75	NP	32.31	0.00	--
	12/23/96	3.68	NP	32.38	0.00	--
	01/30/96	3.46	NP	32.60	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-24	03/06/95	4.98	4.15	30.88	0.83	0.00
(35.15)	03/27/96	5.18	4.28	30.74	0.90	0.00
	04/24/95	4.37	5.31	31.58	0.94	0.00
	05/22/95	4.95	4.96	30.21	0.01	0.00
	06/26/95	8.40	6.50	28.37	1.90	0.00
	07/24/95	7.49	7.25	27.86	0.24	0.00
	08/28/95	10.00	8.42	26.49	1.58	0.00
	12/01/95	NA	NA	NA	NA	28.1
	12/01/96	NM	NM	NM	NM	0.00
	01/30/96	5.10	NP	30.05	0.00	0.00
			SPH Recovered to Date:			**28.1**
MW-25	09/23/96	11.69	NP	23.04	0.00	--
(34.73)	10/28/96	11.22	NP	23.51	0.00	--
	11/25/96	9.95	NP	24.78	0.00	--
	12/23/96	9.72	NP	25.01	0.00	--
	01/30/96	9.37	NP	25.36	0.00	--
			SPH Recovered to Date:			**0.00**
MW-26	09/11/96	10.24	10.00	24.74	0.24	0.00
(34.78)	09/23/96	12.10	11.85	22.89	0.25	0.00
	10/28/96	11.41	11.38	23.40	0.03	0.00
	11/25/96	10.36	NP	24.42	0.00	--
	12/23/96	10.39	NP	24.39	0.00	--
	01/30/96	10.35	NP	24.43	0.00	--
	04/21/97	10.32	NP	24.46	0.00	--
			SPH Recovered to Date:			**0.00**
MW-27	02/26/96	3.94	NP	31.73	0.00	--
(35.67)	03/25/96	4.73	NP	30.94	0.00	--
	04/22/96	3.71	NP	31.96	0.00	--
	05/28/96	4.54	NP	31.13	0.00	--
	06/24/96	5.34	NP	30.33	0.00	--
	07/22/96	5.73	NP	29.94	0.00	--
	08/26/96	5.96	NP	29.71	0.00	--
	09/23/96	6.81	NP	28.86	0.00	--
	10/28/96	5.35	NP	30.32	0.00	--
	11/25/96	3.34	NP	32.33	0.00	--
	12/23/96	4.04	NP	31.63	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-28	03/06/95	4.41	NP	29.98	0.00	--
(34.39)	03/27/95	4.75	4.74	29.65	0.01	0.00
	04/24/95	5.26	NP	29.13	0.00	--
	05/22/95	6.02	6.00	28.39	0.02	0.00
	06/26/95	6.59	6.50	27.88	0.09	0.00
	07/24/95	6.94	NP	27.45	0.00	--
	08/28/95	8.05	8.04	26.35	0.01	0.00
	09/25/96	11.75	NA	22.64	0.00	1.03
	10/23/95	7.60	NP	26.79	0.00	--
	11/27/95	4.04	NA	30.35	0.00	0.03
	12/28/95	4.25	NP	30.14	0.00	--
	01/22/96	2.29	NP	32.10	0.00	--
	02/26/96	3.78	NP	30.61	0.00	--
	03/25/96	5.10	NP	29.29	0.00	--
	04/22/96	4.22	NP	30.17	0.00	--
	05/28/96	4.66	NP	29.73	0.00	--
	06/24/96	6.01	NP	28.38	0.00	--
	07/22/96	6.77	NP	27.62	0.00	--
	08/28/96	7.56	NP	26.83	0.00	--
	09/23/96	6.28	NP	28.11	0.00	--
	10/28/96	5.03	NP	29.36	0.00	--
	11/25/96	2.50	NP	31.89	0.00	--
	12/23/96	4.39	4.38	30.01	0.01	0.00
	01/30/96	3.46	NP	32.60	0.00	--
			SPH Recovered to Date:			**1.06**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-29	04/24/95	13.34	NP	22.43	0.00	--
(35.77)	07/24/95	14.20	NP	21.57	0.00	--
	10/23/95	14.86	NP	20.91	0.00	--
	01/22/96	12.70	NP	23.07	0.00	--
	04/22/96	12.75	NP	23.02	0.00	--
	07/22/96	13.64	NP	22.13	0.00	--
	10/28/96	14.15	NP	21.62	0.00	--
	01/30/96	13.41	NP	22.36	0.00	--
			SPH Recovered to Date:			**0.00**
MW-30	01/30/96	4.43	NP	31.96	0.00	--
(36.39)			SPH Recovered to Date:			**0.00**
MW-31	03/06/95	5.64	NP	31.91	0.00	--
(37.55)	03/27/95	5.76	5.75	31.80	0.01	0.00
	04/24/95	6.09	NP	31.46	0.00	--
	05/22/95	6.70	NP	30.85	0.00	--
	06/26/95	7.26	NP	30.29	0.00	--
	07/24/95	7.74	NP	29.81	0.00	--
	08/28/95	8.41	NP	29.14	0.00	--
	09/25/96	8.96	NP	28.59	0.00	--
	10/23/95	8.56	NP	28.99	0.00	--
	11/27/95	6.33	NP	31.22	0.00	--
	12/28/95	5.90	NP	31.65	0.00	--
	01/22/96	4.62	NP	32.93	0.00	--
	02/26/96	4.92	NP	32.63	0.00	--
	03/25/96	6.02	NP	31.53	0.00	--
	04/22/96	5.57	NP	31.98	0.00	--
	05/28/96	5.73	NP	31.82	0.00	--
	06/24/96	6.72	NP	30.83	0.00	--
	07/22/96	7.38	NP	30.17	0.00	--
	08/28/96	8.02	NP	29.53	0.00	--
	09/23/96	7.48	NP	30.07	0.00	--
	10/28/96	6.68	NP	30.87	0.00	--
	11/25/96	4.92	NP	32.63	0.00	--
	12/23/96	5.08	NP	32.47	0.00	--
	01/30/96	5.45	NP	32.10	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-32	04/24/95	4.27	NP	32.74	0.00	--
(37.01)	07/24/95	5.75	NP	31.26	0.00	--
	10/23/95	6.40	NP	30.61	0.00	--
	01/22/96	3.23	NP	33.78	0.00	--
	04/22/96	3.89	NP	33.12	0.00	--
	07/22/96	5.45	NP	31.56	0.00	--
	10/28/96	5.59	NP	31.42	0.00	--
	01/30/96	4.73	NP	32.28	0.00	--
			SPH Recovered to Date:			**0.00**
MW-33	04/24/95	19.93	NP	19.41	0.00	--
(39.34)	07/24/95	20.68	NP	18.66	0.00	--
	10/23/95	21.05	NP	18.29	0.00	--
	01/22/96	19.07	NP	20.27	0.00	--
	04/22/96	19.48	NP	19.86	0.00	--
	07/22/96	20.26	NP	19.08	0.00	--
	10/28/96	20.58	NP	18.76	0.00	--
	01/30/96	18.92	NP	20.42	0.00	--
			SPH Recovered to Date:			**0.00**
MW-34	04/24/95	19.40	NP	20.27	0.00	--
(39.67)	07/24/95	19.99	NP	17.02	0.00	--
	10/23/95	20.26	NP	16.75	0.00	--
	01/22/96	18.71	NP	18.30	0.00	--
	04/22/96	19.43	NP	17.58	0.00	--
	07/22/96	19.74	NP	17.27	0.00	--
	10/28/96	20.18	NP	16.83	0.00	--
	01/30/96	18.78	NP	20.89	0.00	--
			SPH Recovered to Date:			**0.00**
MW-35	01/30/96	2.08	NP	31.31	0.00	--
(33.39)			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-36	04/24/95	19.40	NP	15.48	0.00	--
(34.88)	07/24/95	19.99	NP	14.89	0.00	--
	10/23/95	20.26	NP	14.62	0.00	--
	01/22/96	13.74	NP	21.14	0.00	--
	04/22/96	13.72	NP	21.16	0.00	--
	07/22/96	14.90	NP	19.98	0.00	--
	10/28/96	15.54	NP	19.34	0.00	--
	01/30/96	13.02	NP	21.86	0.00	--
			SPH Recovered to Date:			**0.00**
MW-37	04/24/95	14.96	NP	19.90	0.00	--
(34.86)	07/24/95	15.88	NP	18.98	0.00	--
	10/23/95	16.37	NP	18.49	0.00	--
	01/22/96	14.22	NP	20.64	0.00	--
	04/22/96	13.72	NP	21.14	0.00	--
	07/22/96	15.28	NP	19.58	0.00	--
	10/28/96	15.80	NP	19.06	0.00	--
	01/30/96	13.44	NP	21.42	0.00	--
			SPH Recovered to Date:			**0.00**
MW-38	01/30/96	3.98	NP	-	0.00	--
(NA)			SPH Recovered to Date:			**0.00**
MW-39	06/24/96	13.01	NP	22.01	0.00	--
(35.02)	07/22/96	13.45	NP	21.57	0.00	--
	08/26/96	13.90	NP	21.12	0.00	--
	09/23/96	14.08	NP	20.94	0.00	--
	10/28/96	14.00	NP	21.02	0.00	--
	11/25/96	13.54	NP	21.48	0.00	--
	12/23/96	12.77	NP	22.25	0.00	--
	01/30/96	NM	NM	NM	NM	NM
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			GATX (continued)			
MW-40	06/24/96	13.81	NP	19.84	0.00	--
(33.65)	07/22/96	14.32	NP	19.33	0.00	--
	08/26/96	14.77	NP	18.88	0.00	--
	09/23/96	14.83	NP	18.82	0.00	--
	10/28/96	14.63	NP	19.02	0.00	--
	11/25/96	13.78	NP	19.87	0.00	--
	12/23/96	13.37	NP	20.28	0.00	--
	01/30/96	12.74	NP	20.91	0.00	--
				SPH Recovered to Date:		**0.00**
				GATX total SPH Recovered to Date:		**103.71**
			TOSCO			
B-1	04/24/95	17.91	17.42	17.30	0.49	0.00
(34.79)	05/22/95	18.04	17.57	17.15	0.47	0.00
	06/26/95	18.23	17.75	16.97	0.48	0.00
	07/24/95	18.00	17.98	16.81	0.02	0.00
	08/28/95	18.34	18.32	16.47	0.02	0.00
	09/25/95	18.51	18.37	16.40	0.14	0.00
	10/23/95	18.31	18.30	16.49	0.01	0.00
	11/27/95	17.97	17.94	16.85	0.03	0.01
	12/28/95	16.91	16.75	18.02	0.16	0.85
	01/22/96	16.85	16.73	18.04	0.12	0.01
	02/26/96	13.42	13.40	21.39	0.02	0.08
	04/22/96	16.35	16.20	18.57	0.15	0.01
	05/28/96	16.21	NP	18.58	0.00	--
	06/24/96	16.69	16.68	18.11	0.01	0.00
	07/22/96	17.22	17.20	17.59	0.02	0.00
	08/23/96	17.52	17.49	17.30	0.03	0.00
	09/23/96	17.73	17.72	17.07	0.01	0.00
	10/28/96	17.19	17.18	17.61	0.01	0.00
	01/31/97	16.10	15.94	18.83	0.16	0.00
				SPH Recovered to Date:		**0.96**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-2	03/28/95	16.84	NP	18.51	0.00	--
(35.35)	04/24/95	17.02	NP	18.33	0.00	--
	05/22/95	17.22	NP	18.13	0.00	--
	06/26/95	17.48	NP	17.87	0.00	--
	08/28/95	19.84	19.58	15.73	0.26	0.00
	09/25/95	18.18	NP	17.17	0.00	--
	10/23/95	18.15	NP	17.20	0.00	--
	12/28/95	16.56	NP	18.79	0.00	--
	01/22/96	16.50	16.48	18.87	0.02	0.00
	04/22/96	16.28	NP	19.07	0.00	--
	05/28/96	16.14	NP	19.21	0.00	--
	06/24/96	16.50	NP	18.85	0.00	--
	07/22/96	16.99	NP	18.36	0.00	--
	08/23/96	17.48	NP	17.87	0.00	--
	09/23/96	17.50	NP	17.85	0.00	--
	10/28/96	17.60	NP	17.75	0.00	--
	01/31/97	15.69	NP	19.66	0.00	--
			SPH Recovered to Date:			**0.00**
B-3	01/31/97	17.26	NP	17.65	0.00	--
(34.91)			SPH Recovered to Date:			**0.00**
B-4	03/28/95	18.63	17.92	16.76	0.71	0.00
(34.79)	04/24/95	19.17	18.01	16.61	1.16	0.00
	05/22/95	19.24	18.11	16.51	1.13	0.00
	06/26/95	19.28	18.27	16.37	1.01	0.00
	07/24/95	18.64	18.53	16.24	0.11	0.15
	08/28/95	18.63	18.62	16.17	0.01	0.00
	09/25/95	18.95	18.82	15.95	0.13	0.00
	10/23/95	18.85	18.83	15.96	0.02	0.00
	11/27/95	18.62	18.56	16.22	0.06	0.37
	01/22/96	17.64	17.60	17.18	0.04	0.24
	02/26/96	13.68	NP	21.11	0.00	--
	04/22/96	16.44	16.35	18.41	0.07	0.02
	05/28/96	16.42	16.35	18.43	0.07	0.02
	08/23/96	18.35	NP	16.44	0.00	--
	09/23/96	18.45	18.44	16.35	0.01	0.00
	10/28/96	18.59	17.56	17.08	1.03	0.00
	01/31/97	17.26	17.00	18.53	1.03	3.25
			SPH Recovered to Date:			**4.05**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-5	01/22/96	16.18	NP	18.65	0.00	--
(34.83)	02/26/96	4.40	NP	30.43	0.00	--
	05/28/96	15.59	NP	19.24	0.00	--
	06/24/96	DRY	DRY	DRY	DRY	--
	07/22/96	DRY	DRY	DRY	DRY	--
	08/23/96	DRY	DRY	DRY	DRY	--
	09/23/96	17.02	NP	17.81	0.00	--
	10/28/96	17.10	NP	17.73	0.00	--
	01/31/97	15.30	NP	19.53	0.00	--
			SPH Recovered to Date:			**0.00**
B-6	01/22/96	16.44	NP	18.97	0.00	--
(35.41)	02/26/96	5.60	NP	29.81	0.00	--
	04/22/96	16.15	NP	19.26	0.00	--
	05/28/96	16.11	NP	19.30	0.00	--
	06/24/96	16.47	NP	18.94	0.00	--
	07/22/96	16.91	NP	18.50	0.00	--
	08/23/96	17.99	NP	17.42	0.00	--
	09/23/96	17.45	NP	17.96	0.00	--
	10/28/96	17.34	NP	18.07	0.00	--
	01/31/97	15.47	NP	19.94	0.00	--
			SPH Recovered to Date:			**0.00**
B-16	03/24/95	16.99	NP	18.83	0.00	--
(35.82)	04/24/95	17.12	NP	18.70	0.00	--
	05/22/95	17.37	NP	18.45	0.00	--
	06/19/95	17.59	NP	18.23	0.00	--
	07/24/95	17.89	NP	17.93	0.00	--
	08/28/95	8.10	NP	27.72	0.00	--
	09/25/95	18.35	NP	17.47	0.00	--
	10/23/95	18.30	NP	17.52	0.00	--
	11/27/95	17.90	NP	17.93	0.01	0.00
	01/22/96	16.75	NP	19.07	0.00	--
	01/29/96	15.75	NP	20.07	0.00	--
	02/26/96	13.30	NP	22.52	0.00	--
	04/22/96	16.04	NP	19.78	0.00	--
	05/28/96	16.39	NP	19.43	0.00	--
	06/24/96	16.71	NP	19.11	0.00	--
	07/22/96	17.19	NP	18.63	0.00	--
	09/23/96	17.76	NP	18.06	0.00	--
	10/28/96	17.82	NP	18.00	0.00	--
	01/31/97	15.75	NP	20.07	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
B-17	03/28/95	16.95	NP	18.64	0.00	--
(35.59)	04/24/95	17.15	NP	18.44	0.00	--
	05/22/95	17.36	NP	18.23	0.00	--
	06/26/95	17.61	NP	17.98	0.00	--
	07/24/95	17.80	17.79	17.80	0.01	0.00
	08/28/95	18.79	18.78	16.81	0.01	0.00
	09/25/95	18.23	NP	17.36	0.00	--
	10/23/95	18.21	NP	17.38	0.00	--
	11/27/95	17.85	NP	17.74	0.00	--
	12/28/95	16.85	NP	18.74	0.00	--
	01/22/96	16.78	NP	18.81	0.00	--
	02/26/96	13.36	13.35	22.24	0.01	0.00
	04/22/96	16.44	NP	19.15	0.00	--
	05/28/96	16.40	NP	19.19	0.00	--
	06/24/96	16.40	NP	19.19	0.00	--
	07/22/96	17.16	NP	18.43	0.00	--
	08/23/96	17.57	NP	18.02	0.00	--
	09/23/96	17.68	NP	17.91	0.00	--
	10/28/96	17.75	NP	17.84	0.00	--
	01/31/97	15.86	NP	19.73	0.00	--
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-18	03/28/95	19.28	NP	16.51	0.00	--
(35.79)	04/24/95	19.38	NP	16.41	0.00	--
	05/22/95	19.44	NP	16.35	0.00	--
	06/26/95	19.56	NP	16.23	0.00	--
	07/24/95	19.74	NP	16.05	0.00	--
	08/28/95	19.43	NP	16.36	0.00	--
	09/25/95	20.02	NP	15.77	0.00	--
	10/23/95	20.08	NP	15.71	0.00	--
	12/28/95	18.66	NP	17.13	0.00	--
	01/22/96	18.20	NP	17.59	0.00	--
	02/26/96	18.38	NP	17.41	0.00	--
	04/22/96	18.50	NP	17.29	0.00	--
	05/28/96	17.84	NP	17.95	0.00	--
	06/24/96	18.35	NP	17.44	0.00	--
	07/22/96	18.97	NP	16.82	0.00	--
	08/23/96	17.50	NP	18.29	0.00	--
	09/23/96	19.43	NP	16.36	0.00	--
	10/28/96	19.47	NP	16.32	0.00	--
	01/31/97	18.09	NP	17.70	0.00	--
			SPH Recovered to Date:			0.00
B-22	03/28/95	18.50	NP	17.33	0.00	--
(35.83)	04/24/95	19.10	NP	16.73	0.00	--
	05/22/95	19.09	NP	16.74	0.00	--
	06/26/95	19.26	NP	16.57	0.00	--
	09/25/95	20.50	NP	15.33	0.00	--
	10/23/95	19.96	NP	15.87	0.00	--
	12/28/95	18.59	NA	17.24	0.00	0.02
	01/22/96	18.88	NP	16.95	0.00	--
	02/26/96	12.05	NP	23.78	0.00	--
	04/22/96	17.75	NP	18.08	0.00	--
	05/28/96	17.31	NP	18.52	0.00	--
	06/24/96	18.12	NP	17.71	0.00	--
	07/22/96	19.09	NP	16.74	0.00	--
	08/23/96	19.03	NP	16.80	0.00	--
	09/23/96	19.79	NP	16.04	0.00	--
	10/28/96	19.75	NP	16.08	0.00	--
	01/31/97	17.93	17.92	16.75	0.01	0.00
			SPH Recovered to Date:			0.02

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-27	03/28/95	17.52	17.25	18.45	0.27	0.00
(35.74)	04/24/95	18.01	17.70	17.99	0.31	0.00
	05/22/95	18.17	17.85	17.84	0.32	0.00
	06/26/95	19.03	17.91	17.66	1.12	0.00
	07/24/95	19.25	18.11	17.46	1.14	0.00
	08/28/95	19.25	18.75	16.92	0.50	0.00
	09/25/95	19.60	18.50	17.08	1.10	0.00
	10/23/95	19.69	18.59	16.99	1.10	0.00
	11/27/95	18.80	18.50	17.20	0.30	0.80
	01/22/96	17.87	17.44	18.24	0.43	0.78
	02/26/96	13.69	13.38	22.31	0.31	0.25
	04/22/96	16.95	16.68	19.02	0.27	0.12
	08/23/96	18.68	18.12	17.54	0.56	0.31
	09/23/96	18.70	18.34	17.35	0.36	0.00
	10/28/96	18.69	18.58	17.14	0.11	0.00
	01/31/97	18.63	16.43	18.98	2.20	4.00
			SPH Recovered to Date:			**6.26**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
TOSCO (continued)						
B-35	04/24/95	16.33	16.10	17.45	0.23	0.00
(33.58)	05/22/95	16.43	16.24	17.31	0.19	0.00
	06/26/95	16.68	16.45	17.10	0.23	0.00
	07/24/95	16.86	16.65	16.90	0.21	0.00
	08/28/95	17.52	17.35	16.20	0.17	0.00
	09/25/95	17.32	17.02	16.52	0.30	0.00
	10/23/95	17.15	16.94	16.61	0.21	0.00
	11/27/95	16.56	16.50	17.07	0.06	0.08
	12/28/95	15.61	15.60	17.98	0.01	0.02
	01/22/96	15.57	15.52	18.05	0.05	0.00
	02/26/96	13.55	13.50	20.07	0.05	0.00
	04/22/96	17.84	17.78	15.79	0.06	0.00
	05/28/96	15.08	NP	18.50	0.00	--
	06/24/96	15.54	NP	18.04	0.00	--
	07/22/96	16.06	NP	17.52	0.00	--
	08/23/96	16.85	NP	16.73	0.00	--
	09/23/96	16.60	NP	16.98	0.00	--
	10/28/96	16.91	16.85	16.72	0.06	0.00
	01/31/97	14.84	NP	18.74	0.00	--
			SPH Recovered to Date:			0.00
B-36	03/28/95	14.65	NP	16.32	0.00	--
(30.97)	04/24/95	14.95	NP	16.02	0.00	--
	05/22/95	15.03	NP	15.94	0.00	--
	06/26/95	15.24	NP	15.73	0.00	--
	07/24/95	15.47	NP	15.50	0.00	--
	08/28/95	15.35	NP	15.62	0.00	--
	09/25/95	15.82	NP	15.15	0.00	--
	10/23/95	15.60	NP	15.37	0.00	--
	12/28/95	13.91	NP	17.06	0.00	--
	01/22/96	13.93	NP	17.04	0.00	--
	02/26/96	10.75	NP	20.22	0.00	--
	04/22/96	14.10	NP	16.87	0.00	--
	05/28/96	13.01	NP	17.96	0.00	--
	06/24/96	13.84	NP	17.13	0.00	--
	07/22/96	15.01	NP	15.96	0.00	--
	08/23/96	15.81	NP	15.16	0.00	--
	09/23/96	15.65	NP	15.32	0.00	--
	10/28/96	15.55	NP	15.42	0.00	--
	01/31/97	13.44	NP	17.53	0.00	--
			SPH Recovered to Date:			0.00

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-37	03/28/95	18.51	NP	16.73	0.00	--
(35.24)	04/24/95	19.66	NP	15.58	0.00	--
	05/22/95	19.62	NP	15.62	0.00	--
	06/26/95	19.75	NP	15.49	0.00	--
	07/24/95	20.08	NP	15.16	0.00	--
	08/28/95	20.10	NP	15.14	0.00	--
	09/25/95	20.42	20.41	14.83	0.01	0.00
	10/23/95	20.45	20.44	14.80	0.01	0.00
	11/27/95	19.90	NP	15.34	0.00	--
	12/28/95	19.66	NP	15.58	0.00	--
	01/22/96	18.23	18.20	17.04	0.03	0.00
	02/26/96	14.15	NP	21.09	0.00	--
	04/22/96	18.90	NP	16.34	0.00	--
	05/28/96	17.94	NP	17.30	0.00	--
	06/24/96	19.13	NP	16.11	0.00	--
	07/22/96	20.13	NP	15.11	0.00	--
	08/23/96	20.15	NP	15.09	0.00	--
	09/23/96	20.76	NP	14.48	0.00	--
	10/28/96	20.87	NP	14.37	0.00	--
	01/31/97	19.29	NP	15.95	0.00	--
			SPH Recovered to Date:			**0.00**
B-38	03/28/95	20.90	18.95	15.51	1.95	0.00
(34.75)	04/24/95	20.68	19.17	15.35	1.51	0.00
	05/22/95	20.58	19.13	15.40	1.45	0.00
	06/26/95	20.46	19.30	15.28	1.16	0.00
	07/24/95	19.92	19.75	14.97	0.17	0.20
	08/28/95	20.53	19.82	14.82	0.71	0.00
	09/25/95	21.02	19.99	14.61	1.03	0.00
	10/23/95	21.03	20.00	14.60	1.03	0.00
	11/27/95	19.82	19.50	15.20	0.32	0.81
	01/22/96	19.03	18.89	15.84	0.14	0.45
	02/26/96	14.07	13.70	20.99	0.37	1.31
	04/22/96	18.88	18.63	16.08	0.25	0.00
	07/22/96	20.84	19.59	14.97	1.25	0.00
	08/23/96	18.73	18.70	16.05	0.03	0.00
	09/23/96	20.96	20.18	14.45	0.78	0.00
	10/28/96	20.88	20.18	14.47	0.70	0.00
	01/31/97	19.18	18.80	15.51	0.91	2.00
			SPH Recovered to Date:			**4.77**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-39	03/28/95	18.18	18.14	15.77	0.04	0.00
(33.92)	04/24/95	18.34	18.31	15.61	0.03	0.00
	05/22/95	18.31	18.28	15.64	0.03	0.00
	06/26/95	18.52	18.43	15.48	0.09	0.00
	07/24/95	18.86	18.73	15.17	0.13	0.00
	08/28/95	19.06	18.95	14.95	0.11	0.00
	09/25/95	19.22	19.08	14.82	0.14	0.00
	10/23/95	19.29	19.09	14.80	0.20	0.00
	11/27/95	19.62	19.55	14.36	0.07	0.11
	12/28/95	18.23	18.05	15.84	0.18	0.04
	01/22/96	17.10	17.03	16.88	0.07	0.01
	02/26/96	14.00	13.54	20.31	0.46	0.03
	04/22/96	18.73	18.65	15.26	0.08	0.90
	05/28/96	16.76	16.64	17.26	0.12	0.02
	06/24/96	18.39	17.67	16.14	0.72	0.03
	07/22/96	18.71	18.68	15.24	0.03	0.01
	08/23/96	20.05	19.18	14.61	0.87	0.40
	09/23/96	19.51	19.42	14.49	0.09	0.00
	10/28/96	19.29	19.25	14.66	0.04	0.00
	01/31/97	17.30	18.27	16.35	0.54	2.00
			SPH Recovered to Date:			**3.55**
B-40	03/28/95	17.64	17.55	15.63	0.09	0.00
(33.19)	04/24/95	17.96	17.84	15.33	0.12	0.00
	05/22/95	17.86	17.75	15.42	0.11	0.00
	06/26/95	18.06	17.95	15.22	0.11	0.00
	08/28/95	18.41	18.40	14.79	0.01	0.00
	09/25/95	18.77	NP	14.42	0.00	--
	10/23/95	18.75	18.74	14.45	0.01	0.00
	11/27/95	18.00	17.98	15.21	0.02	0.00
	12/28/95	17.23	NP	15.96	0.00	--
	01/22/96	16.40	NP	16.79	0.00	--
	02/26/96	12.75	NP	20.44	0.00	--
	04/22/96	17.01	NP	16.18	0.00	--
	05/28/96	16.07	15.78	17.37	0.29	0.00
	06/24/96	17.14	16.99	16.18	0.15	0.23
	07/22/96	18.44	18.32	14.85	0.12	0.01
	08/23/96	18.93	18.87	14.31	0.06	0.02
	09/23/96	19.12	19.06	14.12	0.06	0.00
	10/28/96	19.02	NP	14.17	0.00	--
	01/31/97	17.30	16.76	16.35	0.54	0.00
			SPH Recovered to Date:			**0.26**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
B-41	03/28/95	18.88	18.80	16.04	0.08	0.00
(34.85)	04/24/95	18.99	18.93	15.91	0.06	0.00
	05/22/95	19.02	18.95	15.89	0.07	0.00
	06/26/95	19.17	19.11	15.73	0.06	0.00
	08/28/95	19.25	18.55	16.20	0.70	0.00
	09/25/95	19.93	19.73	15.09	0.20	0.00
	10/23/95	20.30	19.70	15.06	0.60	0.00
	11/27/95	18.65	18.50	16.33	0.15	0.23
	01/22/96	17.42	17.38	17.46	0.04	0.18
	02/26/96	13.81	13.40	21.39	0.41	0.00
	04/22/96	0.23	12.75	45.65	12.98	0.00
	09/23/96	19.40	19.38	15.47	0.02	0.06
	10/28/96	19.95	19.87	14.97	0.08	0.00
	01/31/97	18.31	NP	16.54	0.00	--
			SPH Recovered to Date:			**0.47**
RES-N	03/28/95	23.90	23.14	15.33	0.76	0.00
(38.58)	04/24/95	24.91	23.17	15.15	1.74	0.00
	05/22/95	23.92	23.17	15.30	0.75	0.00
	06/26/95	24.01	23.26	15.21	0.75	0.00
	07/24/96	24.21	23.45	15.02	0.76	0.00
	08/28/95	24.32	23.64	14.84	0.68	0.00
	09/25/95	24.25	23.75	14.76	0.50	0.00
	10/23/95	24.40	23.80	14.69	0.60	0.00
	11/27/95	23.86	23.26	15.23	0.60	1.59
	12/28/95	22.61	22.59	15.99	0.02	1.21
	01/22/96	20.94	20.91	17.67	0.03	5.00
	02/26/96	24.10	23.34	15.13	0.76	41.25
	04/22/96	22.16	22.14	16.44	0.02	0.00
	05/28/96	21.11	NP	17.47	0.00	--
	06/24/96	22.41	NP	16.17	0.00	--
	07/22/96	22.88	NP	15.70	0.00	--
	08/23/96	22.21	NP	16.37	0.00	--
	09/23/96	23.76	23.74	14.84	0.02	0.00
	10/28/96	24.32	NP	14.26	0.00	--
	01/31/97	22.54	22.45	16.12	0.09	2.00
			SPH Recovered to Date:			**51.05**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
RES-O	03/28/95	17.65	17.61	18.41	0.04	0.00
(36.03)	04/24/95	17.80	17.78	18.25	0.02	0.00
	05/22/95	18.01	17.99	18.04	0.02	0.00
	06/26/95	18.28	18.26	17.77	0.02	0.00
	08/28/95	17.55	17.30	18.69	0.25	0.00
	09/25/95	19.21	18.60	17.34	0.61	0.00
	10/23/95	19.04	18.90	17.11	0.14	0.00
	11/27/95	19.26	19.25	16.78	0.01	0.01
	12/28/95	17.54	17.53	18.50	0.01	0.00
	01/22/96	17.49	17.42	18.60	0.07	0.00
	02/26/96	12.61	12.50	23.51	0.11	0.00
	04/22/96	11.05	10.95	25.07	0.10	0.00
	05/28/96	16.82	NP	19.21	0.00	–
	06/24/96	17.19	17.18	18.85	0.01	0.00
	07/22/96	17.54	17.53	18.50	0.01	0.00
	08/23/96	18.11	18.10	17.93	0.01	0.00
	09/23/96	18.30	18.22	17.80	0.08	0.00
	10/28/96	18.15	18.10	17.92	0.05	0.00
	01/31/97	16.20	NP	19.83	0.00	–
			SPH Recovered to Date:			**0.01**
U-2	03/28/95	14.88	NP	20.14	0.00	–
(35.02)	04/24/95	15.10	NP	19.92	0.00	–
	05/22/95	15.25	NP	19.77	0.00	–
	06/26/95	15.52	NP	19.50	0.00	–
	07/24/95	15.75	NP	19.27	0.00	–
	08/28/95	15.65	NP	19.37	0.00	–
	09/25/95	15.20	NP	19.82	0.00	–
	10/23/95	16.57	NP	18.45	0.00	–
	12/28/95	15.06	NP	19.96	0.00	–
	01/22/96	16.44	NP	18.58	0.00	–
	02/26/96	14.35	NP	20.67	0.00	–
	04/22/96	15.01	NP	20.01	0.00	–
	05/28/96	13.98	NP	21.04	0.00	–
	06/24/96	14.36	NP	20.66	0.00	–
	07/22/96	14.96	NP	20.06	0.00	–
	08/23/96	15.10	NP	19.92	0.00	–
	09/23/96	14.93	NP	20.09	0.00	–
	10/28/96	14.85	NP	20.17	0.00	–
	01/31/97	13.86	NP	21.16	0.00	–
			SPH Recovered to Date:			**0.00**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
U-3	03/28/95	12.72	NP	22.53	0.00	--
(35.25)	04/24/95	12.93	NP	22.32	0.00	--
	05/22/95	13.55	NP	21.70	0.00	--
	06/26/95	13.90	13.89	21.36	0.01	0.00
	07/24/95	14.02	NP	21.23	0.00	--
	08/28/95	19.65	NP	15.60	0.00	--
	09/25/95	16.35	NP	18.90	0.00	--
	10/23/95	14.21	14.20	21.05	0.01	0.00
	11/27/95	14.20	NP	21.05	0.00	--
	12/28/95	12.71	NP	22.54	0.00	--
	01/22/96	16.58	16.56	18.69	0.02	0.00
	02/26/96	14.15	NP	21.10	0.00	--
	04/22/96	15.15	NP	20.10	0.00	--
	05/28/96	12.27	NP	22.98	0.00	--
	06/24/96	12.69	NP	22.56	0.00	--
	07/22/96	13.02	NP	22.23	0.00	--
	08/23/96	13.15	NP	22.10	0.00	--
	09/23/96	15.02	NP	20.23	0.00	--
	10/28/96	17.90	NP	17.35	0.00	--
	01/31/97	11.86	NP	23.39	0.00	--
			SPH Recovered to Date:			**0.00**
U-4	03/28/95	21.40	17.42	16.44	3.98	0.00
(34.46)	04/24/95	21.77	15.60	17.93	6.17	0.00
	05/22/95	21.93	15.75	17.78	6.18	0.00
	06/26/95	22.12	15.96	17.58	6.16	0.00
	07/24/95	20.50	16.33	17.50	4.17	0.00
	08/28/95	20.95	17.23	16.67	3.72	5.20
	09/25/95	18.85	18.60	15.82	0.25	0.00
	10/23/95	21.25	17.35	16.53	3.90	0.00
	11/27/95	18.80	16.40	17.70	2.40	1.22
	01/22/96	17.64	17.60	16.85	0.04	2.79
	02/26/96	13.15	12.85	21.57	0.30	0.98
	04/22/96	11.73	11.50	22.93	0.23	0.31
	08/23/96	16.47	16.31	18.13	0.16	0.25
	09/23/96	16.70	16.61	17.84	0.09	0.00
	10/28/96	17.75	17.56	16.87	0.19	0.00
	01/31/97	17.05	14.80	19.32	2.25	6.50
			SPH Recovered to Date:			**17.25**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
			TOSCO (continued)			
U-5A	03/28/95	6.20	4.73	28.82	1.47	0.00
(33.77)	04/24/95	6.41	6.02	27.69	0.39	0.00
	05/22/95	NA	6.52	NA	NA	--
	06/26/95	NA	6.97	NA	NA	0.50
	07/24/95	10.23	9.86	23.85	0.37	0.00
	08/28/95	9.95	9.50	24.20	0.45	0.01
	09/25/95	15.61	NP	18.16	0.00	--
	10/23/95	15.50	15.30	18.44	0.20	0.00
	11/27/95	6.42	6.34	27.42	0.08	0.36
	12/28/95	6.39	5.97	27.74	0.42	0.25
	01/22/96	6.50	6.43	27.33	0.07	0.07
	02/26/96	8.53	8.50	25.27	0.03	0.08
	04/22/96	9.40	9.35	24.41	0.05	0.05
	06/24/96	6.11	5.79	27.93	0.32	0.15
	07/22/96	6.54	6.47	27.29	0.07	0.05
	08/23/96	8.10	7.21	26.43	0.89	0.32
	09/23/96	9.89	8.58	24.99	1.31	0.00
	10/28/96	NA	NA	NA	NA	--
	01/31/97	4.86	4.59	29.14	0.27	10.00
			SPH Recovered to Date:			**11.84**

Table 5 (continued)
Groundwater Elevation and SPH Recovery Data

Willbridge Terminal
Portland, Oregon

Well Identification (toc)	Date Gauged	Depth to Groundwater (feet)	Depth to SPH (feet)	Groundwater Elevation* (feet)	SPH Thickness (feet)	SPH Recovered (gallons)
U-5	03/28/95	18.21	NP	15.16	0.00	--
(33.37)	04/24/95	18.47	NP	14.90	0.00	--
	05/22/95	18.33	NP	15.04	0.00	--
	06/26/95	8.42	NP	24.95	0.00	--
	07/24/95	18.91	18.90	14.47	0.01	0.00
	08/28/95	19.25	19.13	14.22	0.12	0.00
	09/25/95	19.52	19.27	14.06	0.25	0.00
	10/23/95	19.49	19.32	14.02	0.17	0.00
	11/27/95	18.60	18.50	14.86	0.10	0.03
(34.20)	12/28/95	18.48	18.43	15.76	0.05	0.07
	01/22/96	15.65	15.57	18.62	0.08	0.02
	02/26/96	13.70	13.55	20.63	0.15	0.00
	04/22/96	17.90	17.82	16.37	0.08	0.02
	05/28/96	16.53	16.52	17.68	0.01	0.00
	06/24/96	18.11	18.10	16.10	0.01	0.00
	07/22/96	19.42	19.39	14.81	0.03	0.00
	09/23/96	20.08	20.04	14.15	0.04	0.00
	10/28/96	18.22	18.15	16.04	0.07	0.00
	01/31/97	18.01	NP	16.19	0.00	--
			SPH Recovered to Date:			**0.14**
IT-W	01/31/97	16.65	NP	19.26	0.00	--
(35.91)			SPH Recovered to Date:			**0.00**
IT-E	01/31/97	19.47	18.85	17.06	0.62	0.00
(36.44)			SPH Recovered to Date:			**0.00**
		TOSCO Total SPH Recovered to Date:				**100.63**
	Complete Total SPH Recovered to Date:					**212.36**

Notes:
NA = Not available
-- = No product recovered
SPH = Separate-phase hydrocarbons
NP = No SPH measured
NM = Not measured
SPH recovered to 10-28-96 was a cumaltive process; totals added together for the monthly amount.

Table 6
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			TOSCO		
B-2	10/28/96	18	2.9	ND	3.5
	01/31/97	NS	NS	NS	NS
B-3	10/28/96	ND	ND	ND	ND
	01/31/97	NS	NS	NS	NS
B-4	01/01/95	NS/F	NS/F	NS/F	NS/F
	04/01/95	NS/F	NS/F	NS/F	NS/F
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	NS/F	NS/F	NS/F	NS/F
	04/22/96	NS/F	NS/F	NS/F	NS/F
	07/22/96	NS	NS	NS	NS
	10/28/96	NS	NS	NS	NS
	01/31/97	NS	NS	NS	NS
B-6	01/22/96	240	17	300	120
	07/22/96	270	25	380	120
	10/28/96	180	31	360	130
	01/31/97	NS	NS	NS	NS
B-16	01/22/96	590	9.4	11	11
	07/22/96	210	8.7	7.9	9.9
	10/28/96	850	22	16	16
	01/31/97	NS	NS	NS	NS
B-17	01/01/95	200	17	4.5	26
	04/01/95	590	17	7.7	16
	07/01/95	670	22	11	20
	10/01/95	830	36	16	43
	01/22/96	550	9.8	11	12
	04/22/96	580	19	12	32
	07/22/96	520	22	12	20
	10/28/96	330	15	10	ND
	01/31/97	280	12.1	9.69	10.1

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			TOSCO (continued)		
B-18	01/01/95	ND	ND	ND	0.6
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	ND
	01/22/96	ND	ND	ND	ND
	04/22/96	ND	ND	ND	ND
	07/22/96	ND	ND	ND	ND
	10/28/96	ND	ND	ND	ND
	01/31/97	ND	ND	ND	ND
B-22	01/01/95	NS/F	NS/F	NS/F	NS/F
	04/01/95	NS/F	NS/F	NS/F	NS/F
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	15	1.6	2.3	5.3
	04/22/96	NS/F	NS/F	NS/F	NS/F
	07/22/96	14	0.93	0.52	0.56
	10/28/96	NS	NS	NS	NS
	01/31/97	NS	NS	NS	NS
B-25	01/22/96	2.4	ND	3.6	1.0
	10/28/96	ND	ND	ND	ND
	01/31/97	NS	NS	NS	NS
B-27	01/01/95	NS/F	NS/F	NS/F	NS/F
	04/01/95	NS/F	NS/F	NS/F	NS/F
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	NS/F	NS/F	NS/F	NS/F
	04/22/96	NS/F	NS/F	NS/F	NS/F
	07/22/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS/F	NS/F	NS/F	NS/F
	01/31/97	NS	NS	NS	NS

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			TOSCO (continued)		
B-35	01/01/95	NS/F	NS/F	NS/F	NS/F
	04/01/95	NS/F	NS/F	NS/F	NS/F
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	NS/F	NS/F	NS/F	NS/F
	04/22/96	NS/F	NS/F	NS/F	NS/F
	07/22/96	11	7.2	1.2	8.3
	10/28/96	NS	NS	NS	NS
	01/31/97	3.35	3.81	ND	2.17
Duplicate	01/31/97	3.87	4.72	ND	2.73
B-36	01/01/95	NS	NS	NS	NS
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	ND
	01/22/96	480	8.9	8.2	9.6
	04/22/96	ND	ND	ND	ND
	07/22/96	ND	ND	ND	ND
	10/28/96	ND	ND	ND	ND
	01/31/97	ND	ND	ND	ND
B-37	01/01/95	ND	ND	ND	ND
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/01/96	NS/F	NS/F	NS/F	NS/F
	04/22/96	31	0.54	0.72	1.3
	07/22/96	4.5	ND	ND	0.52
	10/28/96	ND	ND	ND	ND
	01/31/97	ND	ND	ND	ND
B-40	01/22/96	2.9	1.9	16	7.5
	10/28/96	0.93	1.2	1.3	1.2
	01/31/97	NS	NS	NS	NS

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			TOSCO (continued)		
RES-N	01/01/95	4	0.6	3.4	4.5
	04/01/95	NS/F	NS/F	NS/F	NS/F
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	NS/F	NS/F	NS/F	NS/F
	04/22/96	NS/F	NS/F	NS/F	NS/F
	07/22/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS/F	NS/F	NS/F	NS/F
	01/31/97	NS/F	NS/F	NS/F	NS/F
U-2	01/01/95	3.8	ND	4.9	2.9
	04/01/95	0.66	ND	1.2	1.2
	07/01/95	2.6	ND	0.62	4
	10/01/95	6.8	ND	ND	ND
	01/22/96	1.3	ND	2.9	1.2
	04/22/96	ND	ND	ND	ND
	07/22/96	7.5	1.9	10	4.2
	10/28/96	ND	ND	ND	ND
	01/31/97	8.91	ND	42.5	ND
U-3	01/01/95	ND	ND	ND	ND
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/22/96	NS/F	NS/F	NS/F	NS/F
	04/22/06	220	7.9	49	26
	07/22/96	ND	ND	ND	ND
	10/28/96	ND	ND	ND	ND
	01/31/97	ND	ND	ND	ND

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			TOSCO (continued)		
U-4	01/01/95	ND	ND	ND	0.6
	04/01/95	ND	ND	ND	ND
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/01/96	NS/F	NS/F	NS/F	NS/F
	04/01/96	NS/F	NS/F	NS/F	NS/F
	07/01/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS	NS	NS	NS
	01/31/97	NS	NS	NS	NS
U-5	01/01/95	15	2	0.5	3
	04/01/95	1.9	1.4	ND	1.7
	07/01/95	2.7	1.2	ND	1.8
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/01/96	NS/F	NS/F	NS/F	NS/F
	04/01/96	NS/F	NS/F	NS/F	NS/F
	07/01/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS	NS	NS	NS
	01/31/97	ND	ND	ND	ND
U-5A	01/01/95	20	6.5	3.7	7.2
	04/01/95	28	7.8	5	20
	07/01/95	NS/F	NS/F	NS/F	NS/F
	10/01/95	NS/F	NS/F	NS/F	NS/F
	01/01/96	NS/F	NS/F	NS/F	NS/F
	04/01/96	NS/F	NS/F	NS/F	NS/F
	07/01/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS	NS	NS	NS
	01/31/97	NS	NS	NS	NS

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			GATX		
MW-7	01/01/95	ND	ND	18	30
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	ND
	01/22/96	ND	ND	ND	ND
	04/01/96	NS	NS	NS	NS
	07/01/96	NS	NS	NS	NS
	10/28/96	NS	NS	NS	NS
	01/30/97	NS	NS	NS	NS
MW-8	01/01/95	ND	ND	ND	ND
	04/01/95	0.96	ND	ND	ND
	07/01/95	ND	ND	ND	1.1
	10/01/95	ND	ND	ND	ND
	01/22/96	ND	ND	ND	ND
	04/22/96	970	64	6.3	20
	07/22/96	1,100	440	39	140
	10/28/96	1,300	2,000	190	900
	01/30/97	134	3.48	37.8	107
MW-10	01/01/95	1.7	0.7	ND	1
	04/01/95	ND	ND	ND	1.3
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	1.3
	01/22/96	2.3	0.68	ND	1.1
	04/22/96	6.5	0.88	ND	0.62
	07/22/96	ND	ND	ND	ND
	10/28/96	2.4	ND	ND	ND
	01/30/97	5.05	0.647	ND	1.03

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		GATX (continued)			
MW-11	01/01/95	8,900	4,500	2,500	11,000
	04/01/95	7,400	4,900	2,500	12,000
	07/01/95	5,400	2,400	2,600	8,000
	10/01/95	7,100	2,800	2,400	8,700
	01/22/96	7,400	4,500	2,100	10,000
	04/22/96	7,000	3,800	2,500	11,000
	07/22/96	4,900	2,000	2,400	8,100
	10/28/96	5,100	2,200	2,200	8,100
	01/30/97	NS	NS	NS	NS
MW-20	10/28/96	ND	ND	ND	ND
	01/30/97	NS	NS	NS	NS
MW-21	01/30/97	ND	ND	ND	ND
MW-22	01/01/95	2,400	8,100	4,700	16,000
	04/01/95	2,200	7,100	4,500	15,000
	07/01/95	2,000	5,800	4,500	15,000
	10/01/95	2,300	6,300	5,200	19,000
	01/22/96	1,800	5,300	4,100	15,000
	04/22/96	1,900	4,600	4,000	12,000
	07/22/96	2,200	4,300	4,700	15,000
	10/28/96	2,000	3,500	4,200	14,000
Duplicate	10/28/96	1,800	3,400	4,600	15,000
	01/30/97	2,130	3,650	4,680	14,400
MW-23	01/01/95	72	20	210	180
	04/01/95	150	38	240	140
	07/01/95	99	20	240	140
	10/01/95	120	18	230	120
	01/22/96	32	ND	180	156
	04/22/96	35	16	140	140
Dupliate	04/22/96	ND	ND	ND	ND
	07/22/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	31	7.3	140	110
	01/30/97	NS	NS	NS	NS

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		GATX (continued)			
MW-26	01/01/95	1.7	ND	24	33
	04/01/95	8.7	7.3	13	19
	07/01/95	6.4	10	9.6	12
	10/01/95	ND	0.85	1.6	4.9
	01/22/96	ND	4.2	16	20
Duplicate	01/22/96	ND	ND	ND	ND
	01/19/96	ND	ND	ND	ND
	04/22/06	NS	ND	NS	NS
	07/22/96	NS/F	NS/F	NS/F	NS/F
	10/28/96	NS	NS	NS	NS
	01/30/97	1.73	2.00	9.18	8.66
MW-28	01/01/95	0.9	0.6	8.5	20
	04/01/95	ND	ND	20	15
	07/01/95	7.6	2.7	2.6	7.9
	10/01/95	2.8	2.6	7.2	20
	01/19/96	ND	ND	ND	ND
	04/22/96	ND	ND	ND	4.2
	07/22/96	2.0	0.95	0.73	1.8
	10/28/96	1.2	0.66	1.8	3.2
	01/30/97	ND	ND	ND	ND
MW-31	01/01/95	1.3	1.6	1.2	3.8
	04/01/95	9.3	4.7	0.99	3.1
	07/01/95	2.8	1.3	0.64	1.4
	10/01/95	ND	ND	ND	ND
	01/19/96	ND	ND	ND	ND
	04/22/96	ND	ND	ND	ND
	07/22/96	2.5	1.1	0.54	1.9
	10/28/96	1.5	ND	ND	ND
	01/30/97	ND	ND	ND	ND

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		GATX (continued)			
MW-32	01/01/95	ND	ND	ND	ND
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	ND
	01/22/96	ND	ND	ND	ND
	04/22/96	ND	ND	ND	ND
	07/22/96	ND	ND	ND	0.56
	10/28/96	ND	ND	ND	ND
Duplicate	10/28/96	ND	ND	ND	ND
	01/30/97	ND	ND	ND	ND
MW-33	01/01/95	ND	ND	ND	0.5
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	ND
	01/01/96	ND	ND	ND	ND
	04/22/96	ND	ND	ND	ND
	07/22/96	ND	ND	ND	ND
	10/28/96	ND	ND	ND	ND
	01/30/97	ND	ND	ND	ND
Duplicate	01/30/97	ND	ND	ND	ND
MW-36	07/01/95	NS	NS	NS	NS
	10/01/95	NS	ND	ND	ND
	04/22/96	ND	ND	ND	ND
	07/22/96	ND	ND	ND	ND
	10/28/96	ND	ND	ND	ND
	01/30/97	ND	ND	ND	ND
MW-37	01/01/95	ND	ND	2.2	7.1
	04/01/95	ND	ND	ND	ND
	07/01/95	140	ND	ND	ND
	10/01/95	14	ND	ND	ND
	01/22/96	140	1.0	ND	1.8
	04/22/96	92	ND	ND	ND
	07/22/96	450	6.4	ND	4.8
	10/28/96	27	ND	ND	ND
	01/30/97	697	56.7	12.6	49.6
MW-39	10/28/96	0.96	ND	1.8	2.4
	01/30/97	NS	NS	NS	NS

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		CHEVRON			
B-7	01/01/95	ND	ND	ND	ND
	04/01/95	ND	0.73	ND	ND
	07/01/95	ND	0.57	ND	ND
	10/01/95	ND	ND	ND	ND
	01/01/96	ND	ND	1	NS
	04/01/96	ND	ND	ND	ND
	07/22/96	5.4	0.64	ND	ND
	10/28/96	ND	ND	ND	ND
	01/29/97	ND	ND	ND	ND
B-9	01/01/95	ND	0.9	ND	1.5
	04/01/95	ND	0.88	ND	1.3
	07/01/95	ND	1	ND	0.52
	10/01/95	ND	1	ND	2.5
	01/22/96	0.63	0.66	ND	1.8
	04/22/96	1.0	1.3	ND	2.7
	07/22/96	1.8	0.86	ND	0.93
	10/28/96	ND	ND	ND	ND
	01/29/97	ND	ND	ND	ND
B-10	01/01/95	8.6	2.9	0.7	5.2
	04/01/95	11	5.7	14	17
	07/01/95	8.3	3.6	4.3	11
	10/01/95	22	4.3	1.8	13
	01/22/96	8.6	2.1	ND	5.4
	04/22/96	33	5.6	1.3	15
	07/22/96	30	4.5	6.6	15
	10/28/96	120	4.5	4.0	11
	01/29/97	172	6.16	1.27	10.5

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
		CHEVRON (continued)			
B-11	01/01/95	12	2.8	52	9.9
	04/01/95	140	8.2	2.6	6.3
	07/01/95	140	9.3	2.3	9.5
	10/01/95	320	7.8	ND	8.1
	01/22/96	260	4	140	24
Duplicate	01/22/96	ND	ND	ND	ND
	04/01/96	340	9.8	38	14
	07/22/96	250	7.3	2.4	13
	10/28/96	290	12	4.3	9.5
	01/29/97	243	ND	411	79.0
B-13	01/22/96	400	7.7	18	14
	01/29/97	NS	NS	NS	NS
B-14	01/01/95	190	15	78	46
	04/01/95	140	7.6	170	83
	07/01/95	190	21	91	55
	10/01/95	240	20	45	22
	01/22/96	230	9.5	51	27
	04/22/96	260	14	93	52
Duplicate	04/22/96	270	14	90	50
	07/22/96	230	15	100	67
Duplicate	07/22/96	220	18	110	74
	10/28/96	140	8.2	29	12
Duplicate	10/28/96	120	8.3	24	11
	01/29/97	1,340	35.5	498	94.5
Duplicate	01/29/97	2,180	50.0	835	198
B-28	01/01/95	10	0.7	17	2
	04/01/95	19	0.86	48	7.8
	07/01/95	1.7	0.82	32	5.6
	10/01/95	3	ND	0.93	ND
	01/22/96	4.6	ND	19	6.6
	04/01/96	ND	ND	ND	ND
	07/22/96	14	0.74	64	13
	10/28/96	2.3	ND	2.5	ND
	01/29/97	26.4	1.5	160	62.5

Table 6 (continued)
Groundwater Analytical Results

Willbridge Terminal
Portland, Oregon

Well Identification	Date Sampled	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
			CHEVRON (continued)		
B-30	01/01/95	51	7.6	3.1	17
	04/01/95	28	3.1	1.6	9.9
	07/01/95	12	2	0.71	4.5
	10/01/95	43	4.6	0.94	11
	01/22/96	50	7.1	2.4	14
	04/22/96	25	7.4	3.2	15
	07/22/96	38	4.2	1.9	9.0
	10/28/96	19	4.1	0.95	9.1
	01/29/97	97.5	12.4	8.45	15.4
CR-3	01/22/96	ND	ND	ND	ND
	01/29/97	NS	NS	NS	NS
CR-8	01/01/95	ND	ND	3.9	5.8
	04/01/95	ND	ND	ND	ND
	07/01/95	ND	ND	ND	ND
	10/01/95	ND	ND	ND	0.54
	01/22/96	1.2	ND	0.59	1.8
	04/22/96	1.7	0.98	1.1	2.2
	07/22/96	ND	ND	0.58	1.6
	10/28/96	ND	ND	ND	2.4
	01/29/97	ND	ND	8.94	19.1
CR-11	01/01/95	94	3.9	2.4	3.4
	04/01/95	110	3.6	5.4	17
	07/01/95	94	4.4	3	9.1
	10/01/95	130	8.5	4.2	8.8
	01/22/96	78	2.3	1.9	4.8
	04/22/96	91	5.2	4	3.8
	07/22/96	92	5.3	12	23
	10/28/96	NS/F	NS/F	NS/F	NS/F
	01/29/97	50.4	ND	13.3	47.9

Notes:
ppb = Parts per billion
ND = Not detected
NS = Not sampled
NS/F = Not sampled floating product present
NA = Not analyzed, not applicable
BTEX by EPA Method 8020

Table 7
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
10/28/96

Willbridge Terminal
Portland, Oregon

Parameters	B-7 (ppb)	B-9 (ppb)	B-10 (ppb)	B-11 (ppb)	B-14 (ppb)	B-14 (ppb) Duplicate	B-28 (ppb)	B-30 (ppb)	CR-8 (ppb)	CR-11 (ppb)
					CHEVRON					
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Benzo (a) anthracene	ND	0.196	ND	ND	ND	ND	ND	ND	0.398	NS/F
Benzo (b) fluoranthene	ND	0.553	ND	ND	ND	ND	ND	ND	0.905	NS/F
Benzo (k) flouranthene	ND	0.312	ND	ND	ND	ND	ND	ND	0.515	NS/F
Benzo (a) pyrene	ND	0.424	ND	ND	ND	ND	ND	ND	1.37	NS/F
Benzo (g,h,i) perylene	ND	0.505	ND	ND	ND	ND	ND	ND	1.73	NS/F
Chrysene	ND	0.569	ND	ND	ND	ND	ND	ND	0.655	NS/F
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Fluoranthene	ND	0.667	ND	ND	0.413	0.472	ND	ND	0.938	NS/F
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Indeno (1,2,3-cd) pyrene	ND	0.529	ND	ND	ND	ND	ND	ND	1.30	NS/F
Naphthalene	ND	ND	ND	ND	ND	7.35	10.9	ND	ND	NS/F
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS/F
Pyrene	ND	0.813	ND	ND	ND	ND	ND	ND	1.33	NS/F

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006017

Table 7 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
10/28/96

Willbridge Terminal
Portland, Oregon

Parameters	B-2 (ppb)	B-3 (ppb)	B-4 (ppb)	B-6 (ppb)	B-16 (ppb)	B-17 (ppb)	B-18 (ppb)	B-22 (ppb)	B-25 (ppb)	B-27 (ppb)	B-35 (ppb)
						TOSCO					
Acenaphthene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Acenaphthylene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Anthracene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Benzo (a) anthracene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Benzo (b) fluoranthene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Benzo (k) flouranthene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Benzo (a) pyrene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Benzo (g,h,i) perylene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Chrysene	ND	ND	NS	ND	ND	0.298	ND	NS	ND	NS/F	NS
Dibenzo (a,h) anthracene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Fluoranthene	ND	ND	NS	ND	2.21	ND	ND	NS	ND	NS/F	NS
Fluorene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Indeno (1,2,3-cd) pyrene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Naphthalene	ND	11.8	NS	25.9	ND	6.57	ND	NS	ND	NS/F	NS
Phenanthrene	ND	ND	NS	ND	ND	ND	ND	NS	ND	NS/F	NS
Pyrene	ND	ND	NS	ND	ND	ND	2.68	NS	ND	NS/F	NS

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006018

Table 7 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
10/28/96

Willbridge Terminal
Portland, Oregon

Parameters	B-36 (ppb)	B-37 (ppb)	B-40 (ppb)	U-2 (ppb)	U-3 (ppb)	U-4 (ppb)	U-5 (ppb)	U-5A (ppb)
TOSCO (continued)								
Acenaphthene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Acenaphthylene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Anthracene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (a) anthracene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (k) flouranthene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (a) pyrene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (g,h,i) perylene	ND	0.224	ND	ND	ND	NS/F	NS/F	NS/F
Chrysene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Fluoranthene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Fluorene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Naphthalene	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Phenanthrene	ND	ND	43.1	ND	ND	NS/F	NS/F	NS/F
Pyrene	ND	ND	32.8	ND	ND	NS/F	NS/F	NS/F

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006019

Table 7 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
10/28/96

Willbridge Terminal
Portland, Oregon

Parameters	MW-7 (ppb)	MW-11 (ppb)	MW-22 (ppb)	MW-23 (ppb)	MW-24 (ppb)	MW-26 (ppb)	MW-28 (ppb)	MW-31 (ppb)	MW-32 (ppb)	MW-36 (ppb)	MW-37 (ppb)
						GATX					
Acenaphthene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Acenaphthylene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Anthracene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Benzo (a) anthracene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Benzo (k) flouranthene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Benzo (a) pyrene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Chrysene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Fluoranthene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Fluorene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Naphthalene	NS/F	230	360	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Phenanthrene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND
Pyrene	NS/F	ND	ND	NS/F	NS	NS/F	ND	ND	ND	ND	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006020

Table 8
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
07/01/96

Willbridge Terminal
Portland, Oregon

Parameters	B-7 (ppb)	B-9 (ppb)	B-10 (ppb)	B-11 (ppb)	B-14 (ppb)	B-14 (ppb) Duplicate	B-28 (ppb)	B-30 (ppb)	CR-8 (ppb)	CR-11 (ppb)
					CHEVRON					
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	0.22	0.13	ND	ND	ND	0.61	ND
Benzo (b) fluoranthene	ND	ND	ND	0.17	ND	ND	ND	ND	1.0	ND
Benzo (k) flouranthene	ND	ND	ND	ND	ND	ND	ND	ND	0.38	ND
Benzo (a) pyrene	ND	ND	ND	0.16	0.12	0.13	ND	ND	1.2	ND
Benzo (g,h,i) perylene	ND	ND	ND	0.24	0.25	ND	ND	ND	1.8	ND
Chrysene	ND	ND	ND	0.22	0.15	0.12	ND	ND	0.77	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	2.4	2.2	2.0	ND	ND	0.98	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	ND	ND	ND	0.20	ND	0.12	ND	ND	1.2	ND
Naphthalene	ND	ND	ND	ND	12	ND	41	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	3.0	1.9	1.6	ND	ND	1.4	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006021

Table 8 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
07/01/96

Willbridge Terminal
Portland, Oregon

Parameters	B-4 (ppb)	B-17 (ppb)	B-18 (ppb)	B-22 (ppb)	B-27 (ppb)	B-35 (ppb)	B-36 (ppb)	B-37 (ppb)	U-2 (ppb)	U-3 (ppb)	U-4 (ppb)	U-5 (ppb)	U-5A (ppb)
						TOSCO							
Acenaphthene	NS/F	ND	ND	ND	NS/F	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Acenaphthylene	NS/F	ND	ND	ND	NS/F	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Anthracene	NS/F	ND	ND	ND	NS/F	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (a) anthracene	NS/F	ND	ND	ND	NS/F	18	7.5	ND	ND	0.66	NS/F	NS/F	NS/F
Benzo (b) fluoranthene	NS/F	ND	ND	ND	NS/F	2.1	ND	ND	ND	0.98	NS/F	NS/F	NS/F
Benzo (k) flouranthene	NS/F	ND	ND	ND	NS/F	3.8	ND	ND	ND	0.52	NS/F	NS/F	NS/F
Benzo (a) pyrene	NS/F	ND	ND	ND	NS/F	1.9	ND	ND	ND	0.74	NS/F	NS/F	NS/F
Benzo (g,h,i) perylene	NS/F	ND	ND	ND	NS/F	2.2	ND	ND	ND	0.95	NS/F	NS/F	NS/F
Chrysene	NS/F	ND	ND	ND	NS/F	14	5.5	ND	ND	0.87	NS/F	NS/F	NS/F
Dibenzo (a,h) anthracene	NS/F	ND	ND	ND	NS/F	ND	ND	ND	ND	ND	NS/F	NS/F	NS/F
Fluoranthene	NS/F	ND	ND	ND	NS/F	ND	64	ND	ND	ND	NS/F	NS/F	NS/F
Fluorene	NS/F	13	ND	ND	NS/F	44	ND	ND	ND	ND	NS/F	NS/F	NS/F
Indeno (1,2,3-cd) pyrene	NS/F	ND	ND	ND	NS/F	ND	ND	ND	ND	0.70	NS/F	NS/F	NS/F
Naphthalene	NS/F	22	ND	ND	NS/F	25	ND	ND	8.3	ND	NS/F	NS/F	NS/F
Phenanthrene	NS/F	16	ND	ND	NS/F	120	ND	ND	ND	ND	NS/F	NS/F	NS/F
Pyrene	NS/F	ND	ND	ND	NS/F	ND	76	ND	ND	ND	NS/F	NS/F	NS/F

Notes:
ppb = Parts per billion
ND = Not Detected
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006022

Table 8 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
07/01/96

Willbridge Terminal
Portland, Oregon

Parameters	MW-7 (ppb)	MW-11 (ppb)	MW-22 (ppb)	MW-22 (ppb) Duplicate	MW-23 (ppb)	MW-26 (ppb)	MW-28 (ppb)	MW-31 (ppb)	MW-32 (ppb)	MW-36 (ppb)	MW-37 (ppb)
						GATX					
Acenaphthene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Acenaphthylene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Anthracene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Benzo (a) anthracene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Benzo (k) flouranthene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Benzo (a) pyrene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Chrysene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Fluoranthene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Fluorene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Naphthalene	NS/F	280	240	260	NS/F	NS/F	ND	ND	ND	ND	ND
Phenanthrene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND
Pyrene	NS/F	ND	ND	ND	NS/F	NS/F	ND	ND	ND	ND	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006023

Table 9
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
04/22/96

Willbridge Terminal
Portland, Oregon

Parameters	B-7 (ppb)	B-9 (ppb)	B-10 (ppb)	B-11 (ppb)	B-14 (ppb)	B-14 (ppb) Duplicate	B-28 (ppb)	B-30 (ppb)	CR-8 (ppb)	CR-11 (ppb)
					CHEVRON					
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	0.17	ND	ND	0.21	0.12	ND	ND	1.1	ND
Benzo (b) fluoranthene	ND	0.43	ND	ND	ND	ND	ND	ND	2.1	ND
Benzo (k) flouranthene	ND	0.18	ND	ND	ND	ND	ND	ND	1.0	ND
Benzo (a) pyrene	ND	0.28	ND	ND	ND	ND	ND	ND	3.0	ND
Benzo (g,h,i) perylene	ND	0.38	ND	0.10	ND	0.13	ND	ND	3.8	ND
Chrysene	ND	0.34	ND	ND	0.64	0.45	ND	ND	1.4	ND
Dibenzo (a,h) anthracene	ND	0.19	ND	ND	ND	ND	ND	ND	2.7	ND
Fluoranthene	ND	0.64	ND	2.4	2.4	1.9	ND	ND	1.7	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	ND	0.33	ND	ND	ND	ND	ND	ND	2.9	ND
Naphthalene	ND	ND	ND	ND	7.6	6.3	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	0.58	ND	4.1	3.3	2.5	ND	ND	2.5	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006024

Table 9 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
04/22/96

Willbridge Terminal
Portland, Oregon

Parameters	B-2 (ppb)	B-3 (ppb)	B-4 (ppb)	B-6 (ppb)	B-16 (ppb)	B-17 (ppb)	B-18 (ppb)	B-22 (ppb)	B-25 (ppb)	B-27 (ppb)	B-35 (ppb)	B-36 (ppb)
						TOSCO						
Acenaphthene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Acenaphthylene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Anthracene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Benzo (a) anthracene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Benzo (b) fluoranthene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Benzo (k) flouranthene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Benzo (a) pyrene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Benzo (g,h,i) perylene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Chrysene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Dibenzo (a,h) anthracene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Fluoranthene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Fluorene	7.7	ND	NS/F	ND	5.9	5.8	ND	NS	ND	NS/F	NS/F	ND
Indeno (1,2,3-cd) pyrene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Naphthalene	ND	120	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND
Phenanthrene	ND	ND	NS/F	ND	6.2	ND	ND	NS	ND	NS/F	NS/F	ND
Pyrene	ND	ND	NS/F	ND	ND	ND	ND	NS	ND	NS/F	NS/F	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006025

Table 9 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
04/22/96

Willbridge Terminal
Portland, Oregon

Parameters	B-37 (ppb)	B-40 (ppb)	U-2 (ppb)	U-3 (ppb)	U-4 (ppb)	U-5 (ppb)	U-5A (ppb)
				TOSCO (continued)			
Acenaphthene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Acenaphthylene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Anthracene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (a) anthracene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (b) fluoranthene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (k) flouranthene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (a) pyrene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Benzo (g,h,i) perylene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Chrysene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Dibenzo (a,h) anthracene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Fluoranthene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Fluorene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Naphthalene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Phenanthrene	ND	ND	ND	ND	NS/F	NS/F	NS/F
Pyrene	ND	ND	ND	ND	NS/F	NS/F	NS/F

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006026

Table 9 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
04/22/96

Willbridge Terminal
Portland, Oregon

Parameters	MW-7 (ppb)	MW-11 (ppb)	MW-22 (ppb)	MW-23 (ppb)	MW-23 (ppb) Duplicate	MW-26 (ppb)	MW-28 (ppb)	MW-31 (ppb)	MW-36 (ppb)	MW-37 (ppb)
						GATX				
Acenaphthene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Acenaphthylene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Anthracene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Benzo (a) anthracene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	0.77
Benzo (b) fluoranthene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	0.85
Benzo (k) flouranthene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	0.44
Benzo (a) pyrene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	0.91
Benzo (g,h,i) perylene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	1.0
Chrysene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	2.6
Dibenzo (a,h) anthracene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Fluoranthene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Fluorene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	0.77
Naphthalene	NS/F	540	370	17	ND	NS/F	ND	ND	ND	ND
Phenanthrene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND
Pyrene	NS/F	ND	ND	ND	ND	NS/F	ND	ND	ND	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006027

Table 10
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
01-22/23-96

Willbridge Termial
Portland, Oregon

Parameters	B-7 (ppb)	B-9 (ppb)	B-10 (ppb)	B-11 (ppb)	B-13 (ppb)	B-14 (ppb)	B-14 (ppb) (Duplicate)	B-28 (ppb)	B-30 (ppb)	CR-3 (ppb)	CR-8 (ppb)	CR-11 (ppb)
						CHEVRON						
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	ND	0.4	ND	0.11	ND	ND	ND	0.54	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	0.67	ND	ND	ND	ND	ND	1.4	ND
Benzo (k) flouranthene	ND	ND	ND	ND	0.34	ND	ND	ND	ND	ND	0.56	ND
Benzo (a) pyrene	ND	ND	ND	ND	0.49	ND	ND	ND	ND	ND	1.9	ND
Benzo (g,h,i) perylene	ND	ND	ND	ND	0.76	ND	ND	ND	ND	ND	2.3	ND
Chrysene	ND	ND	ND	ND	0.97	ND	0.36	ND	ND	ND	0.82	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	1.7	ND	ND	ND	ND	ND	1.2	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	0.66	ND	ND	ND	ND	ND	2.1	ND
Naphthalene	ND	ND	ND	9.2	21	ND	7.6	7.0	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006028

Table 10 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
01-22/23-96

Willbridge Termial
Portland, Oregon

Parameters	B-4 (ppb)	B-17 (ppb)	B-18 (ppb)	B-22 (ppb)	B-27 (ppb)	B-29 (ppb)	B-35 (ppb)	B-36 (ppb)	B-37 (ppb)	U-2 (ppb)	U-3 (ppb)	U-4 (ppb)	U-5 (ppb)	U-5A (ppb)
							TOSCO							
Acenaphthene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Acenaphthylene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Anthracene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Benzo (a) anthracene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Benzo (b) fluoranthene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Benzo (k) flouranthene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Benzo (a) pyrene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Benzo (g,h,i) perylene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Chrysene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Dibenzo (a,h) anthracene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Fluoranthene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Fluorene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Indeno (1,2,3-cd) pyrene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Naphthalene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Phenanthrene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F
Pyrene	NS/F	NS	NS	NS	NS/F	ND	NS/F	NS	NS/F	NS	NS/F	NS/F	NS/F	NS/F

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006029

Table 10 (continued)
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
01-22/23-96

Willbridge Termial
Portland, Oregon

Parameters	MW-7 (ppb)	MW-11 (ppb)	MW-22 (ppb)	MW-22 (ppb) (Duplicate)	MW-23 (ppb)	MW-26 (ppb)	MW-26 (ppb)	MW-28 (ppb)	MW-31 (ppb)	MW-36 (ppb)	MW-37 (ppb)
						GATX					
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Benzo (a) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	1.2
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	2.3
Benzo (k) flouranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	1.0
Benzo (a) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	2.8
Benzo (g,h,i) perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	1.3
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	3.6
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	1.6
Naphthalene	ND	470	480	440	ND	22	ND	ND	ND	NS	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND

Notes:
ppb = Parts per billion
ND = Not Detected
NS = Not sampled
NS/F = Not sampled floating product present
PAHs by EPA Method 8310

COPPOR0006030

ATTACHMENT A

SAMPLING PROTOCAL

CERTIFIED ANALYTICAL REPORTS

CHAIN-OF-CUSTODY DOCUMENTATION

ATTACHMENT A

Sampling Protocol

The groundwater sampling procedure employed by PACIFIC consists of first measuring depth to water in the well and separate-phase hydrocarbon level and thickness (if present) using a Keck KIR-89 oil/water interface probe. Each well was then purged of a minimum of three casing volumes of water (or until dry) by double diaphragm pump using rigid polyvinyl chloride (PVC) pipe "stinger" system. The stinger system was decontaminated prior to and between uses with an Alconox™-water wash and a water rinse. Groundwater samples were collected using single-use, disposable polyethylene (PE) 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 at 4°C to the selected analytical laboratory. Dissolved metal samples were filtered in the field using a 0.45-micron filter capsule, disposable Tygon® tubing and a peristaltic pump. Purge water was disposed of using facility treatment systems.

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-8	P701469-01	Water	1/30/97
MW-10	P701469-02	Water	1/30/97
MW-21	P701469-03	Water	1/30/97
MW-22	P701469-04	Water	1/30/97
MW-26	P701469-05	Water	1/30/97
MW-28	P701469-06	Water	1/30/97
MW-31	P701469-07	Water	1/30/97
MW-32	P701469-08	Water	1/30/97
MW-33	P701469-09	Water	1/30/97
MW-36	P701469-10	Water	1/30/97
MW-37	P701469-11	Water	1/30/97
MW-D	P701469-12	Water	1/30/97

North Creek Analytical, Inc.

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.

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-8			P701469-01				Water	
Benzene	0270102	2/6/97	2/6/97		1.00	134	ug/l	
Toluene	"	"	"		1.00	3.48	"	
Ethylbenzene	"	"	"		1.00	37.8	"	
Xylenes (total)	"	"	"		2.00	107	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*117*	%	
MW-10			P701469-02				Water	
Benzene	0270092	2/5/97	2/5/97		0.500	5.05	ug/l	
Toluene	"	"	"		0.500	0.647	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	1.03	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*95.6*	%	
MW-21			P701469-03				Water	
Benzene	0270092	2/5/97	2/5/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*90.6*	%	
MW-22			P701469-04				Water	
Benzene	0270150	2/7/97	2/7/97		50.0	2130	ug/l	
Toluene	"	"	"		50.0	3650	"	
Ethylbenzene	"	"	"		50.0	4680	"	
Xylenes (total)	"	"	"		100	14400	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*101*	%	
MW-26			P701469-05				Water	
Benzene	0270150	2/7/97	2/7/97		1.00	1.73	ug/l	
Toluene	"	"	"		1.00	2.00	"	
Ethylbenzene	"	"	"		1.00	9.18	"	
Xylenes (total)	"	"	"		2.00	8.66	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*101*	%	
MW-28			P701469-06				Water	
Benzene	0270102	2/6/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	

North Creek Analytical, Inc.

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

Joy Chang, Project Manager

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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-28 (continued)			P701469-06				Water	
Xylenes (total)	0270102	2/6/97	2/6/97		1.00	ND	ug/l	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*117*	%	
MW-31			P701469-07				Water	
Benzene	0270092	2/5/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*90.0*	%	
MW-32			P701469-08				Water	
Benzene	0270092	2/5/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*86.2*	%	
MW-33			P701469-09				Water	
Benzene	0270092	2/5/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*87.0*	%	
MW-36			P701469-10				Water	
Benzene	0270092	2/5/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*85.4*	%	
MW-37			P701469-11				Water	
Benzene	0270102	2/6/97	2/6/97		5.00	**697**	ug/l	
Toluene	"	"	"		5.00	**56.7**	"	
Ethylbenzene	"	"	"		5.00	**12.6**	"	
Xylenes (total)	"	"	"		10.0	**49.6**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*120*	%	

North Creek Analytical, Inc.

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-D			P701469-12				Water	
Benzene	0270092	2/5/97	2/6/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*85.2*	%	

North Creek Analytical, Inc.

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-8			P701469-01				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.00152**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0180**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/14/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/12/97	EPA 6020	0.00100	**0.00171**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-10			P701469-02				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.00987**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0413**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/14/97	EPA 6020	0.00100	**0.00202**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-21			P701469-03				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.00255**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.198**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	**0.00116**	"	
Lead	"	"	2/14/97	EPA 6020	0.00100	**0.00153**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-22			P701469-04				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.0896**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.166**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	**0.00204**	"	
Lead	"	"	2/14/97	EPA 6020	0.00100	**0.00742**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	**0.00175**	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

North Creek Analytical, Inc.

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

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-26			P701469-05				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	0.0413	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.0718	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/14/97	EPA 6020	0.00100	ND	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-28			P701469-06				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	ND	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.00667	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/14/97	EPA 6020	0.00100	0.00147	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-31			P701469-07				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	0.00630	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.0192	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-32			P701469-08				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	ND	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.00391	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00337	"	
Lead	"	"	"	EPA 6020	0.00100	0.00166	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-33			P701469-09				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.00497**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0421**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-36			P701469-10				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.00153**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0412**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00236**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00511**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-37			P701469-11				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.0245**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0459**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00182**	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/19/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-D			P701469-12				Water	
Arsenic	0270224	2/11/97	2/12/97	EPA 6020	0.00100	**0.131**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.749**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/24/97	EPA 6020	0.00100	**0.00663**	"	
Lead	"	"	2/12/97	EPA 6020	0.00100	**0.00378**	"	
Selenium	"	"	"	EPA 6020	0.00100	**0.00121**	"	
Silver	"	"	2/24/97	EPA 6020	0.00100	ND	"	
Mercury	0270176	2/10/97	2/10/97	EPA 7470A	0.000400	**0.000660**	"	1

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Joy Chang, Project Manager

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NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Dissolved Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-10			P701469-02				Water	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	**0.00976**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0342**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
MW-32			P701469-08				Water	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	ND	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.00218**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00317**	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000240**	"	
MW-33			P701469-09				Water	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	**0.00292**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0255**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-8			P701469-01				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	**1.11**	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*55.9*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*53.8*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*67.8*	"	
MW-10			P701469-02				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*57.6*	%	

North Creek Analytical, Inc.

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-10 (continued)			P701469-02				Water	
Surrogate: Nitrobenzene-d5	*0270110*	*2/6/97*	*2/11/97*	*35.0-114*		*61.0*	%	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*76.3*	"	
MW-21			P701469-03				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*57.2*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*60.2*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*75.0*	"	
MW-22			P701469-04				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	**0.298**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	**0.456**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-22 (continued)			P701469-04				Water	
Naphthalene	0270110	2/6/97	2/18/97		10.0	**352**	ug/l	
Phenanthrene	"	"	2/11/97		0.100	**0.258**	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*60.6*	%	
Surrogate: Nitrobenzene-d5	"	"	*2/14/97*	*35.0-114*		*79.2*	"	
Surrogate: p-Terphenyl-d14	"	"	*2/11/97*	*33.0-141*		*64.8*	"	
MW-26			P701469-05				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	**1.77**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	**0.175**	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.299**	"	
Fluorene	"	"	"		0.100	**1.68**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	**8.77**	"	
Phenanthrene	"	"	"		0.100	**1.36**	"	
Pyrene	"	"	"		0.100	**0.183**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*64.0*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*66.5*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*72.9*	"	
MW-28			P701469-06				Water	2
Acenaphthene	0270110	2/6/97	2/18/97		0.200	**0.756**	ug/l	
Acenaphthylene	"	"	"		0.200	ND	"	
Anthracene	"	"	"		0.200	**0.502**	"	
Benzo (a) anthracene	"	"	"		0.200	**0.220**	"	
Benzo (a) pyrene	"	"	"		0.200	ND	"	
Benzo (b) fluoranthene	"	"	"		0.200	ND	"	
Benzo (ghi) perylene	"	"	"		0.200	ND	"	
Benzo (k) fluoranthene	"	"	"		0.200	ND	"	
Chrysene	"	"	"		0.200	**0.517**	"	

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

Joy Chang, Project Manager

NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-28 (continued)			P701469-06				Water	2
Dibenzo (a,h) anthracene	0270110	2/6/97	2/18/97		0.400	ND	ug/l	
Fluoranthene	"	"	"		0.200	**0.344**	"	
Fluorene	"	"	"		0.200	**2.10**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.200	ND	"	
Naphthalene	"	"	"		0.400	ND	"	
Phenanthrene	"	"	"		0.200	**1.74**	"	
Pyrene	"	"	"		0.200	**0.850**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*81.4*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*85.2*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*89.4*	"	
MW-31			P701469-07				Water	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	**0.651**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	**1.65**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	2/14/97		0.400	ND	"	1
Phenanthrene	"	"	2/11/97		0.100	**0.356**	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*63.1*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*70.8*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*72.5*	"	
MW-32			P701469-08				Water	
Acenaphthene	0270110	2/6/97	2/14/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-32 (continued)			**P701469-08**				**Water**	
Benzo (b) fluoranthene	0270110	2/6/97	2/14/97		0.100	ND	ug/l	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*45.3*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*44.5*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*72.9*	"	
MW-33			**P701469-09**				**Water**	
Acenaphthene	0270110	2/6/97	2/14/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*54.7*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*55.1*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*72.0*	"	
MW-36			**P701469-10**				**Water**	
Acenaphthene	0270110	2/6/97	2/11/97		0.100	ND	ug/l	

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-36 (continued)			**P701469-10**				**Water**	
Acenaphthylene	0270110	2/6/97	2/11/97		0.100	ND	ug/l	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	**0.105**	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*55.1*	*%*	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*51.7*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*82.2*	"	
MW-37			**P701469-11**				**Water**	
Acenaphthene	0270110	2/6/97	2/18/97		0.200	**0.751**	ug/l	1
Acenaphthylene	"	"	"		0.200	ND	"	1
Anthracene	"	"	2/11/97		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.102**	"	
Fluorene	"	"	2/18/97		0.200	**1.21**	"	1
Indeno (1,2,3-cd) pyrene	"	"	2/11/97		0.100	ND	"	
Naphthalene	"	"	2/18/97		0.500	ND	"	1
Phenanthrene	"	"	2/11/97		0.100	**0.156**	"	
Pyrene	"	"	"		0.100	**0.166**	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/18/97*	*43.0-116*		*54.7*	*%*	
Surrogate: Nitrobenzene-d5	"	"	*2/11/97*	*35.0-114*		*71.2*	"	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-37 (continued)			**P701469-11**				**Water**	
Surrogate: p-Terphenyl-d14	*0270110*	*2/6/97*	*2/11/97*	*33.0-141*		*80.9*	*%*	
MW-D			**P701469-12**				**Water**	
Acenaphthene	0270110	2/6/97	2/14/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*61.4*	*%*	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*58.1*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*81.8*	"	

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270092	**Date Prepared: 2/5/97**					**Extraction Method: EPA 5030**				
Blank	**0270092-BLK1**									
Benzene	2/5/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*44.8*	"	*75.0-120*	*89.6*			
LCS	**0270092-BS2**									
Benzene	2/5/97	20.0		20.3	ug/l	67.0-130	101			
Toluene	"	20.0		20.4	"	75.0-126	102			
Ethylbenzene	"	20.0		20.5	"	76.0-124	103			
Xylenes (total)	"	60.0		62.2	"	75.0-126	104			
Surrogate: 4-BFB	"	*50.0*		*47.2*	"	*75.0-120*	*94.4*			
Matrix Spike	**0270092-MS1**		**P701469-09**							
Benzene	2/5/97	20.0	ND	19.1	ug/l	67.0-130	95.5			
Toluene	"	20.0	ND	18.8	"	75.0-126	**94.0**			
Ethylbenzene	"	20.0	ND	18.8	"	76.0-124	**94.0**			
Xylenes (total)	"	60.0	ND	56.6	"	75.0-126	**94.3**			
Surrogate: 4-BFB	"	*50.0*		*46.6*	"	*75.0-120*	*93.2*			
Matrix Spike Dup	**0270092-MSD1**		**P701469-09**							
Benzene	2/5/97	20.0	ND	18.7	ug/l	67.0-130	**93.5**	13.0	**2.12**	
Toluene	"	20.0	ND	18.7	"	75.0-126	**93.5**	13.0	**0.533**	
Ethylbenzene	"	20.0	ND	18.9	"	76.0-124	**94.5**	15.0	**0.531**	
Xylenes (total)	"	60.0	ND	56.5	"	75.0-126	**94.2**	13.0	**0.106**	
Surrogate: 4-BFB	"	*50.0*		*46.5*	"	*75.0-120*	*93.0*			
Batch: 0270102	**Date Prepared: 2/6/97**					**Extraction Method: EPA 5030**				
Blank	**0270102-BLK1**									
Benzene	2/6/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*58.7*	"	*75.0-120*	*117*			
LCS	**0270102-BS1**									
Benzene	2/6/97	20.0		20.8	ug/l	67.0-130	104			

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

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)	**0270102-BS1**									
Toluene	2/6/97	20.0		20.0	ug/l	75.0-126	100			
Ethylbenzene	"	20.0		20.1	"	76.0-124	101			
Xylenes (total)	"	60.0		60.3	"	75.0-126	100			
Surrogate: 4-BFB	"	*50.0*		*52.9*	"	*75.0-120*	*106*			
Batch: 0270150	**Date Prepared: 2/7/97**					**Extraction Method: EPA 5030**				
Blank	**0270150-BLK1**									
Benzene	2/7/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*46.4*	"	*75.0-120*	*92.8*			
LCS	**0270150-BS2**									
Benzene	2/7/97	20.0		20.3	ug/l	67.0-130	101			
Toluene	"	20.0		20.1	"	75.0-126	101			
Ethylbenzene	"	20.0		20.5	"	76.0-124	103			
Xylenes (total)	"	60.0		61.1	"	75.0-126	102			
Surrogate: 4-BFB	"	*50.0*		*50.8*	"	*75.0-120*	*102*			

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270176	**Date Prepared: 2/10/97**					**Extraction Method: Metals**				
Blank	**0270176-BLK1**									
Mercury	2/10/97			ND	mg/l	0.000200				
LCS	**0270176-BS1**									
Mercury	2/10/97	0.00500		0.00510	mg/l	80.0-120	102			
Duplicate	**0270176-DUP1**		**P701462-13**							
Mercury	2/10/97		ND	ND	mg/l			20.0		
Matrix Spike	**0270176-MS1**		**P701462-13**							
Mercury	2/10/97	0.00500	ND	0.00520	mg/l	75.0-125	104			
Matrix Spike	**0270176-MS2**		**P701469-07**							
Mercury	2/10/97	0.00500	ND	0.00550	mg/l	75.0-125	110			
Batch: 0270224	**Date Prepared: 2/11/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270224-BLK1**									
Arsenic	2/12/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	2/14/97			ND	"	0.00100				
Lead	2/12/97			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	2/19/97			ND	"	0.00100				
LCS	**0270224-BS1**									
Arsenic	2/12/97	0.100		0.0987	mg/l	80.0-120	98.7			
Barium	"	0.100		0.100	"	80.0-120	100			
Cadmium	"	0.100		0.101	"	80.0-120	101			
Chromium	2/14/97	0.100		0.106	"	80.0-120	106			
Lead	2/12/97	0.100		0.102	"	80.0-120	102			
Selenium	"	0.100		0.0979	"	75.0-115	97.9			
Silver	2/19/97	0.0500		0.0551	"	80.0-120	110			
Duplicate	**0270224-DUP1**		**P701469-01**							
Arsenic	2/12/97		0.00152	0.00143	mg/l			20.0	**6.10**	
Barium	"		0.0180	0.0175	"			20.0	**2.82**	
Cadmium	"		ND	ND	"			20.0		

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Duplicate (continued)	**0270224-DUP1**		**P701469-01**							
Chromium	2/14/97		ND	ND	mg/l			20.0		
Lead	2/12/97		0.00171	0.00164	"			20.0	4.18	
Selenium	"		ND	ND	"			20.0		
Silver	2/19/97		ND	ND	"			20.0		
Matrix Spike	**0270224-MS1**		**P701469-01**							
Arsenic	2/12/97	0.100	0.00152	0.0993	mg/l	75.0-125	97.8			
Barium	"	0.100	0.0180	0.117	"	75.0-125	99.0			
Cadmium	"	0.100	ND	0.102	"	75.0-125	102			
Chromium	2/24/97	0.100	ND	0.101	"	75.0-125	101			
Lead	2/12/97	0.100	0.00171	0.100	"	75.0-125	98.3			
Selenium	"	0.100	ND	0.0946	"	75.0-125	94.6			
Silver	2/19/97	0.0500	ND	0.0557	"	75.0-125	111			
Matrix Spike	**0270224-MS2**		**P701469-11**							
Arsenic	2/12/97	0.100	0.0245	0.121	mg/l	75.0-125	96.5			
Barium	"	0.100	0.0459	0.148	"	75.0-125	102			
Cadmium	"	0.100	ND	0.0985	"	75.0-125	98.5			
Chromium	"	0.100	0.00182	0.0988	"	75.0-125	97.0			
Lead	"	0.100	ND	0.101	"	75.0-125	101			
Selenium	"	0.100	ND	0.0935	"	75.0-125	93.5			
Silver	2/24/97	0.0500	ND	0.0482	"	75.0-125	96.4			

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270178	**Date Prepared: 2/10/97**					**Extraction Method: Metals**				
Blank	**0270178-BLK1**									
Mercury	2/10/97			ND	mg/l	0.000200				
LCS	**0270178-BS1**									
Mercury	2/10/97	0.00500		0.00510	mg/l	80.0-120	102			
Duplicate	**0270178-DUP1**		**P701419-01**							
Mercury	2/10/97		0.000230	0.000320	mg/l			20.0	32.7	3
Matrix Spike	**0270178-MS1**		**P701419-01**							
Mercury	2/10/97	0.00500	0.000230	0.00580	mg/l	75.0-125	111			
Batch: 0270298	**Date Prepared: 2/14/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270298-BLK1**									
Arsenic	2/16/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	"			ND	"	0.00100				
Lead	"			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	2/18/97			ND	"	0.00100				
LCS	**0270298-BS1**									
Arsenic	2/16/97	0.100		0.0987	mg/l	80.0-120	98.7			
Barium	"	0.100		0.0895	"	80.0-120	89.5			
Cadmium	"	0.100		0.0948	"	80.0-120	94.8			
Chromium	"	0.100		0.0951	"	80.0-120	95.1			
Lead	"	0.100		0.0896	"	80.0-120	89.6			
Selenium	"	0.100		0.0984	"	75.0-125	98.4			
Silver	2/18/97	0.0500		0.0558	"	80.0-120	112			
Duplicate	**0270298-DUP1**		**P702126-01**							
Arsenic	2/16/97		ND	ND	mg/l			20.0		
Barium	"		0.0210	0.0217	"			20.0	3.28	
Cadmium	"		ND	ND	"			20.0		
Chromium	"		ND	ND	"			20.0		
Lead	"		ND	ND	"			20.0		
Selenium	"		ND	ND	"			20.0		

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Duplicate (continued)	**0270298-DUP1**		**P702126-01**							
Silver	2/18/97		ND	ND	mg/l			20.0		
Matrix Spike	**0270298-MS1**		**P702126-01**							
Arsenic	2/16/97	0.100	ND	0.104	mg/l	75.0-125	**104**			
Barium	"	0.100	0.0210	0.117	"	75.0-125	**96.0**			
Cadmium	"	0.100	ND	0.0975	"	75.0-125	**97.5**			
Chromium	"	0.100	ND	0.104	"	75.0-125	**104**			
Lead	"	0.100	ND	0.0932	"	75.0-125	**93.2**			
Selenium	"	0.100	ND	0.0985	"	75.0-125	**98.5**			
Silver	2/18/97	0.0500	ND	0.0559	"	75.0-125	**112**			
Matrix Spike	**0270298-MS2**		**P702006-01**							
Arsenic	2/16/97	0.100	0.00626	0.106	mg/l	75.0-125	**99.7**			
Barium	"	0.100	0.0455	0.129	"	75.0-125	**83.5**			
Cadmium	"	0.100	ND	0.0895	"	75.0-125	**89.5**			
Chromium	"	0.100	ND	0.0982	"	75.0-125	**98.2**			
Lead	"	0.100	ND	0.0839	"	75.0-125	**83.9**			
Selenium	"	0.100	ND	0.0957	"	75.0-125	**95.7**			
Silver	2/18/97	0.0500	ND	0.0556	"	75.0-125	**111**			

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Polynuclear Aromatic Compounds per EPA 8270M-SIM/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270110	**Date Prepared: 2/6/97**					**Extraction Method: EPA 3510/600 Series**				
Blank	**0270110-BLK1**									
Acenaphthene	2/11/97			ND	ug/l	0.100				
Acenaphthylene	"			ND	"	0.100				
Anthracene	"			ND	"	0.100				
Benzo (a) anthracene	"			ND	"	0.100				
Benzo (a) pyrene	"			ND	"	0.100				
Benzo (b) fluoranthene	"			ND	"	0.100				
Benzo (ghi) perylene	"			ND	"	0.100				
Benzo (k) fluoranthene	"			ND	"	0.100				
Chrysene	"			ND	"	0.100				
Dibenzo (a,h) anthracene	"			ND	"	0.200				
Fluoranthene	"			ND	"	0.100				
Fluorene	"			ND	"	0.100				
Indeno (1,2,3-cd) pyrene	"			ND	"	0.100				
Naphthalene	"			ND	"	0.100				
Phenanthrene	"			ND	"	0.100				
Pyrene	"			ND	"	0.100				
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.45*	"	*43.0-116*	*58.0*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.45*	"	*35.0-114*	*58.0*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*2.13*	"	*33.0-141*	*85.2*			
LCS	**0270110-BS1**									
Acenaphthylene	2/11/97	5.01		3.30	ug/l	50.0-150	65.9			
Benzo (k) fluoranthene	"	5.01		5.12	"	50.0-150	102			
Pyrene	"	5.01		4.50	"	50.0-150	89.8			
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.34*	"	*43.0-116*	*53.6*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.35*	"	*35.0-114*	*54.0*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*1.79*	"	*33.0-141*	*71.6*			
LCS Dup	**0270110-BSD1**									
Acenaphthylene	2/11/97	5.01		4.12	ug/l	50.0-150	82.2	60.0	22.0	
Benzo (k) fluoranthene	"	5.01		5.62	"	50.0-150	112	60.0	9.35	
Pyrene	"	5.01		5.27	"	50.0-150	105	60.0	15.6	
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.56*	"	*43.0-116*	*62.4*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.74*	"	*35.0-114*	*69.6*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*1.99*	"	*33.0-141*	*79.6*			

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	GATX-WILLBRIDGE	Sampled: 1/30/97
7320 S.W. Hunziker, Suite 320	Project Number:	1105-003.2B	Received: 1/31/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 14:40

Notes and Definitions

#	Note
1	The reporting limit for this analyte was raised due to matrix interference.
2	Reporting limits raised due to matrix interference.
3	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
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

11 C

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

CHAIN OF CUSTODY REPORT

Work Order # P701469

REPORT TO: PEG
ATTENTION: Kevin Freeman
ADDRESS: Portland, OR
PHONE: 6396305 FAX:
PROJECT NAME: GATX-Willbridge
PROJECT NUMBER: 1105-003.23
SAMPLED BY: K. Robertson / J. Cleland

INVOICE TO: PEG
ATTENTION: Kevin Freeman
ADDRESS: Portland
P.O. NUMBER: — NCA QUOTE #:

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: [X] Standard | 7 | 5 | 4 | 3 | 2 | 1 | Same Day
Fuels & Hydrocarbon Analyses: [X] Standard | 3-4 | 2 | 1 | Same Day
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: OR — BTEX	Total Recoverable Petroleum Hydrocarbons	PAHs 8270 SIM	Dissolved RCRA Metals	MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
1	MW-8			X	X	X		W	4	
2	MW-10			X	X	X	X		5	
3	MW-21			X	X	X			4	
4	MW-22			X	X	X				
5	MW-26			X	X	X				
6	MW-28			X	X	X				
7	MW-31			X	X	X				
8	MW-32			X	X	X	X		5	
9	MW-33			X	X	X	X		5	
10	MW-36			X	X	X			4	

RELINQUISHED BY: K Robertson DATE: 1/31/97
PRINT NAME: K. Robertson FIRM: PEG TIME: 1115
RECEIVED BY: Larry Spangler DATE: 1-31-97
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1115

RELINQUISHED BY: Larry Spangler DATE: 1-31-97
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1550
RECEIVED BY: Kacin Stanley DATE: 1-31-97
PRINT NAME: Kacin Stanley FIRM: NCA TIME: 1160

ADDITIONAL REMARKS:

PAGE 1 OF 2

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

CHAIN OF CUSTODY REPORT

Work Order # P701469

REPORT TO: PEG
ATTENTION: Kevin Freeman
ADDRESS: Portland, OR
PHONE: 639-6305 FAX:
PROJECT NAME: GATX - Willbridge
PROJECT NUMBER: 1105-003.2B
SAMPLED BY: K. Robertson / J. Cleland

INVOICE TO: PEG
ATTENTION: Kevin Freeman
ADDRESS: Portland
P.O. NUMBER: —
NCA QUOTE #:

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: ~~10~~ Standard | 7 | 5 | 4 | 3 | 2 | 1 | Same Day
Fuels & Hydrocarbon Analyses: ~~5~~ Standard | 3-4 | 2 | 1 | Same Day
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

Analysis Request:

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NCA SAMPLE ID (Laboratory Use Only)	BTEX	Total RCRA Metals	PAHs 8270 SIM	Dissolved RCRA Metals							MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
1.	MW-37			X	X	X								W	4	
2.	MW-D			X	X	X								W	4	
3.																
4.																
5.																
6.																
7.																
8.																
9.																
10.																

RELINQUISHED BY (Signature): K Robertson DATE: 1/31/97
PRINT NAME: K. Robertson FIRM: PEG TIME: 1115

RECEIVED BY (Signature): [signature] DATE: 1-31-97
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1115

RELINQUISHED BY (Signature): [signature] DATE: 1-31-97
PRINT NAME: Larry Spangler FIRM: NCA TIME: 1550

RECEIVED BY (Signature): [signature] DATE: 1-31-97
PRINT NAME: Karin Stanley FIRM: NCA TIME: 1650

ADDITIONAL REMARKS:

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
U-5	P702006-01	Water	1/31/97
B-35	P702006-02	Water	1/31/97
U-3	P702006-03	Water	1/31/97
B-37	P702006-04	Water	1/31/97
B-18	P702006-05	Water	1/31/97
B-36	P702006-06	Water	1/31/97
B-35-D	P702006-07	Water	1/31/97
B-17	P702006-08	Water	1/31/97
U-2	P702006-09	Water	1/31/97

North Creek Analytical, Inc.

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 Chang, Project Manager

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
U-5			**P702006-01**				**Water**	
Benzene	0270233	2/12/97	2/12/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*94.8*	%	
B-35			**P702006-02**				**Water**	
Benzene	0270182	2/10/97	2/10/97		1.00	**3.35**	ug/l	
Toluene	"	"	"		1.00	**3.81**	"	
Ethylbenzene	"	"	"		1.00	ND	"	1
Xylenes (total)	"	"	"		2.00	**2.17**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*85.2*	%	
U-3			**P702006-03**				**Water**	
Benzene	0270129	2/6/97	2/7/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*91.6*	%	
B-37			**P702006-04**				**Water**	
Benzene	0270151	2/7/97	2/7/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*105*	%	
B-18			**P702006-05**				**Water**	
Benzene	0270182	2/10/97	2/10/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*95.0*	%	
B-36			**P702006-06**				**Water**	
Benzene	0270151	2/7/97	2/7/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	

North Creek Analytical, Inc.

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-36 (continued)			P702006-06				Water	
Xylenes (total)	0270151	2/7/97	2/7/97		1.00	ND	ug/l	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*99.6*	%	
B-35-D			P702006-07				Water	
Benzene	0270182	2/10/97	2/10/97		1.00	**3.87**	ug/l	
Toluene	"	"	"		1.00	**4.72**	"	
Ethylbenzene	"	"	"		1.00	ND	"	1
Xylenes (total)	"	"	"		2.00	**2.73**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*97.6*	%	
B-17			P702006-08				Water	
Benzene	0270129	2/6/97	2/7/97		5.00	**280**	ug/l	
Toluene	"	"	"		5.00	**12.1**	"	
Ethylbenzene	"	"	"		5.00	**9.69**	"	
Xylenes (total)	"	"	"		10.0	**10.1**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*89.6*	%	
U-2			P702006-09				Water	
Benzene	0270129	2/6/97	2/7/97		2.50	**8.91**	ug/l	
Toluene	"	"	"		2.50	ND	"	1
Ethylbenzene	"	"	"		2.50	**42.5**	"	
Xylenes (total)	"	"	"		5.00	ND	"	1
Surrogate: 4-BFB	"	"	"	*75.0-120*		*90.2*	%	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
U-5			P702006-01				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.00830**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0498**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00353**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00220**	"	
Selenium	"	"	"	EPA 6020	0.00100	**0.00133**	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000280**	"	
B-35			P702006-02				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0398**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.120**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00781**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.0203**	"	
Selenium	"	"	"	EPA 6020	0.00100	**0.00124**	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	**0.00105**	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
U-3			P702006-03				Water	
Arsenic	0270248	2/12/97	2/20/97	EPA 6020	0.0100	**0.319**	mg/l	1
Barium	"	"	"	EPA 6020	0.0200	**2.27**	"	1
Cadmium	"	"	"	EPA 6020	0.0100	**0.0816**	"	1
Chromium	"	"	2/21/97	EPA 6020	0.0100	**2.41**	"	1
Lead	"	"	"	EPA 6020	0.0500	**6.30**	"	2
Selenium	"	"	2/20/97	EPA 6020	0.0100	ND	"	1
Silver	"	"	2/24/97	EPA 6020	0.0100	ND	"	1
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000300	**0.00420**	"	1
B-37			P702006-04				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0451**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0971**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00763**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00342**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
B-18			P702006-05				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0138**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0732**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00469**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00452**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000250**	"	
B-36			P702006-06				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.00382**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0449**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00644**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00354**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
B-35-D			P702006-07				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0410**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.120**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00565**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.0159**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	
B-17			P702006-08				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0587**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.125**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00862**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.0284**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
U-2			P702006-09				Water	
Arsenic	0270248	2/12/97	2/13/97	EPA 6020	0.00100	**0.0219**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0299**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00103**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00174**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270177	2/10/97	2/10/97	EPA 7470A	0.000200	ND	"	

North Creek Analytical, Inc.

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Dissolved Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
U-5			**P702006-01**				**Water**	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	**0.00626**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0455**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270310	2/17/97	2/17/97	EPA 7470A	0.000200	ND	"	
B-17			**P702006-08**				**Water**	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	**0.0558**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0730**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00191**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270310	2/17/97	2/17/97	EPA 7470A	0.000200	ND	"	
U-2			**P702006-09**				**Water**	
Arsenic	0270298	2/14/97	2/16/97	EPA 6020	0.00100	**0.0207**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0240**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	ND	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270310	2/17/97	2/17/97	EPA 7470A	0.000200	ND	"	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
U-5			**P702006-01**				**Water**	
Acenaphthene	0270131	2/7/97	2/22/97		1.00	**3.12**	ug/l	1
Acenaphthylene	"	"	"		1.00	ND	"	1
Anthracene	"	"	2/21/97		0.100	**1.43**	"	
Benzo (a) anthracene	"	"	"		0.100	**0.122**	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	**0.287**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.543**	"	
Fluorene	"	"	2/22/97		1.00	**7.73**	"	1
Indeno (1,2,3-cd) pyrene	"	"	2/21/97		0.100	ND	"	
Naphthalene	"	"	2/22/97		2.00	ND	"	1
Phenanthrene	"	"	2/21/97		0.100	**8.49**	"	
Pyrene	"	"	"		0.100	**0.672**	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/22/97*	*43.0-116*		*80.5*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*108*	"	
Surrogate: p-Terphenyl-d14	"	"	*2/21/97*	*33.0-141*		*67.8*	"	
B-35			**P702006-02**				**Water**	
Acenaphthene	0270131	2/7/97	2/22/97		2.50	**13.6**	ug/l	1
Acenaphthylene	"	"	"		2.50	ND	"	1
Anthracene	"	"	"		2.50	**9.47**	"	1
Benzo (a) anthracene	"	"	"		2.50	**4.38**	"	1
Benzo (a) pyrene	"	"	2/21/97		0.100	**0.978**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**1.47**	"	
Benzo (ghi) perylene	"	"	"		0.100	**0.106**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**1.17**	"	
Chrysene	"	"	2/22/97		2.50	**4.27**	"	1
Dibenzo (a,h) anthracene	"	"	2/21/97		0.200	ND	"	
Fluoranthene	"	"	2/22/97		2.50	**27.4**	"	1
Fluorene	"	"	"		2.50	**42.7**	"	1
Indeno (1,2,3-cd) pyrene	"	"	2/21/97		0.100	**0.144**	"	
Naphthalene	"	"	2/22/97		5.00	ND	"	1
Phenanthrene	"	"	"		2.50	**77.3**	"	1
Pyrene	"	"	"		2.50	**12.8**	"	1
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*80.5*	%	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-35 (continued)			**P702006-02**				**Water**	
Surrogate: Nitrobenzene-d5	*0270131*	*2/7/97*	*2/22/97*	*35.0-114*		*165*	*%*	*3*
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*103*	"	
U-3			**P702006-03**				**Water**	
Acenaphthene	0270131	2/7/97	2/22/97		0.100	**0.220**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	**0.155**	"	
Benzo (a) anthracene	"	"	"		0.100	**0.942**	"	
Benzo (a) pyrene	"	"	"		0.100	**1.24**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**1.41**	"	
Benzo (ghi) perylene	"	"	"		0.100	**1.21**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**1.23**	"	
Chrysene	"	"	"		0.100	**1.20**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	**0.415**	"	
Fluoranthene	"	"	"		0.100	**1.84**	"	
Fluorene	"	"	"		0.100	**0.263**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	**1.10**	"	
Naphthalene	"	"	"		0.200	ND	"	1
Phenanthrene	"	"	"		0.100	**0.881**	"	
Pyrene	"	"	"		0.100	**0.923**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*51.3*	*%*	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*64.0*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*53.0*	"	
B-37			**P702006-04**				**Water**	
Acenaphthene	0270131	2/7/97	2/21/97		0.100	**0.206**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	**0.105**	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-37 (continued)			P702006-04				Water	
Naphthalene	0270131	2/7/97	2/21/97		0.100	ND	ug/l	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*67.8*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*89.4*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*73.7*	"	
B-18			P702006-05				Water	
Acenaphthene	0270131	2/7/97	2/21/97		0.100	**0.559**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	**0.290**	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.189**	"	
Fluorene	"	"	"		0.100	**1.36**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.400	ND	"	I
Phenanthrene	"	"	"		0.100	**1.86**	"	
Pyrene	"	"	"		0.100	**0.215**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*66.5*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*94.9*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*75.4*	"	
B-36			P702006-06				Water	
Acenaphthene	0270131	2/7/97	2/21/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-36 (continued)			P702006-06				Water	
Dibenzo (a,h) anthracene	0270131	2/7/97	2/21/97		0.200	ND	ug/l	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	**0.221**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	**0.108**	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*78.4*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*92.8*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*78.8*	"	
B-35-D			P702006-07				Water	
Acenaphthene	0270131	2/7/97	2/22/97		5.00	**19.1**	ug/l	1
Acenaphthylene	"	"	"		5.00	ND	"	1
Anthracene	"	"	"		5.00	**14.4**	"	1
Benzo (a) anthracene	"	"	2/21/97		0.100	**5.94**	"	
Benzo (a) pyrene	"	"	"		0.100	**1.63**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**2.68**	"	
Benzo (ghi) perylene	"	"	"		0.100	**0.183**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**2.22**	"	
Chrysene	"	"	"		0.100	**5.60**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	2/22/97		5.00	**41.7**	"	1
Fluorene	"	"	"		5.00	**56.6**	"	1
Indeno (1,2,3-cd) pyrene	"	"	2/21/97		0.100	**0.237**	"	
Naphthalene	"	"	2/22/97		10.0	ND	"	1
Phenanthrene	"	"	"		5.00	**110**	"	1
Pyrene	"	"	"		5.00	**16.9**	"	1
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*NR*	%	*4*
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*NR*	"	*4*
Surrogate: p-Terphenyl-d14	"	"	*2/21/97*	*33.0-141*		*70.3*	"	
B-17			P702006-08				Water	
Acenaphthene	0270131	2/7/97	2/22/97		2.50	**10.8**	ug/l	1
Acenaphthylene	"	"	"		2.50	ND	"	1
Anthracene	"	"	"		2.50	**4.46**	"	1
Benzo (a) anthracene	"	"	"		2.50	ND	"	1
Benzo (a) pyrene	"	"	2/21/97		0.100	**0.140**	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-17 (continued)			P702006-08				Water	
Benzo (b) fluoranthene	0270131	2/7/97	2/21/97		0.100	**0.142**	ug/l	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	2/22/97		2.50	ND	"	1
Dibenzo (a,h) anthracene	"	"	2/21/97		0.200	ND	"	
Fluoranthene	"	"	2/22/97		2.50	**3.04**	"	1
Fluorene	"	"	"		2.50	**38.0**	"	1
Indeno (1,2,3-cd) pyrene	"	"	2/21/97		0.100	ND	"	
Naphthalene	"	"	2/22/97		10.0	ND	"	1
Phenanthrene	"	"	"		2.50	**66.6**	"	1
Pyrene	"	"	"		2.50	ND	"	1
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*NR*	%	*4*
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*NR*	"	*4*
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*NR*	"	*4*
U-2			P702006-09				Water	
Acenaphthene	0270131	2/7/97	2/21/97		0.100	**0.516**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.278**	"	
Fluorene	"	"	"		0.100	**0.541**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	2/25/97		2.00	**39.8**	"	
Phenanthrene	"	"	2/21/97		0.100	**0.111**	"	
Pyrene	"	"	"		0.100	**0.250**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*71.2*	%	
Surrogate: Nitrobenzene-d5	"	"	*2/25/97*	*35.0-114*		*104*	"	
Surrogate: p-Terphenyl-d14	"	"	*2/21/97*	*33.0-141*		*84.3*	"	

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270129	**Date Prepared: 2/6/97**				**Extraction Method: EPA 5030**					
Blank	**0270129-BLK1**									
Benzene	2/6/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*46.2*	"	*75.0-120*	*92.4*			
LCS	**0270129-BS1**									
Benzene	2/6/97	20.0		19.4	ug/l	67.0-130	97.0			
Toluene	"	20.0		19.2	"	75.0-126	96.0			
Ethylbenzene	"	20.0		19.4	"	76.0-124	97.0			
Xylenes (total)	"	60.0		58.3	"	75.0-126	97.2			
Surrogate: 4-BFB	"	*50.0*		*50.8*	"	*75.0-120*	*102*			
Matrix Spike	**0270129-MS1**		**P702075-01**							
Benzene	2/6/97	20.0	ND	20.3	ug/l	67.0-130	101			
Toluene	"	20.0	ND	20.1	"	75.0-126	101			
Ethylbenzene	"	20.0	ND	20.2	"	76.0-124	101			
Xylenes (total)	"	60.0	ND	60.4	"	75.0-126	101			
Surrogate: 4-BFB	"	*50.0*		*49.7*	"	*75.0-120*	*99.4*			
Matrix Spike Dup	**0270129-MSD1**		**P702075-01**							
Benzene	2/6/97	20.0	ND	19.1	ug/l	67.0-130	95.5	13.0	5.60	
Toluene	"	20.0	ND	19.1	"	75.0-126	95.5	13.0	5.60	
Ethylbenzene	"	20.0	ND	19.2	"	76.0-124	96.0	15.0	5.08	
Xylenes (total)	"	60.0	ND	57.8	"	75.0-126	96.3	13.0	4.76	
Surrogate: 4-BFB	*2/7/97*	*50.0*		*47.5*	"	*75.0-120*	*95.0*			
Batch: 0270151	**Date Prepared: 2/7/97**				**Extraction Method: EPA 5030**					
Blank	**0270151-BLK1**									
Benzene	2/7/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*53.8*	"	*75.0-120*	*108*			
LCS	**0270151-BS2**									
Benzene	2/7/97	20.0		22.0	ug/l	67.0-130	110			

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)	**0270151-BS2**									
Toluene	2/7/97	20.0		21.4	ug/l	75.0-126	107			
Ethylbenzene	"	20.0		21.4	"	76.0-124	107			
Xylenes (total)	"	60.0		64.2	"	75.0-126	107			
Surrogate: 4-BFB	"	*50.0*		*54.2*	"	*75.0-120*	*108*			
Batch: 0270182	**Date Prepared: 2/10/97**					**Extraction Method: EPA 5030**				
Blank	**0270182-BLK1**									
Benzene	2/10/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*45.4*	"	*75.0-120*	*90.8*			
LCS	**0270182-BS2**									
Benzene	2/10/97	20.0		19.1	ug/l	67.0-130	95.5			
Toluene	"	20.0		18.7	"	75.0-126	93.5			
Ethylbenzene	"	20.0		18.6	"	76.0-124	93.0			
Xylenes (total)	"	60.0		56.2	"	75.0-126	93.7			
Surrogate: 4-BFB	"	*50.0*		*48.7*	"	*75.0-120*	*97.4*			
Batch: 0270233	**Date Prepared: 2/12/97**					**Extraction Method: EPA 5030**				
Blank	**0270233-BLK1**									
Benzene	2/12/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*42.5*	"	*75.0-120*	*85.0*			
LCS	**0270233-BS2**									
Benzene	2/12/97	20.0		19.7	ug/l	67.0-130	98.5			
Toluene	"	20.0		19.4	"	75.0-126	97.0			
Ethylbenzene	"	20.0		18.6	"	76.0-124	93.0			
Xylenes (total)	"	60.0		56.4	"	75.0-126	94.0			
Surrogate: 4-BFB	"	*50.0*		*46.4*	"	*75.0-120*	*92.8*			

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270177	**Date Prepared: 2/10/97**					**Extraction Method: Metals**				
Blank	**0270177-BLK1**									
Mercury	2/10/97			ND	mg/l	0.000200				
LCS	**0270177-BS1**									
Mercury	2/10/97	0.00500		0.00500	mg/l	80.0-120	100			
Duplicate	**0270177-DUP1**		**P702006-01**							
Mercury	2/10/97		0.000280	0.000220	mg/l			20.0	**24.0**	5
Matrix Spike	**0270177-MS1**		**P702006-01**							
Mercury	2/10/97	0.00500	0.000280	0.00550	mg/l	75.0-125	**104**			
Matrix Spike	**0270177-MS2**		**P702006-09**							
Mercury	2/10/97	0.00500	ND	0.00530	mg/l	75.0-125	**106**			
Batch: 0270248	**Date Prepared: 2/12/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270248-BLK1**									
Arsenic	2/13/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	"			ND	"	0.00100				
Lead	"			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	2/18/97			ND	"	0.00100				
LCS	**0270248-BS1**									
Arsenic	2/13/97	0.100		0.0936	mg/l	80.0-120	93.6			
Barium	"	0.100		0.0958	"	80.0-120	95.8			
Cadmium	"	0.100		0.0946	"	80.0-120	94.6			
Chromium	"	0.100		0.0986	"	80.0-120	98.6			
Lead	"	0.100		0.100	"	80.0-120	100			
Selenium	"	0.100		0.0897	"	75.0-115	89.7			
Silver	2/18/97	0.0500		0.0553	"	80.0-120	111			
Duplicate	**0270248-DUP1**		**P702032-02**							
Arsenic	2/13/97		0.00803	0.00804	mg/l			20.0	**0.124**	
Barium	"		0.0941	0.0949	"			20.0	**0.847**	
Cadmium	"		ND	ND	"			20.0		

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Duplicate (continued)	**0270248-DUP1**		**P702032-02**							
Chromium	2/13/97		0.00165	0.00160	mg/l			20.0	3.08	5
Lead	"		ND	ND	"			20.0		
Selenium	"		0.00132	0.00134	"			20.0	1.50	5
Silver	2/18/97		ND	ND	"			20.0		
Matrix Spike	**0270248-MS1**		**P702032-02**							
Arsenic	2/13/97	0.100	0.00803	0.103	mg/l	75.0-125	95.0			
Barium	"	0.100	0.0941	0.191	"	75.0-125	96.9			
Cadmium	"	0.100	ND	0.0889	"	75.0-125	88.9			
Chromium	"	0.100	0.00165	0.109	"	75.0-125	107			
Lead	"	0.100	ND	0.0936	"	75.0-125	93.6			
Selenium	"	0.100	0.00132	0.0875	"	75.0-125	86.2			
Silver	2/18/97	0.0500	ND	0.0540	"	75.0-125	108			
Matrix Spike	**0270248-MS2**		**P702006-06**							
Arsenic	2/13/97	0.100	0.00382	0.100	mg/l	75.0-125	96.2			
Barium	"	0.100	0.0449	0.148	"	75.0-125	103			
Cadmium	"	0.100	ND	0.0958	"	75.0-125	95.8			
Chromium	"	0.100	0.00644	0.113	"	75.0-125	107			
Lead	"	0.100	0.00354	0.103	"	75.0-125	99.5			
Selenium	"	0.100	ND	0.0841	"	75.0-125	84.1			
Silver	"	0.0500	ND	0.0556	"	75.0-125	111			

NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270298	**Date Prepared: 2/14/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270298-BLK1**									
Arsenic	2/16/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	"			ND	"	0.00100				
Lead	"			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	2/18/97			ND	"	0.00100				
LCS	**0270298-BS1**									
Arsenic	2/16/97	0.100		0.0987	mg/l	80.0-120	98.7			
Barium	"	0.100		0.0895	"	80.0-120	89.5			
Cadmium	"	0.100		0.0948	"	80.0-120	94.8			
Chromium	"	0.100		0.0951	"	80.0-120	95.1			
Lead	"	0.100		0.0896	"	80.0-120	89.6			
Selenium	"	0.100		0.0984	"	75.0-125	98.4			
Silver	2/18/97	0.0500		0.0558	"	80.0-120	112			
Duplicate	**0270298-DUP1**		**P702126-01**							
Arsenic	2/16/97		ND	ND	mg/l			20.0		
Barium	"		0.0210	0.0217	"			20.0	3.28	
Cadmium	"		ND	ND	"			20.0		
Chromium	"		ND	ND	"			20.0		
Lead	"		ND	ND	"			20.0		
Selenium	"		ND	ND	"			20.0		
Silver	2/18/97		ND	ND	"			20.0		
Matrix Spike	**0270298-MS1**		**P702126-01**							
Arsenic	2/16/97	0.100	ND	0.104	mg/l	75.0-125	104			
Barium	"	0.100	0.0210	0.117	"	75.0-125	96.0			
Cadmium	"	0.100	ND	0.0975	"	75.0-125	97.5			
Chromium	"	0.100	ND	0.104	"	75.0-125	104			
Lead	"	0.100	ND	0.0932	"	75.0-125	93.2			
Selenium	"	0.100	ND	0.0985	"	75.0-125	98.5			
Silver	2/18/97	0.0500	ND	0.0559	"	75.0-125	112			
Matrix Spike	**0270298-MS2**		**P702006-01**							
Arsenic	2/16/97	0.100	0.00626	0.106	mg/l	75.0-125	99.7			

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Matrix Spike (continued)	**0270298-MS2**		**P702006-01**							
Barium	2/16/97	0.100	0.0455	0.129	mg/l	75.0-125	**83.5**			
Cadmium	"	0.100	ND	0.0895	"	75.0-125	**89.5**			
Chromium	"	0.100	ND	0.0982	"	75.0-125	**98.2**			
Lead	"	0.100	ND	0.0839	"	75.0-125	**83.9**			
Selenium	"	0.100	ND	0.0957	"	75.0-125	**95.7**			
Silver	2/18/97	0.0500	ND	0.0556	"	75.0-125	**111**			
Batch: 0270310	**Date Prepared: 2/17/97**					**Extraction Method: Metals**				
Blank	**0270310-BLK1**									
Mercury	2/17/97			ND	mg/l	**0.000200**				
LCS	**0270310-BS1**									
Mercury	2/17/97	0.00500		0.00500	mg/l	80.0-120	100			
Duplicate	**0270310-DUP1**		**P702006-01**							
Mercury	2/17/97		ND	ND	mg/l			20.0		
Matrix Spike	**0270310-MS1**		**P702006-01**							
Mercury	2/17/97	0.00500	ND	0.00490	mg/l	75.0-125	**98.0**			

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Pacific Environmental Group - OR	Project:	UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number:	1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/28/97 16:45

Polynuclear Aromatic Compounds per EPA 8270M-SIM/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270131	**Date Prepared: 2/7/97**					**Extraction Method: EPA 3510/600 Series**				
Blank	**0270131-BLK1**									
Acenaphthene	2/21/97			ND	ug/l	0.100				
Acenaphthylene	"			ND	"	0.100				
Anthracene	"			ND	"	0.100				
Benzo (a) anthracene	"			ND	"	0.100				
Benzo (a) pyrene	"			ND	"	0.100				
Benzo (b) fluoranthene	"			ND	"	0.100				
Benzo (ghi) perylene	"			ND	"	0.100				
Benzo (k) fluoranthene	"			ND	"	0.100				
Chrysene	"			ND	"	0.100				
Dibenzo (a,h) anthracene	"			ND	"	0.200				
Fluoranthene	"			ND	"	0.100				
Fluorene	"			ND	"	0.100				
Indeno (1,2,3-cd) pyrene	"			ND	"	0.100				
Naphthalene	"			ND	"	0.100				
Phenanthrene	"			ND	"	0.100				
Pyrene	"			ND	"	0.100				
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.57*	"	*43.0-116*	*62.8*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.79*	"	*35.0-114*	*71.6*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*2.21*	"	*33.0-141*	*88.4*			
LCS	**0270131-BS1**									
Acenaphthylene	2/21/97	5.01		4.36	ug/l	50.0-150	87.0			
Benzo (k) fluoranthene	"	5.01		5.86	"	50.0-150	117			
Pyrene	"	5.01		4.74	"	50.0-150	94.6			
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.78*	"	*43.0-116*	*71.2*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*2.23*	"	*35.0-114*	*89.2*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*2.19*	"	*33.0-141*	*87.6*			
LCS Dup	**0270131-BSD1**									
Acenaphthylene	2/21/97	5.01		4.09	ug/l	50.0-150	81.6	60.0	6.41	
Benzo (k) fluoranthene	"	5.01		6.06	"	50.0-150	121	60.0	3.36	
Pyrene	"	5.01		4.41	"	50.0-150	88.0	60.0	7.23	
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.67*	"	*43.0-116*	*66.8*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*2.07*	"	*35.0-114*	*82.8*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*2.00*	"	*33.0-141*	*80.0*			

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Pacific Environmental Group - OR	Project: UNOCAL #0608, Portland, OR	Sampled: 1/31/97
7320 S.W. Hunziker, Suite 320	Project Number: 1110-001-2B	Received: 2/3/97
Portland, OR 97223	Project Manager: Kevin Freeman	Reported: 2/28/97 16:45

Notes and Definitions

#	Note
1	The reporting limit for this analyte was raised due to matrix interference.
2	The reporting limit for this analyte was raised due to the high analyte concentration present in the sample.
3	Surrogate recovery is outside control limits due to matrix interference.
4	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
5	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
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

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UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 0608
Site Address: Portland Term, 5528 NW Doane
City, State, ZIP: Portland OR 97210
Site Release Number:
Unocal Manager: Dan Tauzzolino
CERT INFO: (check one) o Evaluation X Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: Pacific Env. Group Project Number: 1110.001-28
Address: 7320 SW Hunziker St. Suite 320
Portland OR 97223
Phone: 639-6305 Fax: 639-7482
Project Manager: Kevin Freeman
Sample Collection by: KMF/JC

Chain of Custody Record #: P702006

Quality Assurance Data Level: [X] A: Standard Summary [B] B: Standard + Chromatograms

Laboratory Turnaround Days: [X] 5 [3] [2] [1]

X Oregon o Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	1/31/96 SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS Semi Vols. (EPA 8270) PAHs	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8) RCRA	NCA SAMPLE NUMBER
1. U-5	1500	W	5			X									X			X	Dissolved/Total Metals
2. B-35	1645	|	4			|									|		|	
3. U-3	1330	|	4			|									|		|	
4. B-37	1445	|				|									|		|	
5. B-18	1415	|				|									|		|	
6. B-36	1545	|				|									|		|	
7. B-35-D	1650	|				|									|		|	
8. B-17	1715	↓	5			↓									↓			↓	Diss/Total Mets
9. U-2	1330	W	5			X									X			X	Dissol./Total Mets
10.																			

	Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	[signature]	PEG	2/3/97 0900	[signature]	NCA	2-3-97 1045
2.	[signature]	NCA	2-3-97 1100	[signature]	NCA	2397 1110
3.						

Page ____ of ____

Rev. 2.2, 11/94

Comments: ~~PAH's~~ PAH's by 8270SIMS

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

Final Report Approval

Were all requested results provided? [yes] [no] Define

Were results within requested turnaround? [yes] [no] "No" on back

Final Approval Signature: _____

Firm: Date:

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
B-7	P701445-01	Water	1/29/97
B-9	P701445-02	Water	1/29/97
B-10	P701445-03	Water	1/29/97
B-11	P701445-04	Water	1/29/97
CR-11	P701445-05	Water	1/29/97
CR-8	P701445-06	Water	1/29/97
B-28	P701445-07	Water	1/29/97
B-14	P701445-08	Water	1/29/97
B-30	P701445-09	Water	1/29/97
B-14-D	P701445-10	Water	1/29/97

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-7			P701445-01				Water	
Benzene	0170574	1/31/97	2/10/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*102*	%	
B-9			P701445-02				Water	
Benzene	0170574	1/31/97	2/10/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB	"	"	*1/31/97*	*75.0-120*		*98.8*	%	
B-10			P701445-03				Water	
Benzene	0270045	2/4/97	2/4/97		1.00	**172**	ug/l	
Toluene	"	"	"		1.00	**6.16**	"	
Ethylbenzene	"	"	"		1.00	**1.27**	"	
Xylenes (total)	"	"	"		2.00	**10.5**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*123*	%	
B-11			P701445-04				Water	
Benzene	0170574	1/31/97	1/31/97		2.50	**243**	ug/l	
Toluene	"	"	"		2.50	ND	"	
Ethylbenzene	"	"	"		2.50	**411**	"	
Xylenes (total)	"	"	"		5.00	**79.0**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*86.2*	%	
CR-11			P701445-05				Water	
Benzene	0170574	1/31/97	1/31/97		1.00	**50.4**	ug/l	
Toluene	"	"	"		1.00	ND	"	
Ethylbenzene	"	"	"		1.00	**13.3**	"	
Xylenes (total)	"	"	"		2.00	**47.9**	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*104*	%	
CR-8			P701445-06				Water	
Benzene	0170574	1/31/97	1/31/97		0.500	ND	ug/l	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	**8.94**	"	

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

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

BTEX per EPA Method 8020A
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
CR-8 (continued)			P701445-06				Water	
Xylenes (total)	0170574	1/31/97	1/31/97		1.00	19.1	ug/l	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*127*	%	*1*
B-28			P701445-07				Water	
Benzene	0270233	2/12/97	2/12/97		1.00	26.4	ug/l	
Toluene	"	"	"		1.00	1.50	"	
Ethylbenzene	"	"	"		1.00	160	"	
Xylenes (total)	"	"	"		2.00	62.5	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*102*	%	
B-14			P701445-08				Water	
Benzene	0270057	2/4/97	2/5/97		12.5	1340	ug/l	
Toluene	"	"	"		12.5	35.5	"	
Ethylbenzene	"	"	"		12.5	498	"	
Xylenes (total)	"	"	"		25.0	94.5	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*81.8*	%	
B-30			P701445-09				Water	
Benzene	0270057	2/4/97	2/5/97		2.50	97.5	ug/l	
Toluene	"	"	"		2.50	12.4	"	
Ethylbenzene	"	"	"		2.50	8.45	"	
Xylenes (total)	"	"	"		5.00	15.4	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*98.4*	%	
B-14-D			P701445-10				Water	
Benzene	0270057	2/4/97	2/5/97		12.5	2180	ug/l	
Toluene	"	"	"		12.5	50.0	"	
Ethylbenzene	"	"	"		12.5	835	"	
Xylenes (total)	"	"	"		25.0	198	"	
Surrogate: 4-BFB	"	"	"	*75.0-120*		*97.0*	%	

North Creek Analytical, Inc.

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
B-7			P701445-01				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	**0.0108**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0631**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	**0.00468**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00307**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/15/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	**0.000200**	"	
B-9			P701445-02				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	**0.0155**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0706**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	**0.00313**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00390**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/15/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	ND	"	
B-10			P701445-03				Water	
Arsenic	0270246	2/11/97	2/15/97	EPA 6020	0.00100	**0.0301**	mg/l	
Barium	"	"	2/12/97	EPA 6020	0.00200	**0.105**	"	
Cadmium	"	"	2/15/97	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00685**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00709**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	**0.000230**	"	
B-11			P701445-04				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	**0.0287**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0838**	"	
Cadmium	"	"	"	EPA 6020	0.00100	**0.00193**	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	**0.00570**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00687**	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	**0.000270**	"	

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

Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
CR-11			P701445-05				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	0.0521	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.189	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	0.00642	"	
Lead	"	"	"	EPA 6020	0.00100	0.00572	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	0.00286	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	0.000540	"	
CR-8			P701445-06				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	0.0226	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.0917	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	0.00664	"	
Lead	"	"	"	EPA 6020	0.00100	0.0115	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	0.00104	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	0.000420	"	
B-28			P701445-07				Water	
Arsenic	0270246	2/11/97	2/12/97	EPA 6020	0.00100	0.00402	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.0888	"	
Cadmium	"	"	"	EPA 6020	0.00100	0.00443	"	
Chromium	"	"	2/15/97	EPA 6020	0.00100	0.00713	"	
Lead	"	"	"	EPA 6020	0.00100	0.0142	"	
Selenium	"	"	2/12/97	EPA 6020	0.00100	0.00132	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270008	2/3/97	2/3/97	EPA 7470A	0.000200	0.000270	"	
B-14			P701445-08				Water	
Arsenic	0270246	2/11/97	2/13/97	EPA 6020	0.00100	0.0374	mg/l	
Barium	"	"	"	EPA 6020	0.00200	0.0987	"	
Cadmium	"	"	"	EPA 6020	0.00100	0.00437	"	
Chromium	"	"	"	EPA 6020	0.00100	0.00362	"	
Lead	"	"	"	EPA 6020	0.00100	0.0161	"	
Selenium	"	"	"	EPA 6020	0.00100	0.00185	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270018	2/3/97	2/3/97	EPA 7470A	0.000200	0.000340	"	

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
B-30			P701445-09				Water	
Arsenic	0270246	2/11/97	2/13/97	EPA 6020	0.00100	**0.0221**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0533**	"	
Cadmium	"	"	"	EPA 6020	0.00100	**0.00506**	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00229**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.00839**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270018	2/3/97	2/3/97	EPA 7470A	0.000200	**0.000200**	"	
B-14-D			P701445-10				Water	
Arsenic	0270246	2/11/97	2/13/97	EPA 6020	0.00100	**0.0374**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0968**	"	
Cadmium	"	"	"	EPA 6020	0.00100	**0.00358**	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00361**	"	
Lead	"	"	"	EPA 6020	0.00100	**0.0146**	"	
Selenium	"	"	"	EPA 6020	0.00100	**0.00145**	"	
Silver	"	"	2/18/97	EPA 6020	0.00100	ND	"	
Mercury	0270018	2/3/97	2/3/97	EPA 7470A	0.000200	**0.000310**	"	

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Dissolved Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
B-7			P701445-01				Water	
Arsenic	0270120	2/6/97	2/7/97	EPA 6020	0.00100	**0.0108**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0411**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/11/97	EPA 6020	0.00100	**0.00106**	"	
Lead	"	"	2/7/97	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000200**	"	
CR-8			P701445-06				Water	
Arsenic	0270120	2/6/97	2/7/97	EPA 6020	0.00100	**0.0136**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0342**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/11/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/7/97	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000210**	"	
B-30			P701445-09				Water	
Arsenic	0270120	2/6/97	2/7/97	EPA 6020	0.00100	**0.0200**	mg/l	
Barium	"	"	"	EPA 6020	0.00200	**0.0457**	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	2/11/97	EPA 6020	0.00100	ND	"	
Lead	"	"	2/7/97	EPA 6020	0.00100	ND	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	"	EPA 6020	0.00100	ND	"	
Mercury	0270178	2/10/97	2/10/97	EPA 7470A	0.000200	**0.000250**	"	

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-7			P701445-01				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	1.80	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	0.364	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	2/13/97		0.500	ND	"	2
Fluorene	"	"	2/11/97		0.100	6.38	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	2/13/97		1.00	ND	"	2
Phenanthrene	"	"	2/11/97		0.100	2.11	"	
Pyrene	"	"	2/13/97		0.500	ND	"	2
Surrogate: 2-Fluorobiphenyl	"	"	*2/11/97*	*43.0-116*		*52.1*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*70.8*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*45.8*	"	
B-9			P701445-02				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	1.38	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	0.325	"	
Benzo (a) anthracene	"	"	"		0.100	0.208	"	
Benzo (a) pyrene	"	"	"		0.100	0.295	"	
Benzo (b) fluoranthene	"	"	"		0.100	0.380	"	
Benzo (ghi) perylene	"	"	"		0.100	0.413	"	
Benzo (k) fluoranthene	"	"	"		0.100	0.364	"	
Chrysene	"	"	"		0.100	0.425	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	0.629	"	
Fluorene	"	"	"		0.100	4.72	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	0.349	"	
Naphthalene	"	"	2/13/97		0.500	ND	"	2
Phenanthrene	"	"	2/11/97		0.100	1.13	"	
Pyrene	"	"	"		0.100	0.587	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/13/97*	*43.0-116*		*48.3*	%	

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-9 (continued)			P701445-02				Water	
Surrogate: Nitrobenzene-d5	*0270058*	*2/5/97*	*2/11/97*	*35.0-114*		*66.5*	%	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*39.7*	"	
B-10			P701445-03				Water	
Acenaphthene	0270058	2/5/97	2/10/97		0.100	1.35	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	0.647	"	
Benzo (a) anthracene	"	"	"		0.100	0.258	"	
Benzo (a) pyrene	"	"	"		0.100	0.334	"	
Benzo (b) fluoranthene	"	"	"		0.100	0.481	"	
Benzo (ghi) perylene	"	"	"		0.100	0.283	"	
Benzo (k) fluoranthene	"	"	"		0.100	0.409	"	
Chrysene	"	"	"		0.100	0.490	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	0.951	"	
Fluorene	"	"	"		0.100	3.71	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	0.275	"	
Naphthalene	"	"	2/13/97		0.500	ND	"	2
Phenanthrene	"	"	2/10/97		0.100	4.45	"	
Pyrene	"	"	"		0.100	0.924	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/13/97*	*43.0-116*		*56.4*	%	
Surrogate: Nitrobenzene-d5	"	"	*2/10/97*	*35.0-114*		*72.0*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*47.9*	"	
B-11			P701445-04				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	0.758	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	0.175	"	
Benzo (a) anthracene	"	"	"		0.100	0.161	"	
Benzo (a) pyrene	"	"	"		0.100	0.240	"	
Benzo (b) fluoranthene	"	"	"		0.100	0.321	"	
Benzo (ghi) perylene	"	"	"		0.100	0.317	"	
Benzo (k) fluoranthene	"	"	"		0.100	0.267	"	
Chrysene	"	"	"		0.100	0.297	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	0.398	"	
Fluorene	"	"	"		0.100	1.24	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	0.245	"	

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-11 (continued)			P701445-04				Water	
Naphthalene	0270058	2/5/97	2/13/97		1.00	**29.1**	ug/l	
Phenanthrene	"	"	2/11/97		0.100	**1.26**	"	
Pyrene	"	"	"		0.100	**0.457**	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/13/97*	*43.0-116*		*48.7*	%	
Surrogate: Nitrobenzene-d5	"	"	*2/11/97*	*35.0-114*		*77.5*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*43.6*	"	
CR-11			P701445-05				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	**0.941**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	**0.185**	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	**2.06**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	2/13/97		2.00	ND	"	2
Phenanthrene	"	"	2/11/97		0.100	**1.37**	"	
Pyrene	"	"	"		0.100	**0.109**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*56.4*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*166*	"	*1*
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*49.2*	"	
CR-8			P701445-06				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	**0.359**	"	
Benzo (a) pyrene	"	"	"		0.100	**0.791**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**0.602**	"	
Benzo (ghi) perylene	"	"	"		0.100	**1.24**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**0.545**	"	
Chrysene	"	"	"		0.100	**0.514**	"	

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Joy Chang, Project Manager

NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
CR-8 (continued)			**P701445-06**				**Water**	
Dibenzo (a,h) anthracene	0270058	2/5/97	2/11/97		0.200	ND	ug/l	
Fluoranthene	"	"	"		0.100	**0.526**	"	
Fluorene	"	"	"		0.100	ND	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	**0.760**	"	
Naphthalene	"	"	"		0.100	ND	"	
Phenanthrene	"	"	"		0.100	ND	"	
Pyrene	"	"	"		0.100	**0.950**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*50.4*	%	
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*61.0*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*58.1*	"	
B-28			**P701445-07**				**Water**	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	ND	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	**0.104**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**0.110**	"	
Benzo (ghi) perylene	"	"	"		0.100	**0.107**	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	**0.109**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.127**	"	
Fluorene	"	"	"		0.100	**0.166**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	2/13/97		2.00	**30.4**	"	
Phenanthrene	"	"	2/11/97		0.100	**0.281**	"	
Pyrene	"	"	"		0.100	**0.163**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*45.3*	%	
Surrogate: Nitrobenzene-d5	"	"	*2/13/97*	*35.0-114*		*NR*	"	*3*
Surrogate: p-Terphenyl-d14	"	"	*2/11/97*	*33.0-141*		*54.7*	"	
B-14			**P701445-08**				**Water**	
Acenaphthene	0270058	2/5/97	2/13/97		1.00	**1.19**	ug/l	
Acenaphthylene	"	"	"		1.00	ND	"	4
Anthracene	"	"	2/11/97		0.100	**0.254**	"	
Benzo (a) anthracene	"	"	"		0.100	**0.225**	"	
Benzo (a) pyrene	"	"	"		0.100	**0.229**	"	

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Joy Chang, Project Manager

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NORTH CREEK ANALYTICAL
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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-14 (continued)			P701445-08				Water	
Benzo (b) fluoranthene	0270058	2/5/97	2/11/97		0.100	**0.272**	ug/l	
Benzo (ghi) perylene	"	"	"		0.100	**0.262**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**0.242**	"	
Chrysene	"	"	"		0.100	**0.314**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.580**	"	
Fluorene	"	"	2/13/97		1.00	**2.54**	"	
Indeno (1,2,3-cd) pyrene	"	"	2/11/97		0.100	**0.198**	"	
Naphthalene	"	"	2/13/97		1.00	**68.7**	"	
Phenanthrene	"	"	2/11/97		0.100	**2.39**	"	
Pyrene	"	"	"		0.100	**0.737**	"	
Surrogate: 2-Fluorobiphenyl	"	"	*2/13/97*	*43.0-116*		*34.5*	%	*1*
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*42.1*	"	
Surrogate: p-Terphenyl-d14	"	"	*2/11/97*	*33.0-141*		*38.8*	"	
B-30			P701445-09				Water	
Acenaphthene	0270058	2/5/97	2/11/97		0.100	**0.172**	ug/l	
Acenaphthylene	"	"	"		0.100	ND	"	
Anthracene	"	"	"		0.100	ND	"	
Benzo (a) anthracene	"	"	"		0.100	ND	"	
Benzo (a) pyrene	"	"	"		0.100	ND	"	
Benzo (b) fluoranthene	"	"	"		0.100	ND	"	
Benzo (ghi) perylene	"	"	"		0.100	ND	"	
Benzo (k) fluoranthene	"	"	"		0.100	ND	"	
Chrysene	"	"	"		0.100	ND	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	ND	"	
Fluorene	"	"	"		0.100	**0.219**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	ND	"	
Naphthalene	"	"	"		0.100	**0.199**	"	
Phenanthrene	"	"	"		0.100	**0.440**	"	
Pyrene	"	"	"		0.100	ND	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*42.8*	%	*1*
Surrogate: Nitrobenzene-d5	"	"	"	*35.0-114*		*49.2*	"	
Surrogate: p-Terphenyl-d14	"	"	"	*33.0-141*		*43.2*	"	
B-14-D			P701445-10				Water	
Acenaphthene	0270058	2/5/97	2/10/97		0.100	**0.788**	ug/l	

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
B-14-D (continued)			**P701445-10**				**Water**	
Acenaphthylene	0270058	2/5/97	2/10/97		0.100	ND	ug/l	
Anthracene	"	"	"		0.100	**0.377**	"	
Benzo (a) anthracene	"	"	"		0.100	**0.238**	"	
Benzo (a) pyrene	"	"	"		0.100	**0.205**	"	
Benzo (b) fluoranthene	"	"	"		0.100	**0.205**	"	
Benzo (ghi) perylene	"	"	"		0.100	**0.128**	"	
Benzo (k) fluoranthene	"	"	"		0.100	**0.187**	"	
Chrysene	"	"	"		0.100	**0.307**	"	
Dibenzo (a,h) anthracene	"	"	"		0.200	ND	"	
Fluoranthene	"	"	"		0.100	**0.868**	"	
Fluorene	"	"	"		0.100	**2.34**	"	
Indeno (1,2,3-cd) pyrene	"	"	"		0.100	**0.121**	"	
Naphthalene	"	"	2/13/97		2.50	**65.8**	"	
Phenanthrene	"	"	2/10/97		0.100	**3.29**	"	
Pyrene	"	"	"		0.100	**0.941**	"	
Surrogate: 2-Fluorobiphenyl	"	"	"	*43.0-116*		*30.6*	%	*1*
Surrogate: Nitrobenzene-d5	"	"	*2/13/97*	*35.0-114*		*NR*	"	*3*
Surrogate: p-Terphenyl-d14	"	"	*2/10/97*	*33.0-141*		*36.1*	"	

North Creek Analytical, Inc.

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NORTH CREEK ANALYTICAL
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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0170574	**Date Prepared: 1/31/97**				**Extraction Method: EPA 5030**					
Blank	**0170574-BLK1**									
Benzene	1/31/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*50.5*	"	*75.0-120*	*101*			
LCS	**0170574-BS1**									
Benzene	1/31/97	20.0		20.8	ug/l	67.0-130	104			
Toluene	"	20.0		20.7	"	75.0-126	104			
Ethylbenzene	"	20.0		20.7	"	76.0-124	104			
Xylenes (total)	"	60.0		62.7	"	75.0-126	105			
Surrogate: 4-BFB	"	*50.0*		*50.5*	"	*75.0-120*	*101*			
Matrix Spike	**0170574-MS1**		**P701445-01**							
Benzene	1/31/97	20.0	ND	21.3	ug/l	67.0-130	106			
Toluene	"	20.0	ND	20.4	"	75.0-126	102			
Ethylbenzene	"	20.0	ND	20.4	"	76.0-124	102			
Xylenes (total)	"	60.0	ND	61.7	"	75.0-126	103			
Surrogate: 4-BFB	"	*50.0*		*60.7*	"	*75.0-120*	*121*			*5*
Matrix Spike Dup	**0170574-MSD1**		**P701445-01**							
Benzene	1/31/97	20.0	ND	20.3	ug/l	67.0-130	101	13.0	4.83	
Toluene	"	20.0	ND	19.6	"	75.0-126	98.0	13.0	4.00	
Ethylbenzene	"	20.0	ND	19.5	"	76.0-124	97.5	15.0	4.51	
Xylenes (total)	"	60.0	ND	59.6	"	75.0-126	99.3	13.0	3.66	
Surrogate: 4-BFB	"	*50.0*		*54.9*	"	*75.0-120*	*110*			
Batch: 0270045	**Date Prepared: 2/4/97**				**Extraction Method: EPA 5030**					
Blank	**0270045-BLK1**									
Benzene	2/4/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*58.7*	"	*75.0-120*	*117*			
LCS	**0270045-BS1**									
Benzene	2/4/97	20.0		22.1	ug/l	67.0-130	111			

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Joy Chang, Project Manager

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

BTEX per EPA Method 8020A/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)	**0270045-BS1**									
Toluene	2/4/97	20.0		21.3	ug/l	75.0-126	106			
Ethylbenzene	"	20.0		21.4	"	76.0-124	107			
Xylenes (total)	"	60.0		64.7	"	75.0-126	108			
Surrogate: 4-BFB	"	*50.0*		*55.9*	"	*75.0-120*	*112*			
Batch: 0270057	**Date Prepared: 2/4/97**					**Extraction Method: EPA 5030**				
Blank	**0270057-BLK1**									
Benzene	2/5/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*44.8*	"	*75.0-120*	*89.6*			
LCS	**0270057-BS1**									
Benzene	2/5/97	20.0		20.3	ug/l	67.0-130	101			
Toluene	"	20.0		20.4	"	75.0-126	102			
Ethylbenzene	"	20.0		20.5	"	76.0-124	103			
Xylenes (total)	"	60.0		62.2	"	75.0-126	104			
Surrogate: 4-BFB	"	*50.0*		*47.2*	"	*75.0-120*	*94.4*			
Batch: 0270233	**Date Prepared: 2/12/97**					**Extraction Method: EPA 5030**				
Blank	**0270233-BLK1**									
Benzene	2/12/97			ND	ug/l	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB	"	*50.0*		*42.5*	"	*75.0-120*	*85.0*			
LCS	**0270233-BS2**									
Benzene	2/12/97	20.0		19.7	ug/l	67.0-130	98.5			
Toluene	"	20.0		19.4	"	75.0-126	97.0			
Ethylbenzene	"	20.0		18.6	"	76.0-124	93.0			
Xylenes (total)	"	60.0		56.4	"	75.0-126	94.0			
Surrogate: 4-BFB	"	*50.0*		*46.4*	"	*75.0-120*	*92.8*			

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270008	**Date Prepared: 2/3/97**					**Extraction Method: Metals**				
Blank	**0270008-BLK1**									
Mercury	2/3/97			ND	mg/l	0.000200				
LCS	**0270008-BS1**									
Mercury	2/3/97	0.00500		0.00480	mg/l	80.0-120	96.0			
Duplicate	**0270008-DUP1**		**P701348-01**							
Mercury	2/3/97		0.000680	0.000630	mg/l			20.0	7.63	6
Matrix Spike	**0270008-MS1**		**P701348-01**							
Mercury	2/3/97	0.00500	0.000680	0.00550	mg/l	75.0-125	96.4			
Matrix Spike	**0270008-MS2**		**P701419-01**							
Mercury	2/3/97	0.00500	0.000500	0.00550	mg/l	75.0-125	100			
Batch: 0270018	**Date Prepared: 2/3/97**					**Extraction Method: Metals**				
Blank	**0270018-BLK1**									
Mercury	2/3/97			ND	mg/l	0.000200				
LCS	**0270018-BS1**									
Mercury	2/3/97	0.00500		0.00500	mg/l	80.0-120	100			
Duplicate	**0270018-DUP1**		**P701445-08**							
Mercury	2/3/97		0.000340	0.000330	mg/l			20.0	2.99	6
Matrix Spike	**0270018-MS1**		**P701445-08**							
Mercury	2/3/97	0.00500	0.000340	0.00560	mg/l	75.0-125	105			
Matrix Spike	**0270018-MS2**		**P701458-05**							
Mercury	2/3/97	0.00500	ND	0.00520	mg/l	75.0-125	104			
Batch: 0270246	**Date Prepared: 2/11/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270246-BLK1**									
Arsenic	2/12/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	2/15/97			ND	"	0.00100				
Lead	2/12/97			ND	"	0.00100				

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Blank (continued)	**0270246-BLK1**									
Selenium	2/12/97			ND	mg/l	0.00100				
Silver	2/15/97			ND	"	0.00100				
LCS	**0270246-BS1**									
Arsenic	2/12/97	0.100		0.0961	mg/l	80.0-120	96.1			
Barium	"	0.100		0.100	"	80.0-120	100			
Cadmium	"	0.100		0.103	"	80.0-120	103			
Chromium	2/15/97	0.100		0.103	"	80.0-120	103			
Lead	2/12/97	0.100		0.0954	"	80.0-120	95.4			
Selenium	"	0.100		0.0968	"	75.0-125	96.8			
Silver	2/18/97	0.0500		0.0541	"	80.0-120	108			
Duplicate	**0270246-DUP1**		**P702118-01**							
Arsenic	2/12/97		ND	ND	mg/l			20.0		
Barium	"		ND	ND	"			20.0		
Cadmium	"		ND	ND	"			20.0		
Chromium	2/15/97		0.00952	0.00964	"			20.0	1.25	
Lead	"		0.00194	0.00214	"			20.0	9.80	6
Selenium	2/12/97		ND	ND	"			20.0		
Silver	2/15/97		ND	ND	"			20.0		
Matrix Spike	**0270246-MS1**		**P702118-01**							
Arsenic	2/12/97	0.100	ND	0.0796	mg/l	75.0-125	79.6			
Barium	"	0.100	ND	0.0991	"	75.0-125	99.1			
Cadmium	"	0.100	ND	0.0803	"	75.0-125	80.3			
Chromium	2/15/97	0.100	0.00952	0.0938	"	75.0-125	84.3			
Lead	"	0.100	0.00194	0.0990	"	75.0-125	97.1			
Selenium	2/12/97	0.100	ND	0.0747	"	75.0-125	74.7			7
Silver	2/15/97	0.0500	ND	0.0483	"	75.0-125	96.6			
Matrix Spike	**0270246-MS2**		**P701445-10**							
Arsenic	2/13/97	0.100	0.0374	0.138	mg/l	75.0-125	101			
Barium	"	0.100	0.0968	0.190	"	75.0-125	93.2			
Cadmium	"	0.100	0.00358	0.0986	"	75.0-125	95.0			
Chromium	"	0.100	0.00361	0.110	"	75.0-125	106			
Lead	"	0.100	0.0146	0.105	"	75.0-125	90.4			
Selenium	"	0.100	0.00145	0.0982	"	75.0-125	96.7			
Silver	2/18/97	0.0500	ND	0.0511	"	75.0-125	102			

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

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270120	**Date Prepared: 2/6/97**					**Extraction Method: EPA 200/3005**				
Blank	**0270120-BLK1**									
Arsenic	2/7/97			ND	mg/l	0.00100				
Barium	"			ND	"	0.00200				
Cadmium	"			ND	"	0.00100				
Chromium	2/11/97			ND	"	0.00100				
Lead	2/7/97			ND	"	0.00100				
Selenium	"			ND	"	0.00100				
Silver	"			ND	"	0.00100				
LCS	**0270120-BS1**									
Arsenic	2/7/97	0.100		0.0931	mg/l	80.0-120	93.1			
Barium	"	0.100		0.100	"	80.0-120	100			
Cadmium	"	0.100		0.0971	"	80.0-120	97.1			
Chromium	2/11/97	0.100		0.106	"	80.0-120	106			
Lead	2/7/97	0.100		0.101	"	80.0-120	101			
Selenium	"	0.100		0.0857	"	75.0-125	85.7			
Silver	"	0.0500		0.0528	"	80.0-120	106			
Duplicate	**0270120-DUP1**		**P701419-01**							
Arsenic	2/7/97		0.00100	ND	mg/l			20.0		6
Barium	"		0.0105	0.0105	"			20.0	0	
Cadmium	"		ND	ND	"			20.0		
Chromium	2/11/97		ND	ND	"			20.0		
Lead	2/7/97		ND	ND	"			20.0		
Selenium	"		ND	ND	"			20.0		
Silver	"		ND	ND	"			20.0		
Matrix Spike	**0270120-MS1**		**P701419-01**							
Arsenic	2/7/97	0.100	0.00100	0.0964	mg/l	75.0-125	**95.4**			
Barium	"	0.100	0.0105	0.110	"	75.0-125	**99.5**			
Cadmium	"	0.100	ND	0.0965	"	75.0-125	**96.5**			
Chromium	2/11/97	0.100	ND	0.119	"	75.0-125	**119**			
Lead	2/7/97	0.100	ND	0.0995	"	75.0-125	**99.5**			
Selenium	"	0.100	ND	0.0851	"	75.0-125	**85.1**			
Silver	"	0.0500	ND	0.0519	"	75.0-125	**104**			
Matrix Spike	**0270120-MS2**		**P701371-02**							
Arsenic	2/7/97	0.100	0.00126	0.102	mg/l	75.0-125	**101**			

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Dissolved Metals per EPA 6000/7000 Series Methods/Quality Control: North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Matrix Spike (continued)	**0270120-MS2**		**P701371-02**							
Barium	2/7/97	0.100	0.0290	0.130	mg/l	75.0-125	**101**			
Cadmium	"	0.100	ND	0.101	"	75.0-125	**101**			
Chromium	2/11/97	0.100	0.00130	0.107	"	75.0-125	**106**			
Lead	2/7/97	0.100	ND	0.106	"	75.0-125	**106**			
Selenium	"	0.100	ND	0.0885	"	75.0-125	**88.5**			
Silver	2/11/97	0.0500	ND	0.0627	"	75.0-125	**125**			
Batch: 0270178	**Date Prepared: 2/10/97**					**Extraction Method: Metals**				
Blank	**0270178-BLK1**									
Mercury	2/10/97			**ND**	mg/l	**0.000200**				
LCS	**0270178-BS1**									
Mercury	2/10/97	0.00500		0.00510	mg/l	80.0-120	102			
Duplicate	**0270178-DUP1**		**P701419-01**							
Mercury	2/10/97		0.000230	0.000320	mg/l			20.0	32.7	6
Matrix Spike	**0270178-MS1**		**P701419-01**							
Mercury	2/10/97	0.00500	0.000230	0.00580	mg/l	75.0-125	**111**			

North Creek Analytical, Inc.

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

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Polynuclear Aromatic Compounds per EPA 8270M-SIM/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0270058	**Date Prepared: 2/5/97**					**Extraction Method: EPA 3510/600 Series**				
Blank	**0270058-BLK1**									
Acenaphthene	2/10/97			ND	ug/l	0.100				
Acenaphthylene	"			ND	"	0.100				
Anthracene	"			ND	"	0.100				
Benzo (a) anthracene	"			ND	"	0.100				
Benzo (a) pyrene	"			ND	"	0.100				
Benzo (b) fluoranthene	"			ND	"	0.100				
Benzo (ghi) perylene	"			ND	"	0.100				
Benzo (k) fluoranthene	"			ND	"	0.100				
Chrysene	"			ND	"	0.100				
Dibenzo (a,h) anthracene	"			ND	"	0.200				
Fluoranthene	"			ND	"	0.100				
Fluorene	"			ND	"	0.100				
Indeno (1,2,3-cd) pyrene	"			ND	"	0.100				
Naphthalene	"			ND	"	0.100				
Phenanthrene	"			ND	"	0.100				
Pyrene	"			ND	"	0.100				
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.84*	"	*43.0-116*	*73.6*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.88*	"	*35.0-114*	*75.2*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*1.62*	"	*33.0-141*	*64.8*			
LCS	**0270058-BS1**									
Acenaphthylene	2/10/97	5.01		3.56	ug/l	50.0-150	71.1			
Benzo (k) fluoranthene	"	5.01		4.46	"	50.0-150	89.0			
Pyrene	"	5.01		3.58	"	50.0-150	71.5			
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.52*	"	*43.0-116*	*60.8*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*1.77*	"	*35.0-114*	*70.8*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*1.66*	"	*33.0-141*	*66.4*			
LCS Dup	**0270058-BSD1**									
Acenaphthylene	2/10/97	5.01		4.30	ug/l	50.0-150	85.8	60.0	18.7	
Benzo (k) fluoranthene	"	5.01		4.31	"	50.0-150	86.0	60.0	3.43	
Pyrene	"	5.01		3.61	"	50.0-150	72.1	60.0	0.836	
Surrogate: 2-Fluorobiphenyl	"	*2.50*		*1.87*	"	*43.0-116*	*74.8*			
Surrogate: Nitrobenzene-d5	"	*2.50*		*2.10*	"	*35.0-114*	*84.0*			
Surrogate: p-Terphenyl-d14	"	*2.50*		*1.55*	"	*33.0-141*	*62.0*			

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Pacific Environmental Group - OR	Project:	CHEVRON #61001868, Portland, OR	Sampled: 1/29/97
7320 S.W. Hunziker, Suite 320	Project Number:	1120-111.2B	Received: 1/30/97
Portland, OR 97223	Project Manager:	Kevin Freeman	Reported: 2/21/97 13:33

Notes and Definitions

#	Note
1	Surrogate recovery is outside control limits due to matrix interference.
2	The reporting limit for this analyte was raised due to matrix interference.
3	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.
4	The reporting limit for this analyte was raised due to the high analyte concentration present in the sample.
5	The surrogate recovery for this sample is outside of NCA established control limits.
6	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
7	The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.
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

North Creek Analytical, Inc.

Joy Chang, Project Manager

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CHEVRON U.S.A., Inc. CHAIN OF CUSTODY REPORT

P701445

CHEVRON INFORMATION	CONSULTANT INFORMATION	Turnaround Times
CHEVRON Facility #: 61001868	Name: Pacific Env Grp Consultant Project #: 1120-111-2B	Standard Analyses (DAYS): X
Facility Address: 5531 NW Doane Ave	Address: 7320 SW Hunziker Ste 320 Portland OR 97223	RUSH Analyses (HOURS): 24 48
City, State, ZIP: Portland OR		RUSH Analyses (DAYS): 5
CHEVRON Contact Name: Rene White	Phone: 639-6305 Fax: 639-7482	
CHEVRON Telephone #: 510-842-9581	Project Manager: Kevin Freeman Consultant Project #:	
Laboratory Release #:	Sample Collection by: KMF/SC Airbill #:	

O Oregon O Washington O Alaska O Other - Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O,A)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS Semi Vols. (EPA 8270) PAH	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	Total Metals (8) RCRA	NCA Sample Number	REMARKS
1. B-7	1/29/97 1115	W	5			X									X			2		Total/Dissolved
2. B-9	1200		4			X									X			X		
3. B-10	1230		4			X									X			X		
4. B-11	1300		4			X									X			X		
5. CR-11	1330		4			X									X			X		
6. CR-8	1430		5			X									X			2		Total/Dissolved
7. B-28	1500		4			X									X			X		
8. B-14	1530		4			X									X			X		
9. B-30	1615	X	5			X									X			2		Total/Dissolved
10. B-14-D	1535		4			X									X			X		

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	PEG	1/30/97 0800		N/A	1-30-97 1250
2.	N/A	1-30-97 1725			1-30-97 1900
3.					

REPORTS: SAMPLE PRESERVATION (Iced)
Level 1 Yes
Level 2 No
Fax Copy of Lab Report & COC to CHEVRON: Yes No

Page ____ of ____
Rev. 1.0 3/95

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DEPT OF ENVIRONMENTAL QUALITY
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June 27, 1996

132597.II.01

Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. Fourth Avenue, Suite 400
Portland, OR 97204

Dear Ms. Kiernan:

Subject: **Willbridge RI/FS Interim Action,**
Quarterly Report for March through May 1996

This letter presents the quarterly progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Unocal, and GATX Willbridge facilities in Portland, Oregon. This report presents a summary of the following:

- Actions taken under the Consent Order from March to May 1996.
- Sampling, test results, and other data generated between March and May 1996.
- A description of problems experienced and the manner in which they were resolved or are being addressed.
- Actions scheduled to be taken under the Consent Order from June to August 1996.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

Action Taken from March through May 1996

The following work was performed from March through May 1996:

- Performed quarterly groundwater sampling, monthly monitoring, and bi-weekly seep and sheen observations at the Chevron, GATX, and Unocal facilities.
- Continued to operate the Holbrook Slough cutoff trench at the Old Doane Avenue storm water outfall for groundwater and free product recovery when river stage levels allow operation of the system.

Serving Oregon and Southwest Washington from two locations:

Portland Office	825 N.E. Multnomah, Suite 1300, Portland, OR 97232-2146	503.235.5000	503.235.2445 FAX
Corvallis Office	2300 NW Walnut Blvd., Corvallis, OR 97330-3538	503.752.4271	503.752.0276 FAX

- Recovered approximately 9 gallons of product from monitoring wells at the Unocal, Chevron, and GATX facilities from March through May 1996.
- Submitted the *Willbridge Facilities Riverfront Interim Action* - Doane Avenue Storm Sewer Investigation Work Plan to DEQ.
- Prepared technical memorandums regarding BTEX concentrations in the Riverfront area and a summary of monitoring during the February 1996 flood.

Sampling, Test Results, and Data Generated from March through May 1996

Interim action monitoring activities performed this quarter included water level and product thickness measurements and groundwater sampling from selected wells, as described in the Field Coordination Plan (FCP) dated April 1995. Groundwater samples were not obtained from wells with free product. Water level measurements were not collected at the Unocal site during March 1996.

Groundwater Levels and Flow

Water level measurements performed in March, April, and May 1996 are presented in Tables 1b to 1c, Tables 2a to 2c, and Tables 3a to 3c, respectively. Measurements were corrected for free product where present. A groundwater contour map using the April 1996 data is presented in Figures 1 and 1a.

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the river front. The groundwater elevations beneath the site during early winter (last quarter) were relatively high as a result of the increased precipitation and infiltration during the winter months. During this quarter (March to May) the water table elevation beneath the site dropped approximately 0.5 feet.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX south tank farm, and apparent elongated groundwater depressions (troughs) beneath N.W. Doane Avenue, and the Saltzman Creek flume. These troughs may be caused by groundwater drainage through the backfill associated with these structures.

River Stage Data

The Willamette River stage (measured on the river gauge at the Unocal dock and converted to City of Portland datum) ranged from approximately 9.7 to 15.6 feet during March to May 1996. The river stage was dropping during March and April following the flood (February

1996), but began rising again during May because of the record breaking quantity of rainfall in Portland that month.

During the flooding in February, additional groundwater elevation measurements were obtained from selected wells in the waterfront area. A separate technical memorandum was prepared summarizing these water level measurements and the effects of this type of extraordinary events on the groundwater flow directions beneath the Willbridge site. A copy of this memorandum is presented in Attachment A.

Product Thickness Measurements

Free product thicknesses were measured at selected wells on a monthly and quarterly basis (see Tables 1b to 3c). These data were compiled with apparent free product thickness data for July, October 1995, and January and April 1996 and are shown in Figures 2 and 2a.

The presence of free product appears to be associated with the former and current alignments of the Doane Avenue stormwater outfall and possibly the Holbrook slough. Wells B-1, B-4 and B-35, located in the dock area nearest the Old Doane Avenue storm drain alignment, contained 0.15, 0.07, and 0.06 feet of free product, respectively (April measurement). Wells B-38, B-39, U-5, and RES-New appear to be connected to the New Doane Avenue storm drain backfill material (based on water level measurements) and contained 0.25, 0.08, 0.08, and 0.02 feet of free product, respectively.

The April 1996 product measurements generally show product thicknesses that are similar to last quarters measurements in wells located in the general riverfront area of the site (Table 2a, 2b, and 2c).

Water Quality

Groundwater samples collected from selected locations in the monitoring well network were tested for benzene, toluene, ethylbenzene, and xylene (BTEX) (EPA method SW8020) and polycyclic aromatic hydrocarbons (PAHs) (EPA method SW8310), as described in the FCP. April 1996 BTEX results are presented in Tables 4a to 4c. April 1996 PAHs results are presented in Tables 5a to 5c. Wells which contained free product were not sampled (free product designated by an F in the Tables).

The water quality monitoring results appear to be consistent with past data, with the exception of Well B-36. During the previous quarter (January 1996) Well B-36 showed an unusual detection of BTEX (benzene; 480 µg/L). However, no BTEX compounds were detected in Well B-36 this sampling event, and BTEX had not been detected in Well B-36 prior to January 1996.

Following the identification of increasing BTEX concentrations in three wells in the waterfront area during 1995, additional wells in the vicinity of Front Avenue were tested for BTEX concentrations to evaluate possible sources in January 1996. A technical

memorandum was prepared summarizing the results of the additional sampling . A copy of this memorandum is presented in Attachment B.

Product Recovery

The recovery program began in May 1995. The well locations included in the product recovery program and the corresponding product recovery equipment are described in Chapter 3 of the FCP. Approximately 112 gallons of free product has been recovered by product recovery equipment in monitoring wells since the recovery program began in late May 1995. Product recovery data for each site are presented in Table 6.

Product recovery quantities vary from month to month. The passive PRC product recovery equipment consistently recovers small quantities of product each month while the more aggressive active product recovery equipment recovers larger quantities of product (2 to 20 gallons) on an irregular basis.

Shell/GATX Site

A Petro-belt is operating in Well MW-24 and product recovery canisters (PRCs) are also present in Wells MW-7, MW-6 and MW-28. Measurable thicknesses of product were present in Well MW-6, and MW-7 during this quarter. Approximately 1.1 gallons of product was recovered from the Shell/GATX site this quarter.

Unocal Site

PRCs are present in Wells U-4, B-4, B-27 and B-41. A hand bailing program has been implemented in Wells B-1, B-22, B-35, B-39, U-5, U-5A and RES-Old. A Petro-belt is in Well B-38 and the product skimmer is in RES-New. A total of 1.6 gallons of product was recovered from the Unocal site this quarter.

Chevron Site

PRCs are installed in Wells B-24, CR-6, and CR-7. A Petro-belt is present in Well CR-10. A total of 5.6 gallons of product was recovered from the Chevron site this quarter.

Holbrook Recovery Trench

The river stage controls operation of the Holbrook Slough recovery trench, located along the shoreline near the old Doane Avenue outfall location. The trench is shut off as the river stage rises above approximately 5 to 6 feet (measured on the river gauge staff on the Unocal dock). River stage levels this quarter ranged between 6.6 and 12.5 feet. The trench was not operating this quarter.

Seep and Sheen Monitoring

Weekly to biweekly site visits were performed to document the location and extent of hydrocarbon seeps and sheens at the riverbank. Field observations were recorded on the seep/sheen form. Monitoring indicates that several site conditions, including the river stage and the recovery trench operation (tied to the river stage), affect the presence and magnitude of hydrocarbon seeps and the resulting sheens observed at the river's edge.

Sheens that are observed on the water surface are controlled with containment booms and recoverable product is removed from the water surface in these areas by adsorbent pads. The containment booms currently encompass the shoreline between the Chevron and Unocal docks, and from the south edge of the Unocal dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). In addition, secondary containment booms are located inside of the first boom between the Chevron and Unocal docks and around the new Doane Avenue outfall pipe.

Holbrook Recovery Trench Shoreline. Heavy sheens were consistently observed near the submerged recovery trench during this quarter.

New Doane Avenue Outfall. In general, the presence and magnitude of the sheens observed during March through May 1996 were consistent with the sheens observed during previous quarters in the vicinity of the storm sewer outfall. These sheens are believed to be produced from product exiting the pipe outfall and by product seep discharge from the gravel backfill surrounding the pipe.

North of the Chevron dock light sheens were observed behind the boat house on the April 2 site visit. Slight sheens were also observed north of the Shell/GATX dock also on April 2. The river stage was at the low point for this quarter on the April 2 visit. No sheen were observed north of the of the Chevron or Shell/GATX docks during other site visits when accessible for observation.

Problems Experienced from March through May 1996

The Petro-belt is not operating properly in Well B-38 because of excessive drag on the belt from the crooked well casing. The Petro-belt will be removed from the well and access to the water table through the crooked casing will be evaluated using a small bailer. If access to the water table is possible with a small bailer, the well will be included in the hand-bailing program to continue product recovery from this well.

Actions Scheduled for June through August 1996

The following actions are scheduled for June through August 1996:

- Continue the interim action monitoring program at the Chevron, GATX, and Unocal facilities, as described in the Interim Action Plan, the FCP, and modifications discussed in quarterly reports.
- Continue operation of the Holbrook Slough cutoff trench as an interim action if river levels are below the automatic shut-off level.
- Receive DEQ comments on the Doane Avenue Storm Sewer System Investigation Work Plan.
- Begin the Doane Avenue Storm Sewer System Investigation work.
- Submit to DEQ a Waterfront Subsurface Investigation Work Plan.
- Continue review of existing information and interim action monitoring data.

Please call me at 503/235-5000 if you have any questions.

Sincerely,

CH2M HILL

Ross D. Rieke, P.E.
Project Manager

Enclosures

Tables 1b to 1c, Water Level Monitoring Data: March 1996
Tables 2a to 2c, Water Level Monitoring Data: April 1996
Tables 3a to 3c, Water Level Monitoring Data: May 1996
Tables 4a to 4c, Water Quality Monitoring Results, Aromatic Volatiles, 1996
Tables 5a to 5c, Water Quality Monitoring Results, PAHs, 1996
Table 6, Free Product Recovered
Figure 1, Groundwater Elevation Contour Map
Figure 1a, Groundwater Elevation Contour Map-Dock Area
Figure 2, Apparent Free Product Thickness Measurements
Figure 2a, Apparent Free Product Thickness Measurements-Dock Area

cc: Rene White/Chevron
Andrew Holbrook/GATX
Joe Comstock/UNOCAL
Irv Jenkins/Shell Oil
Terry Fisk/GeoEngineers
Gregory Kupillas/Hart Crowser
Paul Woods/SECOR

Table 1b
Water Level Monitoring Data
Chevron

Date: 03/25/96
Time Begin: 1020 **Time End: 1520**
Field Staff: TDR

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network						
B-7	33.96 b	17.38 M	17.39 M	0.01	17.38	16.58
B-9	33.95 b		15.49 M			18.46
B-19	34.71 b		14.80 M			19.91
B-21	34.79 b		15.08 M			19.71
B-31	33.86 d		16.06 M			17.80
B-32	34.23 a		15.45 M			18.78
River Stage	e		M			
General Groundwater Sampling						
B-7	33.96 b	17.38 M	17.39 M	0.01	17.38	16.58
B-9	33.95 b		15.49 M			18.46
B-10	34.74 b	13.82 M	13.82 M	0.00	13.82	20.92
B-11	34.95 b		Q			
B-14	36.59 b		Q			
B-19	34.71 b		14.80 M			19.91
B-20	33.40 b	15.99 M	15.99 M	0.00	15.99	17.41
B-24	34.70 b	14.62 M	14.62 M	0.00	14.62	20.08
B-26	35.30 b		Q			
B-28	35.25 b		Q			
B-30	35.35 b		Q			
B-32	34.23 a		15.45 M			18.78
CR-3	34.32 a		Q			
CR-4	34.93 a		Q			
CR-6	35.61 a	11.28	11.28 M	0.00	11.28	24.33
CR-7	35.57 a	9.81 M	9.83 M	0.02	9.81	25.76
CR-8	33.14 a		Q			
CR-10	35.57 a	7.62 M	7.62 M	0.00	7.62	27.95
CR-11	34.43 a	1.27 M	1.27 M	0.00	1.27	33.16
River Stage	e		0.00 M			

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20A and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 1c
Water Level Monitoring Data
Shell/GATX

Date: March 25, 1996
Time Begin: 7:50 a.m. **Time End: 9:56 a.m.**
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q	0.00	0.00	
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	3.34	M	3.34	M	0.00	3.34	30.00
MW-7	34.12 c	7.50	M	7.70	M	0.20	7.54	26.58
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	5.50	M	5.50	M	0.00	5.50	30.97
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	2.56	M	2.56	M	0.00	2.56	30.83
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	3.47	M	3.47	M	0.00	3.47	32.18
MW-23	36.06 c	4.24	M	4.24	M			31.82
MW-24	35.15 c		M		M	0.00	0.00	NM-1
MW-27	35.67 c	4.73	M	4.73	M	0.00	4.73	30.94
MW-28	34.39 c	5.10	M	5.10	M	0.00	5.10	29.29
MW-29	35.77 c				Q			
MW-31	37.55 c	6.02	M	6.02	M	0.00	6.02	31.53
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			
MW-39	na c		M		M	0.00	0.00	na
MW-40	na c	12.77	M	12.77	M	0.00	12.77	na

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).
4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38
5 NM-1 = Well not monitored because of product recovery equipment in well.

Table 2a
Water Level Monitoring Data
Unocal

Date: 04/22/96
Time Begin: Time End:
Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network						
B-1	34.79 b	16.20 M	16.35 M	0.15	16.23	18.56
B-2	35.35 b		16.28 M			19.07
B-4	34.79 b	16.35 M	16.42 M	0.07	16.36	18.43
B-17	35.59 b	16.44 M	16.44 M	0.00	16.44	19.15
B-35	33.58 a	17.78 M	17.84 M	0.06	17.79	15.79
B-36	30.97 a		14.10 M			16.87
RES-New Well Network						
B-1	34.79 b	16.20	16.35	0.15	16.23	18.56
B-17	35.59 b	16.44	16.44	0.00	16.44	19.15
B-18	35.79 b		18.50 M			17.29
B-22	34.67 b	16.75 M	16.79 M	0.04	16.76	17.91
B-25	35.83 b		17.75 M			18.08
B-37	35.24 a		18.90 M			16.34
B-40	33.19 a	17.01 M	17.01 M	0.00	17.01	16.18
B-41	34.64 a	12.75 M	12.98 M	0.23	12.80	21.84
U-5	34.20	17.82	17.90 Q	0.08	17.84	16.36
RES - New	38.58	22.14 M	22.16 M	0.02	22.14	16.44
General Groundwater Monitoring						
U-2	35.02 a		15.01 Q			20.01
U-3	35.25 a		15.15 Q			20.10
U-4	34.46 a	11.50 M	11.73 M	0.23	11.55	22.91
U-5A	33.77 a	9.35 M	9.40 M	0.05	9.36	24.41
U-5	34.20 a	17.82	17.90	0.08	17.84	16.36
B-1	34.79 b	16.20	16.35	0.15	16.23	18.56
B-4	34.79 b	16.35	16.42	0.07	16.36	18.43
B-5	34.79 b		0.00			
B-6	35.41 b		16.15			19.26
B-16	35.82 b		16.04 M			19.78
B-17	35.59 b	16.44	16.44	0.00	16.44	19.15
B-18	35.79 b		18.50			17.29
B-22	34.67 b	16.75	16.79	0.04	16.76	17.91
B-27	35.74 c	16.68 M	16.95 M	0.27	16.73	19.01
B-35	33.58 a	17.78	17.84	0.06	17.79	15.79
B-36	30.97 a		14.10			16.87
B-37	35.24 a		18.90			16.34
B-38	34.75 a	18.63 M	18.88 M	0.25	18.68	16.07
B-39	33.92 a	18.65 M	18.73 M	0.08	18.67	15.25
B-40	33.19 a	17.01	17.01	0.00	17.01	16.18
B-41	34.64 a	12.75	12.98	0.23	12.80	21.84
RES - Old	36.03 d	10.95 M	11.05 M	0.10	10.97	25.06

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
0 NM-1 = Well not monitored because product recovery equipment in well.

Table 2b
Water Level Monitoring Data
Chevron

Date: 04/22/96
Time Begin: 858 **Time End: 1540**
Field Staff: TDT/EAA

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network									
B-7	33.96	b	17.07	M	17.08	M	0.01	17.07	16.89
B-9	33.95	b			15.20	M			18.75
B-19	34.71	b			15.39	M			19.32
B-21	34.79	b			15.77	M			19.02
B-31	33.86	d			12.56	M			21.30
B-32	34.23	a			15.75	M			18.48
River Stage		e				M			
General Groundwater Sampling									
B-7	33.96	b	17.07	M	17.08	M	0.01	17.07	16.89
B-9	33.95	b			15.20	M			18.75
B-10	34.74	b	14.66	M	14.66	M	0.00	14.66	20.08
B-11	34.95	b			14.44	Q			20.51
B-14	36.59	b			15.80	Q			20.79
B-19	34.71	b			15.39	M			19.32
B-20	33.40	b	15.88	M	15.88	M	0.00	15.88	17.52
B-24	34.70	b	15.28	M	15.28	M	0.00	15.28	19.42
B-26	35.30	b			14.85	Q			20.45
B-28	35.25	b			14.62	Q			20.63
B-30	35.35	b			14.12	Q			21.23
B-32	34.23	a			15.75	M			18.48
CR-3	34.32	a			12.68	Q			21.64
CR-4	34.93	a				Q			
CR-6	35.61	a				M	0.00	0.00	
CR-7	35.57	a	10.21	M	10.33	M	0.12	10.23	25.34
CR-8	33.14	a			6.47	Q			26.67
CR-10	35.57	a	7.69	M	7.69	M	0.00	7.69	27.88
CR-11	34.43	a	1.40	M	1.40	M	0.00	1.40	33.03
River Stage		e			0.00	M			

Notes:
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3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 *Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60*
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 2c
Water Level Monitoring Data
Shell/GATX

Date: April 22, 1996
Time Begin: 7:45 a.m. **Time End: 2:23 p.m.**
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c			4.01	Q			31.42
MW-3	36.02 c			6.34	Q			29.68
MW-4	36.39 c			5.59	Q			30.80
MW-5	33.52 c			4.73	Q			28.79
MW-6	33.34 c	3.18	M	3.18	M	0.00	3.18	30.16
MW-7	34.12 c	7.84	M	7.95	M	0.11	7.86	26.26
MW-8	33.95 c			6.99	Q			26.96
MW-9	36.53 c			9.47	Q			27.06
MW-10	35.82 c			8.09	Q			27.73
MW-11	36.47 c	5.15	M	5.15	M	0.00	5.15	31.32
MW-12	35.95 c			4.34	Q			31.61
MW-13	37.89 c			4.18	Q			33.71
MW-14	36.28 c			3.25	Q			33.03
MW-16	34.93 c			3.46	Q			31.47
MW-18	33.76 c			0.89	Q			32.87
MW-19	33.39 c	1.77	M	1.77	M	0.00	1.77	31.62
MW-20	34.76 c			9.53	Q			25.23
MW-21	34.33 c			0.78	Q			33.55
MW-22	35.65 c	3.32	M	3.32	M	0.00	3.32	32.33
MW-23	36.06 c	3.23	M	3.23	M			32.83
MW-24	35.15 c		M		M	0.00	0.00	
MW-27	35.67 c	3.71	M	3.71	M	0.00	3.71	31.96
MW-28	34.39 c	4.22	M	4.22	M	0.00	4.22	30.17
MW-29	35.77 c			12.75	Q			23.02
MW-31	37.55 c	5.57	M	5.57	M	0.00	5.57	31.98
MW-32	37.01 c			3.89	Q			33.12
MW-33	39.34 c			19.48	Q			19.86
MW-34	39.67 c			19.43	Q			20.24
MW-36	34.88 c			13.72	Q			21.16
MW-37	34.86 c			14.24	Q			20.62
MW-39	na c		M		M	0.00	0.00	na
MW-40	na c	13.41	M	13.41	M	0.00	13.41	na

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).
4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38

Table 3a
Water Level Monitoring Data
Unocal

Date: 05/28/96
Time Begin: Time End:
Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network								
B-1	34.79 b	16.21	M	16.21	M	0.00	16.21	18.58
B-2	35.35 b			16.14	M			19.21
B-4	34.79 b	16.35	M	16.42	M	0.07	16.36	18.43
B-17	35.59 b	16.40	M	16.40	M	0.00	16.40	19.19
B-35	33.58 a	15.08	M	15.08	M	0.00	15.08	18.50
B-36	30.97 a			13.01	M			17.96
RES-New Well Network								
B-1	34.79 b	16.21		16.21		0.00	16.21	18.58
B-17	35.59 b	16.40		16.40		0.00	16.40	19.19
B-18	35.79 b			17.84	M			17.95
B-22	34.67 b	16.94	M	16.94	M	0.00	16.94	17.73
B-25	35.83 b			17.31	M			18.52
B-37	35.24 a			17.94	M			17.30
B-40	33.19 a	15.78	M	16.07	M	0.29	15.84	17.35
B-41	34.64 a	0.00	M	0.00	M	0.00	0.00	34.64
U-5	34.20	16.52		16.53	Q	0.01	16.52	17.68
RES - New	38.58	21.11	M	21.11	M	0.00	21.11	17.47
General Groundwater Monitoring								
U-2	35.02 a			13.98	Q			21.04
U-3	35.25 a			12.27	Q			22.98
U-4	34.46 a	0.00	M	0.00	M	0.00	0.00	34.46
U-5A	33.77 a		M		M	0.00	0.00	33.77
U-5	34.20 a	16.52		16.53		0.01	16.52	17.68
B-1	34.79 b	16.21		16.21		0.00	16.21	18.58
B-4	34.79 b	16.35		16.42		0.07	16.36	18.43
B-5	34.79 b			15.59				19.20
B-6	35.41 b			16.11				19.30
B-16	35.82 b			16.39	M			19.43
B-17	35.59 b	16.40		16.40		0.00	16.40	19.19
B-18	35.79 b			17.84				17.95
B-22	34.67 b	16.94		16.94		0.00	16.94	17.73
B-27	35.74 c	0.00	M	0.00	M	0.00	0.00	35.74
B-35	33.58 a	15.08		15.08		0.00	15.08	18.50
B-36	30.97 a			13.01				17.96
B-37	35.24 a			17.94				17.30
B-38	34.75 a	0.00	M	0.00	M	0.00	0.00	34.75
B-39	33.92 a	16.64	M	16.76	M	0.12	16.66	17.26
B-40	33.19 a	15.78		16.07		0.29	15.84	17.35
B-41	34.64 a	0.00		0.00		0.00	0.00	34.64
RES - Old	36.03 d	16.82	M	16.82	M	0.00	16.82	19.21

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
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4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
8 NM-1 = Well not monitored because product recovery equipment in well.

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Table 3b
Water Level Monitoring Data
Chevron

Date: 05/28/96
Time Begin: 1115 **Time End: 1445**
Field Staff: EAA

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network						
B-7	33.96 b	16.46 M	16.46 M	0.00	16.46	17.50
B-9	33.95 b		15.47 M			18.48
B-19	34.71 b		15.31 M			19.40
B-21	34.79 b		15.61 M			19.18
B-31	33.86 d		14.61 M			19.25
B-32	34.23 a		15.37 M			18.86
River Stage	e		M			
General Groundwater Sampling						
B-7	33.96 b	16.46 M	16.46 M	0.00	16.46	17.50
B-9	33.95 b		15.47 M			18.48
B-10	34.74 b	14.59 M	14.59 M	0.00	14.59	20.15
B-11	34.95 b		14.46 Q			20.49
B-14	36.59 b		16.82 Q			19.77
B-19	34.71 b		15.31 M			19.40
B-20	33.40 b	15.59 M	15.59 M	0.00	15.59	17.81
B-24	34.70 b	15.25 M	15.25 M	0.00	15.25	19.45
B-26	35.30 b		14.95 Q			20.35
B-28	35.25 b		14.68 Q			20.57
B-30	35.35 b		14.27 Q			21.08
B-32	34.23 a		15.37 M			18.86
CR-3	34.32 a		13.61 Q			20.71
CR-4	34.93 a		4.99 Q			29.94
CR-6	35.61 a	11.49	11.49 M	0.00	11.49	24.12
CR-7	35.57 a	9.82 M	10.13 M	0.31	9.88	25.69
CR-8	33.14 a		6.31 Q			26.83
CR-10	35.57 a	M	M	0.00	0.00	
CR-11	34.43 a	1.45 M	1.45 M	0.00	1.45	32.98
River Stage	e		0.00 M			4.71

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 3c
Water Level Monitoring Data
Shell/GATX

Date: May 28, 1996
Time Begin: 8:09 a.m. **Time End: 9:43 a.m.**
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	3.23	M	3.23	M	0.00	3.23	30.11
MW-7	34.12 c	7.70	M	7.80	M	0.10	7.72	26.40
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	5.29	M	5.29	M	0.00	5.29	31.18
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	2.11	M	2.11	M	0.00	2.11	31.28
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	3.06	M	3.06	M	0.00	3.06	32.59
MW-23	36.06 c	3.97	M	3.97	M	0.00	3.97	32.09
MW-24	35.15 c		M		M	0.00	0.00	
MW-27	35.67 c	4.54	M	4.54	M	0.00	4.54	31.13
MW-28	34.39 c	4.66	M	4.66	M	0.00	4.66	29.73
MW-29	35.77 c				Q			
MW-31	37.55 c	5.73	M	5.73	M	0.00	5.73	31.82
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			
MW-39	na c	12.65	M	12.65	M	0.00	12.65	na
MW-40	na c	13.35	M	13.35	M	0.00	13.35	na

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).
4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38

Table 4a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Holbrook Slough Recovery Trench Well Network									
B-4	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
B-17	Jan-96	550		9.8		11		12	
	Apr-96	580		19		12		32	
	Jul-96								
	Oct-96								
B-35	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
B-36	Jan-96	480		8.9		8.2		9.6	
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96								
	Oct-96								
RES-New Well Network									
B-18	Jan-96	1	U	0.5	U	0.5	U	0.5	U
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96								
	Oct-96								
B-22	Jan-96	15		1.6		2.3		5.3	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
B-37	Jan-96	F		F		F		F	
	Apr-96	31		0.54		0.72		1.3	
	Jul-96								
	Oct-96								
Res-New	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
General Groundwater Monitoring									
U-2	Jan-96	1		0.5	U	2.9		1.2	
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96								
	Oct-96								
U-3	Jan-96	F		F		F		F	
	Apr-96	220		7.9		49		26	
	Jul-96								
	Oct-96								
U-4	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
U-5A	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
U-5	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								
B-27	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 4b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Holbrook Slough Recovery Trench Well Network									
B-7	Jan-96	0.5	U	0.5	U	0.5		1	U
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96								
	Oct-96								
B-9	Jan-96	0.63		0.66		0.5	U	1.8	
	Apr-96	1		1.3		0.5	U	2.7	
	Jul-96								
	Oct-96								
General Groundwater Monitoring									
B-10	Jan-96	8.6		2.1		0.5	U	5.4	
	Apr-96	33		5.6		1.3		15	
	Jul-96								
	Oct-96								
B-11	Jan-96	260		4		140		24	
	Apr-96	340		9.8		38		14	
	Jul-96								
	Oct-96								
B-14	Jan-96	230		9.5		51		27	
	Apr-96	260		14		93		52	
	Jul-96								
	Oct-96								
B-28	Jan-96	4.6		0.5	U	19		6.6	
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96								
	Oct-96								
B-30	Jan-96	50		7.1		2.4		14	
	Apr-96	25		7.4		3.2		15	
	Jul-96								
	Oct-96								
CR-8	Jan-96	1.2		0.5	U	0.59		1.8	
	Apr-96	1.7		0.98		1.1		2.2	
	Jul-96								
	Oct-96								
CR-11	Jan-96	78		2.3		1.9		4.8	
	Apr-96	91		5.2		4		3.8	
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 4c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-96	5.0	U	5.0	U	5.0	U	5.0	U
	Apr-96	NS		NS		NS		NS	
	Jul-96								
	Oct-96								
MW-8	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	970		64		6.3		20	
	Jul-96								
	Oct-96								
MW-10	Jan-96	2.3		0.68		0.50	U	1.1	
	Apr-96	6.5		0.88		0.5	U	0.62	
	Jul-96								
	Oct-96								
MW-11	Jan-96	7,400		4,500		2,100		10,000	
	Apr-96	7,000		3,800		2,500		11,000	
	Jul-96								
	Oct-96								
MW-22	Jan-96	1,800		5,300		4,100		15,000	
	Apr-96	1,800		4,400		3,800		12,000	
	Jul-96								
	Oct-96								
MW-26	Jan-96	1.0	U	4.2		16		20	
	Apr-96	NS		NS		NS		NS	
	Jul-96								
	Oct-96								
MW-23	Jan-96	32		1.0	U	180		156	
	Apr-96	35		16		140		140	
	Jul-96								
	Oct-96								
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	4.2	
	Jul-96								
	Oct-96								
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96	1.0	U	1.0	U	1.0	U	1.0	U
	Jul-96								
	Oct-96								
MW-32	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96								
	Oct-96								
MW-33	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96								
	Oct-96								
MW-36	Jan-96	NS		NS		NS		NS	
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96								
	Oct-96								
MW-37	Jan-96	140		1.0		1.0	U	1.8	
	Apr-96	92		1.0	U	1.0	U	1.0	U
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 5a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																
B-17	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.80	5.0 U	0.50 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
B-35	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																
B-36	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
RES-New Well Network																	
B-18	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
B-22	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
B-37	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
General Groundwater Monitoring																	
U-2	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
U-3	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96																
	Oct-96																
U-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																
U-5A	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																
U-5	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																
B-27	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96																
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - 1 not sampled for PAH analyses due to mis-communication.

COPPOR00006119

Table 5b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-7	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	25 U	25 U	0.5 U	25 U	5 U	2.5 U	25 U	25 U	0.5 U
	Jul-96																
	Oct-96																
B-9	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.28	0.17	0.43	0.18	0.34	0.19	0.33	5 U	5 U	0.64	5 U	5 U	0.58	5 U	5 U	0.38
	Jul-96																
	Oct-96																
General Groundwater Monitoring																	
B-10	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	25 U	25 U	0.5 U	25 U	5 U	2.5 U	25 U	25 U	0.5 U
	Jul-96																
	Oct-96																
B-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	9.2	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	2.4	5 U	5 U	4.1	5 U	5 U	0.1
	Jul-96																
	Oct-96																
B-14	Jan-96	0.1 U	0.11	0.1 U	0.1 U	0.36	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7.6	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.21	0.1 U	0.1 U	0.64	0.1 U	0.1 U	5 U	5 U	2.4	5 U	7.6	3.3	5 U	5 U	0.1 U
	Jul-96																
	Oct-96																
B-28	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7	5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	5 U	5 U	5 U	0.1 U
	Jul-96																
	Oct-96																
B-30	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Jul-96																
	Oct-96																
CR-8	Jan-96	1.9	0.54	1.4	0.56	0.82	0.1 U	2.1	5 U	5 U	1.2	5 U	5 U	1.6	5 U	5 U	2.3
	Apr-96	3	1.1	2.1	1	1.4	2.7	2.9	5 U	5 U	1.7	5 U	5 U	2.5	5 U	5 U	3.8
	Jul-96																
	Oct-96																
CR-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Jul-96																
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

COPPOR0000612O

Table 5c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

Concentration (ug/l)

Sample Location	Sample Date	Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																																	
MW-7	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
	Jul-96																																
	Oct-96																																
MW-11	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	470		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	25	U	5.0	U	0.10	U	5.0	U	540		0.50	U	25	U	5.0	U	0.10	U
	Jul-96																																
	Oct-96																																
MW-22	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	480		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	25	U	5.0	U	0.10	U	5.0	U	370		0.50	U	25	U	5.0	U	0.10	U
	Jul-96																																
	Oct-96																																
MW-23	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	17		0.50	U	5.0	U	5.0	U	0.10	U
	Jul-96																																
	Oct-96																																
MW-26	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	22		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
	Jul-96																																
	Oct-96																																
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	25	U	25	U	0.50	U	25	U	25	U	2.5	U	25	U	25	U	0.50	U
	Jul-96																																
	Oct-96																																
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	25	U	25	U	0.50	U	25	U	25	U	2.5	U	25	U	25	U	0.50	U
	Jul-96																																
	Oct-96																																
MW-36	Jan-96	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	5.0	U	0.50	U	5.0	U	5.0	U	0.10	U
	Jul-96																																
	Oct-96																																
MW-37	Jan-96	2.8		1.2		2.3		1.0		3.6		1.0	U	1.6		50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.3	
	Apr-96	0.91		0.77		0.85		0.44		2.6		0.10	U	0.77		5.0	U	5.0	U	0.10	U	5.0	U	5.0	U	0.50	U	5.0	U	5.0	U	1.0	
	Jul-96																																
	Oct-96																																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

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Table 6
Free Product Recovered
Interim Action Plan
Willbridge Facilities

Week Ending	PRODUCT REMOVED (gallons) Unocal	Chevron	Shell/GATX	Holbrook Recovery Trench	COMMENTS
May 1995	---	---	1.50	off	SHELL/GATX installed Phase I recovery systems MW-6 and MW-24
June 1995	0.50	0.00	1.35	nr	
July 1995	0.55	0.04	0.37	nr	
August 1995	5.21	0.57	0.78	nr	
September 1995	0.00	0.12	26.03	nr	
October 1995	0.00	0.00	3.10	700	Trench recovery quantities totaled in Jan. 1996
November 1995	5.50	0.00	0.03	off	
December 1995	6.31	0.00	0.25	off	
January 1996	5.93	0.16	0.80	off	
February 1996	43.99	0.28	0.00	off	
3/1/96	nc	nc	nc	off	
3/29/96	nc	5.17	0.38	off	B-38: petrobelt not operating properly - excessive drag in the crooked well.
4/5/96	0.32	nc	nc	off	
4/19/96	1.19	nc	nc	off	
4/26/96	0.00	0.07	0.32	off	
5/10/96	0.11	nc	nc	off	
5/31/96	0.00	0.31	0.38	off	
Product Recovered	69.61	6.71	35.29	700	
			Total Recovered	811.6	

Symbols:

--- = no product recovery systems installed.

nc = product recovery systems not checked that week.

nr = system checked, data reported cumulative on the nextreport submitted.

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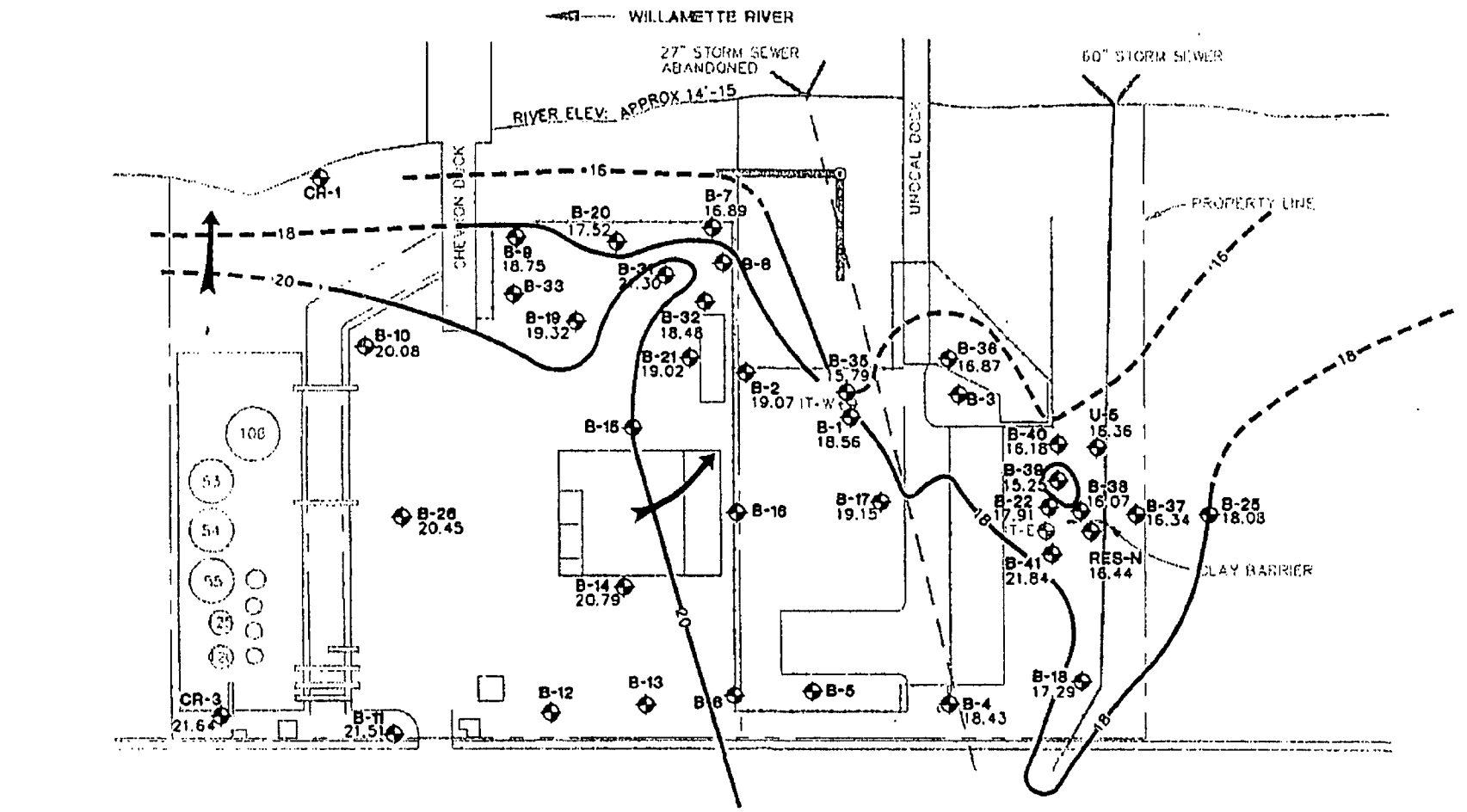

PROJECT NORTH

TRUE NORTH

0 50 100 150 200

SCALE: IN FEET

LEGEND

- B-17 19.15 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION
- —32— GROUNDWATER ELEVATION CONTOUR
- EXTRAPOLATED GW CONTOUR
- GROUNDWATER FLOW DIRECTION

ELEVATION DATUM = CITY OF PORTLAND DATUM

FIGURE 1a
GROUNDWATER ELEVATION CONTOUR MAP, APRIL 1996
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

I:\WILLBRDG\132597\CAD\2597g02.DWG

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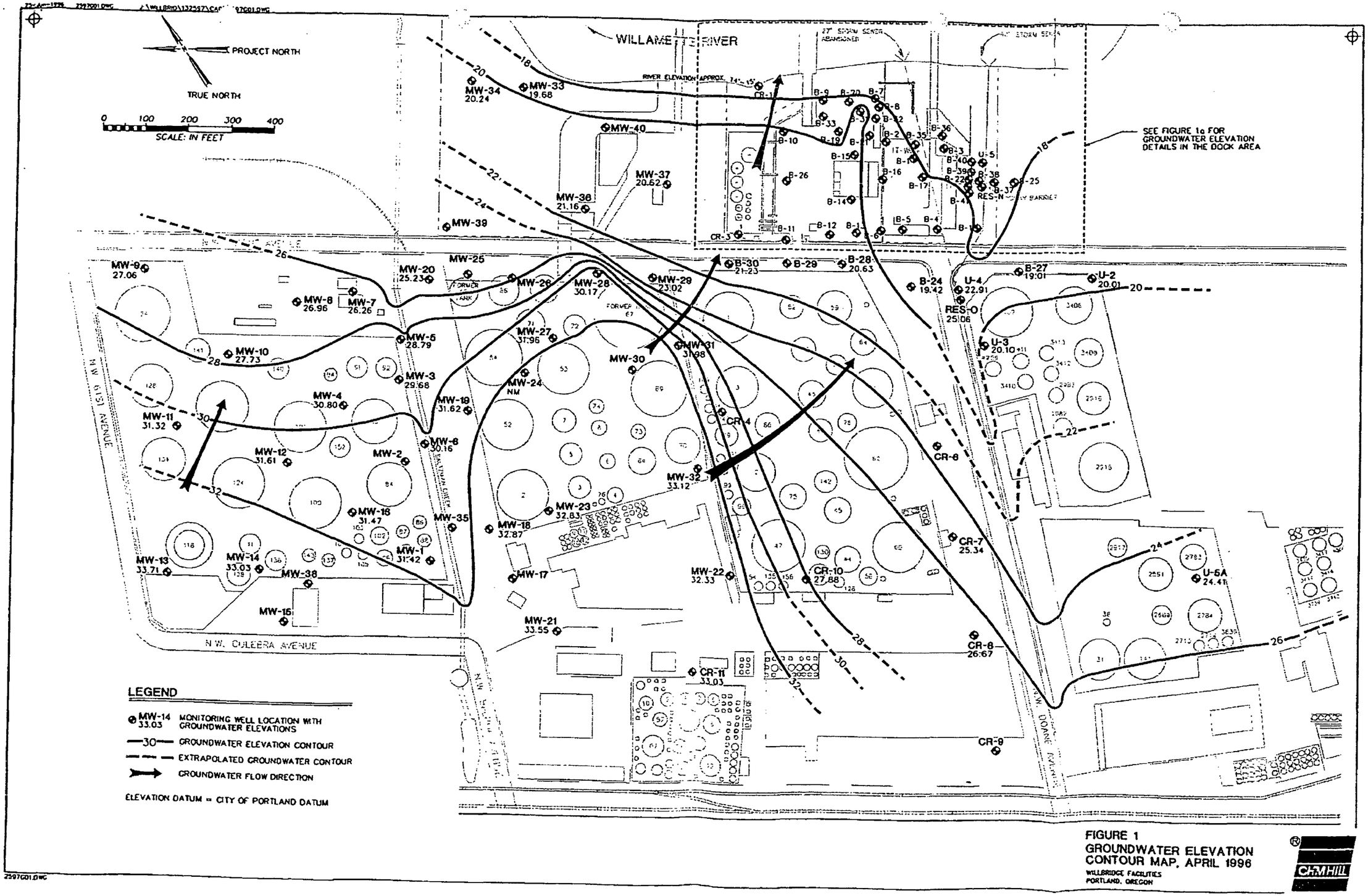

FIGURE 1
GROUNDWATER ELEVATION CONTOUR MAP, APRIL 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR0006124

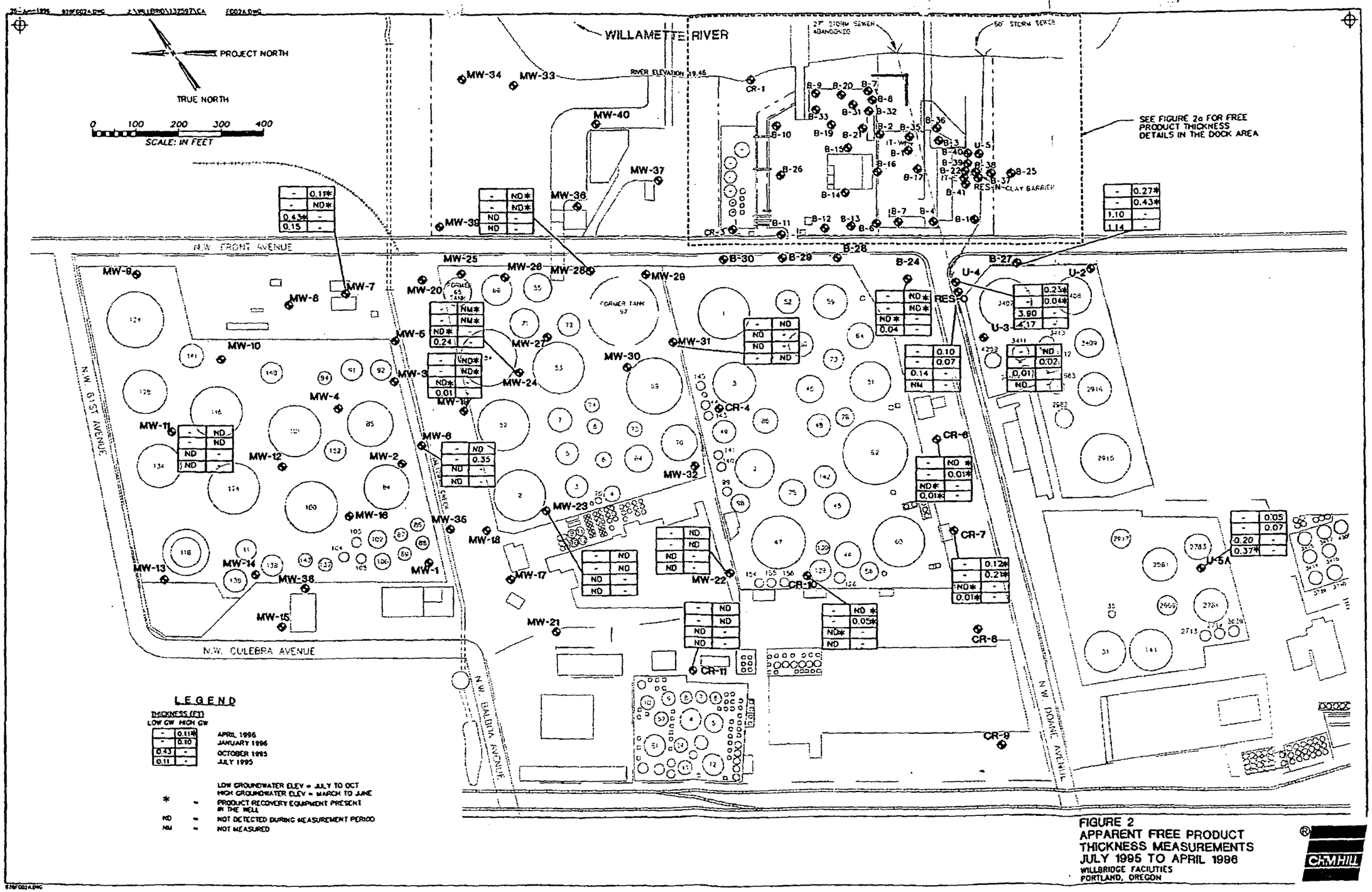

FIGURE 2
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS JULY 1995 TO APRIL 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

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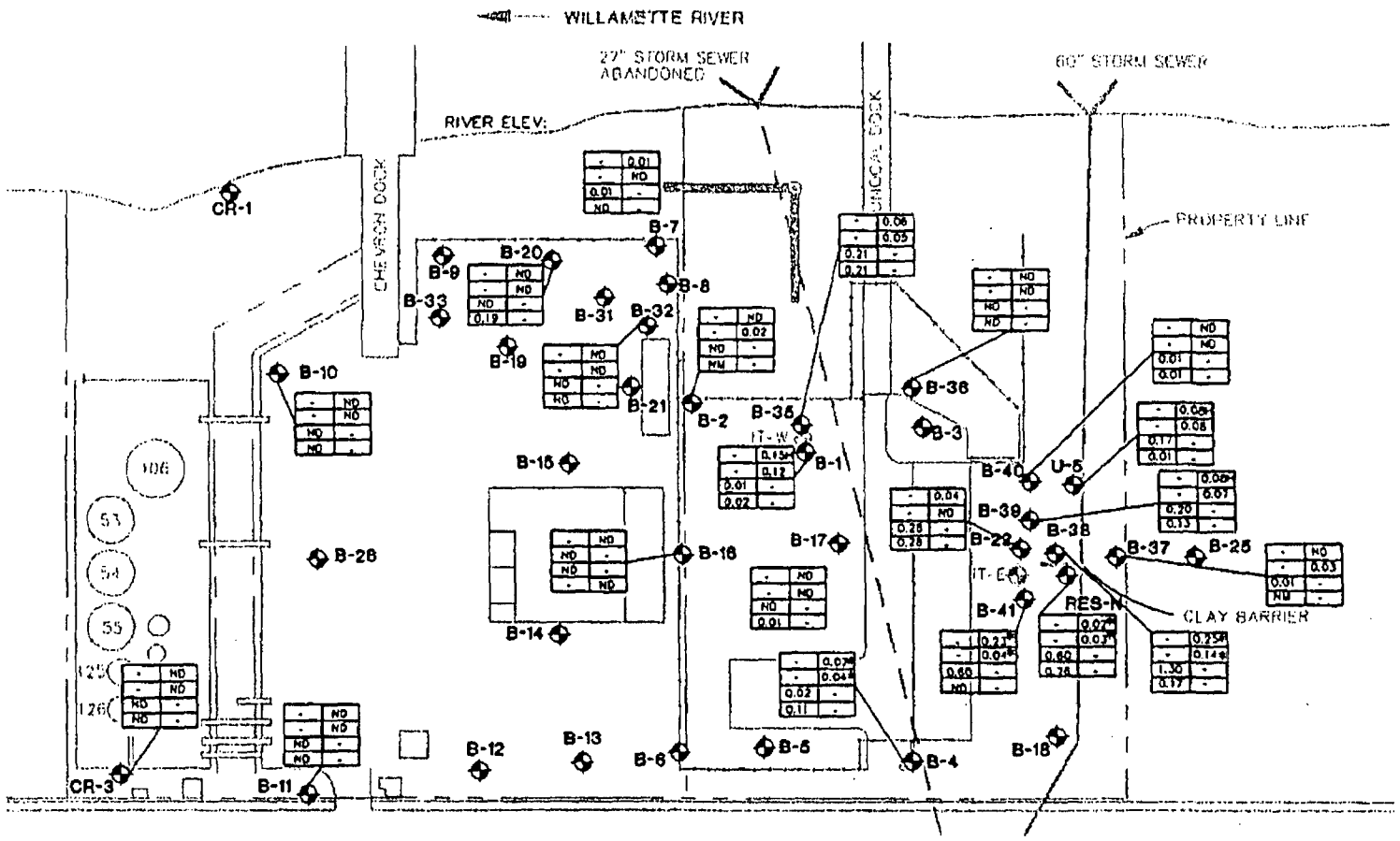

LEGEND

THICKNESS (FT)
LOW GW HIGH GW

APRIL 1996
JANUARY 1996
OCTOBER 1995
JULY 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

ND = NOT DETECTED DURING MEASUREMENT PERIOD
* = PRODUCT RECOVERY EQUIPMENT PRESENT IN THE WELL
H = PRODUCT FROM WELL IS REMOVED BY HAND BAILING
NM = NOT MEASURED

PROJECT NORTH
TRUE NORTH

0 50 100 150 200
SCALE: IN FEET

FIGURE 2a
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS JULY 1995 TO APRIL 1996 SITE PLAN DOCK AREA

WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

DOCKM14B.DWG

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Attachment A

Willbridge Facilities - Portland, Oregon

February 1996 Flood - Water Level Monitoring Results and Conclusions

PREPARED FOR: Rene White/Chevron
Joe Comstock/Unocal
Andrew Holbrook/GATX
Irv Jenkins/Shell

PREPARED BY: Bruce Brody-Heine

COPIES: Ross Rieke/CH2M HILL
Terry Fisk/GeoEngineers
Paul Woods /SECOR
Gregory Kapillas/Hart Crowser

DATE: April 11, 1996

Groundwater levels were measured in selected monitoring wells at the Willbridge Facility riverfront during the extraordinary flood conditions of the Willamette River in February 1996. The supplemental water level data record the response of groundwater at the site to these extreme river conditions and provides insight about groundwater hydraulics beneath this portion of the site. Areas specifically targeted for water level data collection during the flood include wells associated with:

- General riverfront area (B-8, B-10, B-16, B-19, and B-36)
- New Doane Avenue storm sewer (RES-New, U-5, B-37, B-18, and RES-Old)
- Old Doane Avenue storm sewer (B-17 and B-35)
- Holbrook slough area (former channel) (B-7, B-9, B-20, and B-33)

Water levels were measured daily for approximately 10 days during the crest of the flood. Groundwater elevations are presented in Table 1. Hydrographs of the data from the specific areas are presented in Figures 1 through 4.

Water Level Response to the Flood

General Riverfront Area

Figure 1 presents hydrographs for 9 wells closest to the river that represent hydrogeologic conditions in the silty sand fill material at the Willbridge riverfront. Four wells are located at the edge of Chevron's elevated parking area, and are approximately 40 feet from the river's edge. Five additional wells are located on the Unocal property and range from approximately 120 to 210 feet from the rivers edge. The hydrographs indicates that groundwater levels in the wells in Chevron's elevated parking area closely mimic the river

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Table 1
WILLBRIDGE FACILITIES
1996 Flood
Selected Water Level Data

M.P.E.	Willamette River Stage Unocal Staff Gauge		New Storm Sewer Outfall										Old Storm Sewer			
			RES-New 38.58		U-5 34.20		B-37 35.24		B-18 35.79		RES-Old 34.05		B-17 35.59		B-35 33.58	
Date	Staff Gauge	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
7-Feb-96	18.20	21.32	20.19	18.39	16.58	17.62	18.11	17.13	18.13	17.66	16.99	17.06	16.34	19.25	15.12	18.46
8-Feb-96	24.00	27.12	18.99	19.59	15.00	19.20	17.00	18.24	17.54	18.25	16.79	17.26	16.20	19.39	14.40	19.18
9-Feb-96	27.17	30.28	17.23	21.35	11.11	23.09	15.07	20.17	16.32	19.47	16.22	17.83	16.04	19.55	9.07	24.51
10-Feb-96	27.00	30.12	15.37	23.21	8.54	25.66	12.53	22.71	15.75	20.04	16.02	18.03	15.49	20.10	6.97	26.61
11-Feb-96	25.50	28.62	14.64	23.94	8.54	25.66	11.70	23.54	15.28	20.51	15.92	18.13	14.14	21.45	7.11	26.47
12-Feb-96	22.92	26.03	14.80	23.78	9.23	24.97	11.82	23.42	14.87	20.92	15.78	18.27	13.35	22.24	7.87	25.71
13-Feb-96	20.00	23.12	15.42	23.16	10.23	23.97	12.34	22.90	14.70	21.09	15.64	18.41	13.06	22.53	8.79	24.79
15-Feb-96	16.50	19.62	17.02	21.56	12.13	22.07	13.80	21.44	15.04	20.75	15.54	18.51	13.26	22.33	10.31	23.27
16-Feb-96	16.00	19.12	–	–	–	–	–	–	–	–	–	–	–	–	–	–
20-Feb-96	18.42	21.54	–	–	–	–	–	–	–	–	–	–	–	–	–	–

WILLBRIDGE FACILITIES
1996 Flood
Selected Water Level Data

M.P.E.	Willamette River Stage Unocal Staff Gauge		Historic Holbrook Slough Area								General - Wells Near the River									
			B-7 33.96		B-9 33.95		B-20 33.40		B-33 35.10		B-8 34.17		B-10 34.74		B-16 35.82		B-19 34.71		B-36 30.97	
Date	Staff Gauge	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
7-Feb-96	18.20	21.32	12.59	21.37	13.20	20.75	12.98	20.42	14.81	20.29	15.20	18.97	14.29	20.45	16.26	19.56	13.50	21.21	13.69	17.28
8-Feb-96	24.00	27.12	7.03	26.93	7.70	26.25	6.67	26.73	8.30	26.80	7.88	26.29	13.56	21.18	16.12	19.70	13.00	21.71	11.87	19.10
9-Feb-96	27.17	30.28	3.47	30.49	3.70	30.25	2.90	30.50	4.29	30.81	4.07	30.10	10.62	24.12	15.93	19.89	7.07	27.64	4.80	26.17
10-Feb-96	27.00	30.12	3.78	30.18	3.91	30.04	3.20	30.20	4.48	30.62	4.29	29.88	8.31	26.43	15.26	20.56	6.28	28.43	3.00	27.97
11-Feb-96	25.50	28.62	5.10	28.86	5.16	28.79	4.50	28.90	5.74	29.36	5.57	28.60	6.43	28.31	14.06	21.76	7.04	27.67	3.92	27.05
12-Feb-96	22.92	26.03	–	–	–	–	–	–	–	–	–	–	–	–	13.34	22.48	–	–	5.11	25.86
13-Feb-96	20.00	23.12	–	–	–	–	–	–	–	–	–	–	–	–	13.03	22.79	–	–	6.32	24.65
15-Feb-96	16.50	19.62	–	–	–	–	–	–	–	–	–	–	–	–	13.13	22.69	–	–	7.15	23.82
16-Feb-96	16.00	19.12	16.41	17.55	13.90	20.05	14.18	19.22	12.16	22.94	12.81	21.36	11.11	23.63	–	–	11.88	22.83	–	–
20-Feb-96	18.42	21.54	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

DTW = Depth to Water in feet below top of measuring point.
ELEV. = elevation of water table in feet relative to the City of Portland datum

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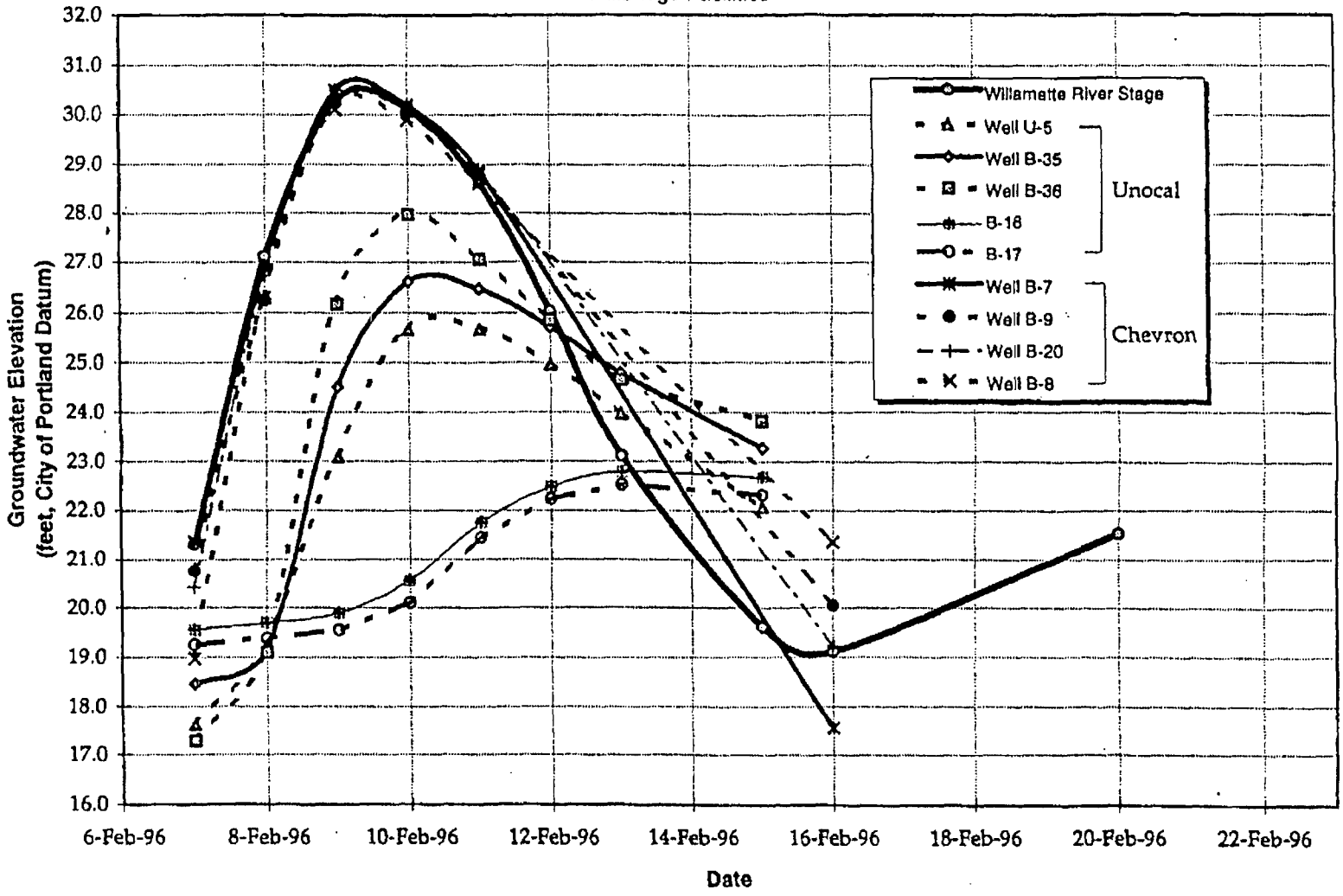
Figure 1
Hydrograph - 1996 Flood
General Riverfront Region
Willbridge Facilities



FLOODWLS.XLS

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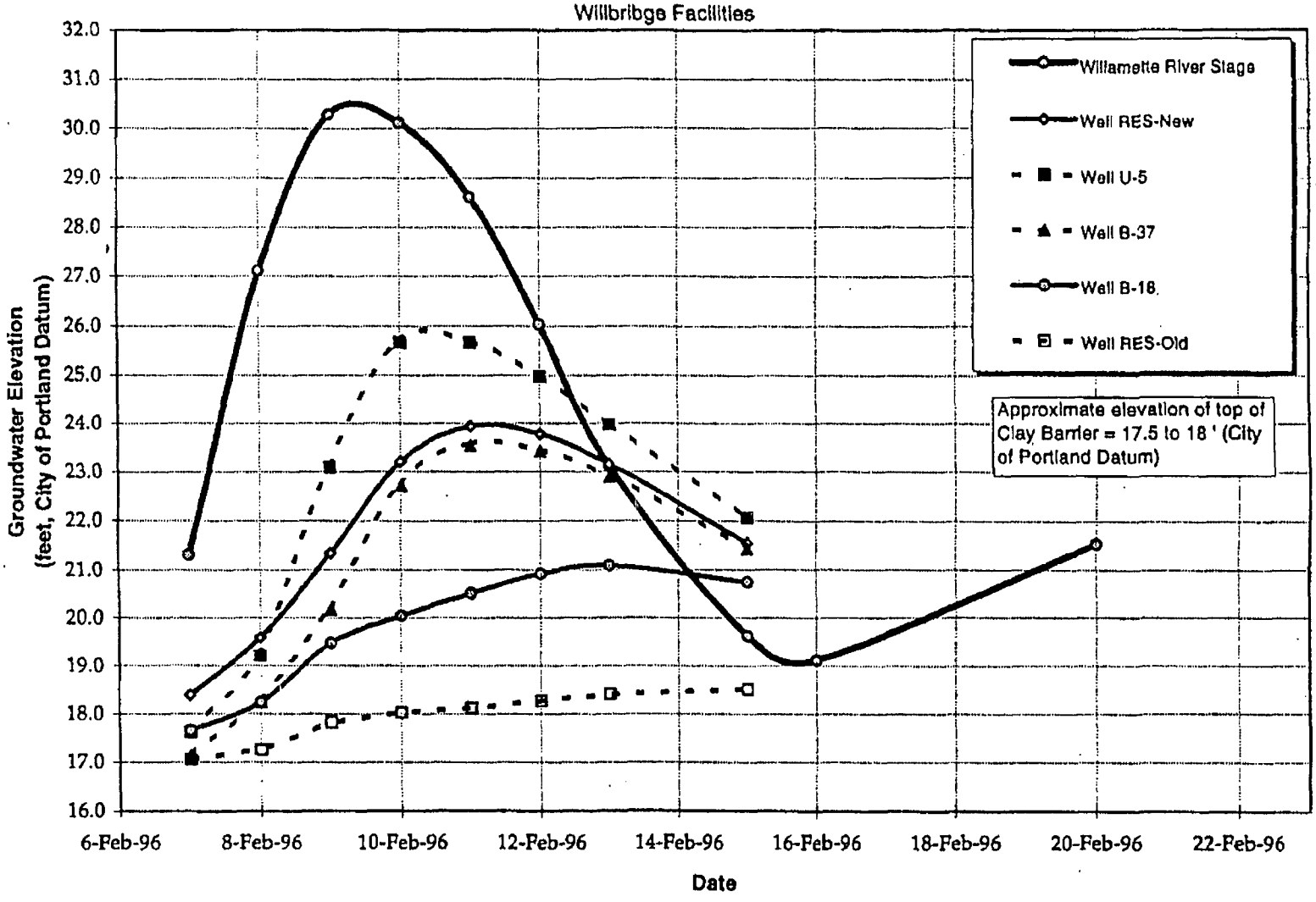
Figure 2
Hydrograph - 1996 Flood
New Storm Sewer Area



FLOODWLS.XLS

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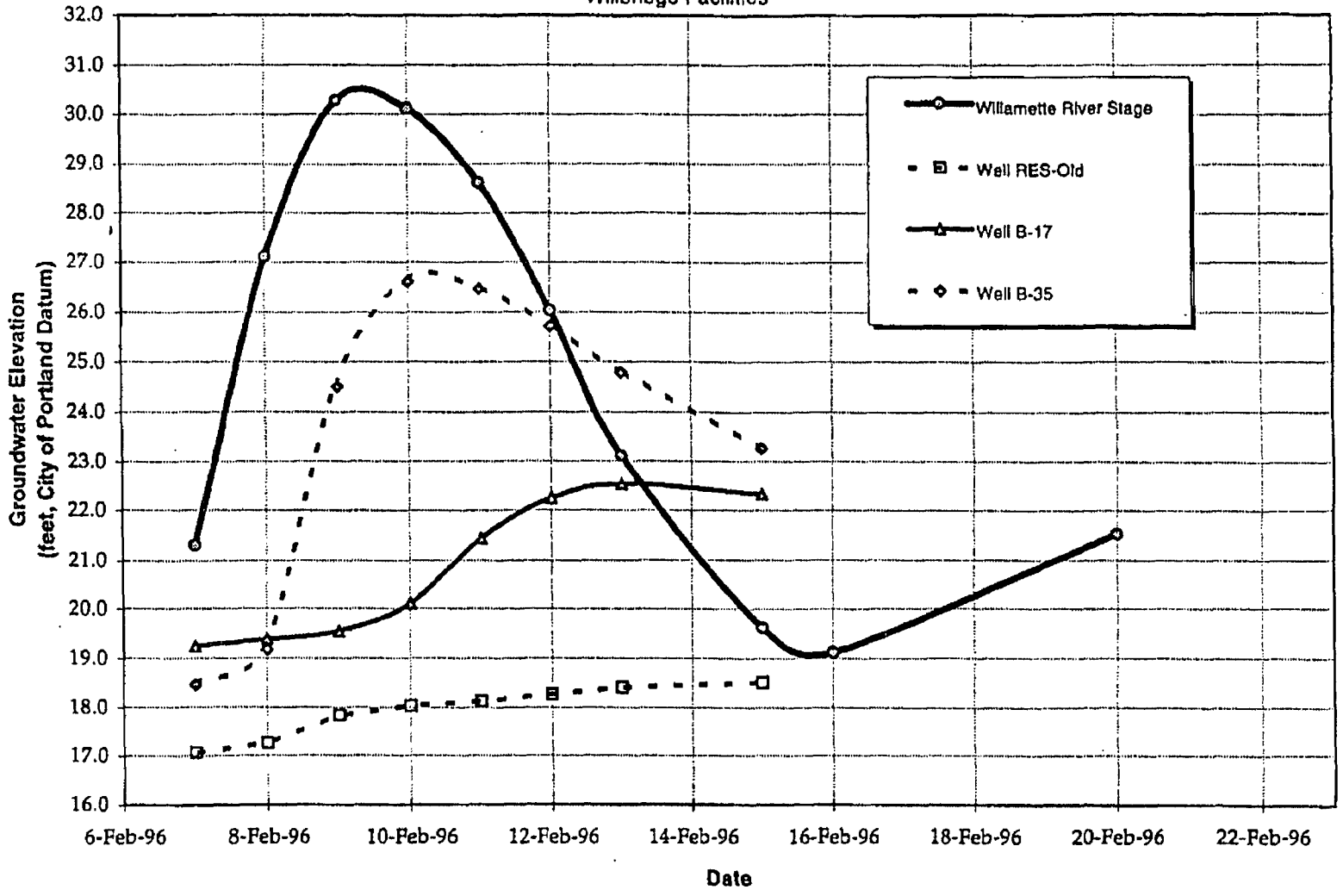
Figure 3
Hydrograph - 1996 Flood
Old Storm Sewer Area
Willbridge Facilities



FLOODWLS.XLS

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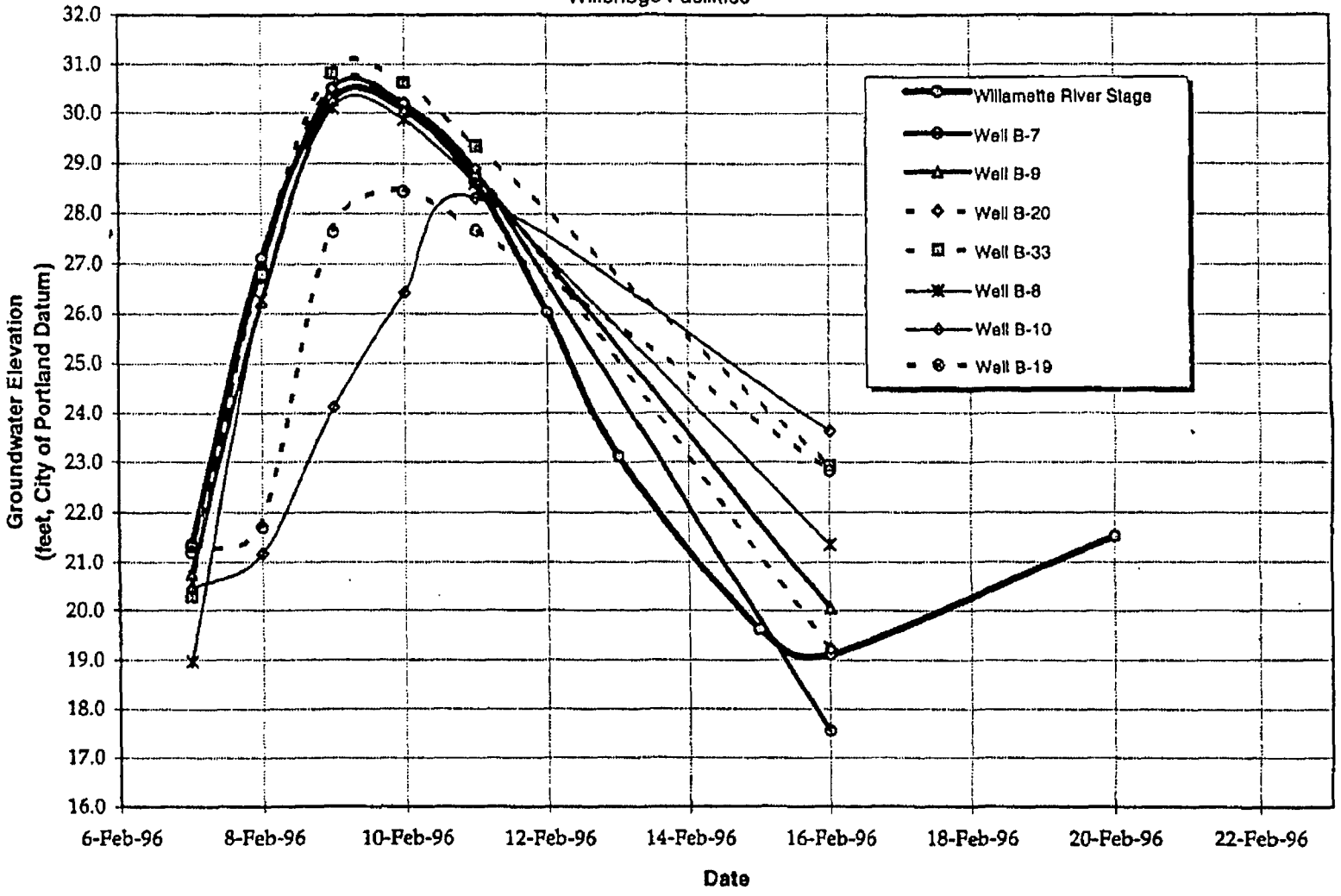
Figure 4
Hydrograph - 1996 Flood
Holbrook Slough Area
Willbridge Facilities



FLOODWLS.XLS

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PROJECT NORTH

TRUE NORTH

0 100 200 300 400

SCALE: IN FEET

WILLAMETTE RIVER

27" STORM SEWER ABANDONED

60" STORM SEWER

RIVER ELEVATION 9.46

N.W. FRONT AVENUE

N.W. 61ST AVENUE

N.W. CULEBRA AVENUE

N.W. BALBOA AVENUE

N.W. DOANE AVENUE

SALTMAN CREEK

FORMER 65 TANK

FORMER TANK 67

RES-N CLAY BARRIER

RES-O

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7 MW-8 MW-9 MW-10 MW-11 MW-12 MW-13 MW-14 MW-15 MW-16 MW-17 MW-18 MW-19 MW-20 MW-21 MW-22 MW-23 MW-24 MW-25 MW-26 MW-27 MW-28 MW-29 MW-30 MW-31 MW-32 MW-33 MW-34 MW-35 MW-36 MW-37 MW-38 MW-39 MW-40

CR-1 CR-3 CR-4 CR-5 CR-6 CR-7 CR-8 CR-9 CR-10 CR-11

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-14 B-15 B-16 B-17 B-18 B-19 B-20 B-21 B-22 B-23 B-24 B-25 B-26 B-27 B-28 B-29 B-30 B-31 B-32 B-33 B-34 B-35 B-36 B-37 B-38 B-39 B-40 B-41

U-1 U-2 U-3 U-4 U-5 U-5A

IT-W IT-E

LEGEND

MW-14
MONITORING WELL LOCATION WITH

FIGURE
GENERAL SITE PLAN
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR0006134

Attachment B

Willbridge Facilities - Portland, Oregon

Benzene Concentrations in Selected Wells in the Riverfront Area

PREPARED FOR: Joe Comstock/Unocal
Andrew Holbrook/GATX
Irv Jenkins/Shell
Rene White/Chevron

PREPARED BY: Bruce Brody-Heine/CH2M HILL

COPIES: Ross Rieke/CH2M HILL
Terry Fisk/GeoEngineers
Gregory Kapillas/Hart Crowser
Paul Woods /SECOR

DATE: April 11, 1996

Prior to January 1995 only selected wells in the riverfront area had been sampled. Well B-14 is the only well in the riverfront area that prior to 1995 had detectable concentrations of benzene that exceeded 100 µg/L (224 to 600 µg/L). Other wells in the riverfront area before 1995 either had low, or no, detection of BTEX compounds, or were not sampled. BTEX data for wells in the riverfront area from sampling events in 1995 and 1996 are presented in the attached figure.

Evaluation of the 1995 water quality data indicated that benzene concentrations had been generally increasing in Wells B-11, B-14, and B-17 during the four quarters of groundwater sampling. These three wells are located on the east side of Front Avenue in the Chevron and Unocal dock areas (see attached Figure). Analytical data from wells that are positioned on the west side of Front Avenue have not shown this increase of benzene concentrations in groundwater.

Three additional monitoring wells, CR-3, B-13, and B-29 (currently not in the groundwater sampling program) were sampled in January 1996 for benzene, toluene, ethylbenzene, and xylenes (BTEX) to obtain additional data in the vicinity of Front Avenue. January 1996 analytical results document a small decrease in the benzene concentrations detected in Wells B-11, B-14, and B-17 (see figure) compared to data from October 1995. BTEX concentrations in the three additional wells sampled in January 1996 (CR-3, B-13, and B-13) are presented on the attached figure. The benzene concentration in Well CR-3, on the north edge of the Chevron property along the riverfront side of Front Avenue, and Well B-29 located across Front Avenue from the riverfront were nondetect. However benzene was detected in well B-13 at a concentration of 400 µg/L. Benzene was also unexpectedly detected in Well B-36, where previous sampling results were nondetect.

The data suggest elevated benzene concentrations are limited to the riverfront side of Front Avenue on the Chevron and Unocal portion of the Willbridge site. One explanation for the

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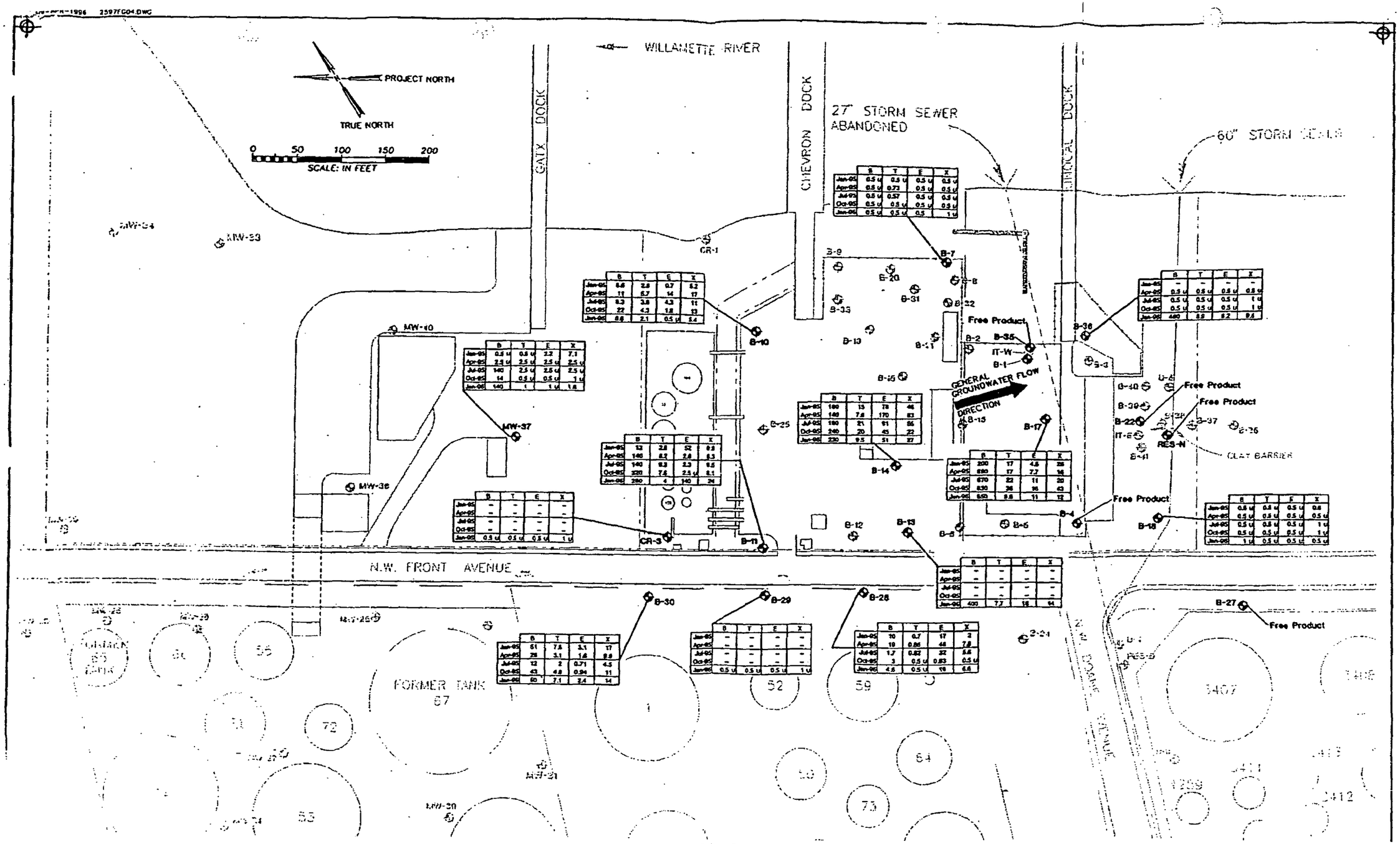

LEGEND

MW-14 ⊕ MONITORING WELL LOCATION

FIGURE 1
BTEX CONCENTRATION MAP
RIVEVRFRONT AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2M HILL

\WILLBRDG\132597\CAD\2597FG04.DWG

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WRF/QSR

Engineers
Planners
CH2MHILL Economists
Scientists

Portland Office

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

APR 10 1996

NORTHWEST REGION

April 5, 1996

132597.II.01

Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. Fourth Avenue, Suite 400
Portland, OR 97204

Dear Ms. Kiernan:

Subject: **Willbridge RI/FS Interim Action,**
Quarterly Report for December 1995 through February 1996

This letter presents the quarterly progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Unocal, and GATX Willbridge facilities in Portland, Oregon. This report presents a summary of the following:

- Actions taken under the Consent Order from December 1995 to February 1996.
- Sampling, test results, and other data generated between December 1995 and February 1996.
- A description of problems experienced and the manner in which they were resolved or are being addressed.
- Actions scheduled to be taken under the Consent Order from March to May 1996.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

Action Taken from December 1995 through February 1996

The following work was performed from December 1995 through February 1996:

- Performed quarterly groundwater sampling, monthly monitoring, and bi-weekly seep and sheen observations at the Chevron, GATX, and Unocal facilities.

Serving Oregon and Southwest Washington from two locations:

Portland Office	*825 N.E. Multnomah, Suite 1300, Portland, OR 97232-2146*	*503.235.5000*	*503.235.2445 FAX*
Corvallis Office	*2300 NW Walnut Blvd., Corvallis, OR 97330-3538*	*503.752.4271*	*503.752.0276 FAX*

- Continued to operate the Holbrook Slough cutoff trench at the Old Doane Avenue storm water outfall for groundwater and free product recovery when river stage levels allow operation of the system.
- Completed installation of a petro-belt in Well B-38, and a product skimmer pump in Well RES-New as a continuation of the free product recovery program.
- Recovered approximately 68 gallons of product from monitoring wells at the Unocal, Chevron, and GATX facilities from December 1995 through February 1996.
- Submitted Willbridge Facilities Riverfront Interim Action Work Plan to DEQ.

Sampling, Test Results, and Data Generated from December 1995 through February 1996

Interim action monitoring activities performed this quarter included water level and product thickness measurements and groundwater sampling from selected wells, as described in Tables 3-1a, 3-1b, and 3-1c of the Field Coordination Plan (FCP) dated April 1995. Groundwater samples were not obtained for chemical testing from wells with free product.

Groundwater Levels and Flow

Water level measurements performed in December 1995, January, and February 1996 are presented in Tables 1a to 1c, Tables 2a to 2c, and Tables 3a to 3c, respectively. Measurements were corrected for free product where present. A groundwater contour map using the January 1996 data is presented in Figures 1 and 1a.

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the river front. The groundwater elevations were rising during the end of the fall (last quarter) from increased precipitation and resulting infiltration during the winter months. The largest water level changes associated with precipitation/infiltration were observed in the Shell/Chevron main tank farm area.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX south tank farm, and an apparent elongated groundwater depressions (troughs) beneath N.W. Doane Avenue, and the Saltzman Creek flume. These troughs may be caused by groundwater drainage through the backfill associated with these structures.

The Willamette River stage (measured on the river gauge at the Unocal dock and converted to City of Portland datum) ranged from approximately 12.9 to 19.5 feet during December 1995 and January 1996. The Willamette Valley received greater than average snow and rain

during the end of January and the beginning of February which resulted in major flooding of the Willamette River and most of its tributaries. The river crested at approximately elevation 30.3 feet (City of Portland datum) on February 9, 1996. The top of the river bank at the Willbridge Facilities riverfront is approximately 31 to 34 feet. Following the flood, the river stage remained relatively high through the end of February.

Wells along the Willbridge riverfront were influenced by the unusual Willamette river stage conditions during January and February 1996. The river stage was 19.5 feet (City of Portland datum) during the water level measurements in January 1996. As a result of this elevated river stage, the water level elevation measurements for January (Figure 1a) indicated a flow direction from the river towards the site adjacent to the Old Doane Avenue storm sewer and the New Doane Avenue storm sewer. In the vicinity of the New Doane Avenue storm sewer, the water levels indicate this groundwater gradient reversal is present up to the clay barrier installed in the sewer backfill. The elevation of the top of the clay barrier is approximately 17 to 18 feet (City of Portland datum).

Groundwater elevation measurements were obtained at frequent intervals during the extraordinary river levels in February. A separate technical memorandum is being prepared summarizing these water level measurements and the inferred groundwater flow directions beneath the Willbridge site.

Product Thickness Measurements

Free product thicknesses were measured at selected wells on a monthly and quarterly basis (see Tables 1a to 3c). These data were compiled with apparent free product thickness data for April, July, October 1995, and January 1996 and are shown in Figures 2 and 2a.

The presence of free product appears to be associated with the former and current alignments of the Doane Avenue stormwater outfall and possibly the Holbrook slough. Wells B-1, B-4 and B-35, located in the dock area nearest the Old Doane Avenue storm drain alignment, contained 0.12, 0.04, and 0.05 feet of free product, respectively (January measurement). Wells B-38, B-39, U-5, and RES-New appear to be connected to the New Doane Avenue storm drain backfill material (based on water level measurements) and contained 0.14, 0.07, 0.08, and 0.03 feet of free product, respectively.

The January 1996 product measurements generally show increased levels of product in wells located in the vicinity of the New Doane Avenue storm sewer at the intersection of Front Avenue and near the clay barrier(Table 2a, 2b, and 2c). Product thicknesses in Wells CR-7 and CR-10 also have increased during this last quarter. These wells are currently included in the Willbridge Facility's product recovery program.

Water Quality

Groundwater samples collected from selected locations in the monitoring well network were tested for benzene, toluene, ethylbenzene, and xylene (BTEX) (EPA method SW8020)

and polycyclic aromatic hydrocarbons (PAHs) (EPA method SW8310), as described in Tables 3-1a, 3-1b, and 3-1c of the FCP. For reference purposes, 1995 BTEX results are presented in Tables 4a to 4c and January 1996 BTEX results are presented in Tables 5a to 5c. 1995 PAHs results are presented in Tables 6a to 6c, and January 1996 PAHs results are presented in Tables 7a to 7c. Based on last quarters recommendations to discontinue sampling wells that contain free product, any well which contained free product was not sampled (free product designated by an F in the Tables).

The water quality monitoring results appear to be consistent with past data, with the exception of BTEX concentrations in Well B-36. During the previous quarter a general trend of increase in BTEX concentrations over the past four quarters was noted in Wells B-11, B-14, and B-17. The January 1996 BTEX concentrations in these three wells remained approximately the same as the October 1995 values. However the January 1996 analysis for Well B-36, downgradient of Wells B-11, B-14, and B-17, shows a detection of BTEX (benzene; 480 µg/L). Benzene was not detected in previous sampling of Well B-36.

Following the identification of the increasing BTEX concentrations last quarter, it was recommended that additional wells in the vicinity of Front Avenue be tested for BTEX concentrations to attempt to identify possible sources. A technical memorandum will be prepared summarizing the results and the document will be submitted as an attachment to the next quarterly report.

Product Recovery

The recovery program began in May 1995. The well locations included in the product recovery program and the corresponding product recovery equipment are described in Chapter 3 of the FCP. Approximately 103 gallons of free product has been recovered by product recovery equipment in monitoring wells since the recovery program began in late May 1995. Product recovery data for each site are presented in Table 8.

Shell/GATX Site

A Petro-belt is operating in Well MW-24 and product recovery canisters (PRCs) are also present in Wells MW-7, MW-19, MW-6 and MW-28. Measurable thicknesses of product were present in Well MW-6, and MW-7 during this quarter. The PRCs from well MW-19 was transferred over to MW-6 in February 1996. Approximately 1.1 gallons of product was recovered from the Shell/GATX site this quarter.

Unocal Site

PRCs are present in Wells U-4, B-4, B-27 and B-41. A handbailing program has been implemented in Wells B-1, B-22, B-35, B-39, U-5, U-5A and RES-Old. A Petro-belt was installed in Well B-38 and the product skimmer was installed in RES-New in December 1995. A total of 42.0 gallons of product was recovered from the Unocal site this quarter.

Chevron Site

PRCs are installed in Wells B-24, CR-6, and CR-7. A Petro-belt is present in Well CR-10, but was undergoing repairs during January and February 1996. A total of 0.4 gallons of product was recovered from the Chevron site this quarter.

Holbrook Recovery Trench

The river stage controls operation of the Holbrook Slough recovery trench, located along the shoreline near the old Doane Avenue outfall location. The trench is shut off as the river stage rises above approximately 5 to 6 feet (measured on the river gauge staff on the Unocal dock). River stage levels this quarter ranged between 12.9 and 27 feet. The trench was not operating this quarter. Based on information obtained from the Chevron terminal personnel, approximately 700 gallons of product was recovered by the trench during May 1995 through October 1995.

Seep and Sheen Monitoring

Weekly to biweekly site visits were performed to document the location and extent of hydrocarbon seeps and sheens at the riverbank. Field observations were recorded on the seep/sheen form. Monitoring indicates that several site conditions, including the river stage and the recovery trench operation (tied to the river stage), affect the presence and magnitude of hydrocarbon seeps and the resulting sheens observed at the river's edge.

Sheens that are observed on the water surface are controlled with containment booms and recoverable product is removed from the water surface in these areas by adsorbent pads and skimming equipment. The containment booms currently encompass the shoreline between the Chevron and Unocal docks, and from the south edge of the Unocal dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). In addition, secondary containment booms are located inside of the first boom between the Chevron and Unocal docks and around the new Doane Avenue outfall pipe.

Holbrook Recovery Trench Shoreline. Heavy sheens were consistently observed near the submerged recovery trench during this quarter.

New Doane Avenue Outfall. In general, the presence and magnitude of the sheens observed during December 1995 through February 1996 were consistent with the sheens observed during previous quarters in the vicinity of the storm sewer outfall. These sheens are believed to be produced from product exiting the pipe outfall and by product seep discharge from the gravel backfill surrounding the pipe.

No seeps and sheens were observed north of the Chevron dock, or north of the Shell/GATX dock when accessible for observation.

Problems Experienced from December 1995 through February 1996

It has been discovered that the hydrophobic filters on the product recovery canisters tend to lose their hydrophobicity after being in contact with groundwater for long periods. This can inhibit the proper functioning of the product recovery device. Once filters lose their hydrophobicity, the filters are being reconditioned in the field.

Actions Scheduled for March through May 1996

The following actions are scheduled for March through May 1996:

- Continue the interim action monitoring program at the Chevron, GATX, and Unocal facilities, as described in the Interim Action Plan, the FCP, and modifications discussed in quarterly reports.
- Continue operation of the Holbrook Slough cutoff trench as an interim action if river levels are below the automatic shut-off level.
- Receive DEQ comments on the Willbridge Waterfront Interim Action Work Plan.
- Submit to DEQ a Doane Avenue Storm Sewer System Investigation Work Plan.
- Continue review of existing information and interim action monitoring data.

Please call me at 503/235-5000 if you have any questions.

Sincerely,

CH2M HILL

Ross D. Rieke, P.E.
Project Manager

Enclosures

Tables 1a to 1c, Water Level Monitoring Data: December 1995
Tables 2a to 2c, Water Level Monitoring Data: January 1996
Tables 3a to 3c, Water Level Monitoring Data: February 1996
Tables 4a to 4c, Water Quality Monitoring Results, Aromatic Volatiles, 1995
Tables 5a to 5c, Water Quality Monitoring Results, Aromatic Volatiles, 1996
Tables 6a to 6c, Water Quality Monitoring Results, PAHs, 1995
Tables 7a to 7c, Water Quality Monitoring Results, PAHs, 1996
Table 8, Free Product Recovered
Figure 1, Groundwater Elevation Contour Map
Figure 1a, Groundwater Elevation Contour Map-Dock Area
Figure 2, Apparent Free Product Thickness Measurements
Figure 2a, Apparent Free Product Thickness Measurements-Dock Area

c: Rene White/Chevron
Joe Comstock/UNOCAL
Andrew Holbrook/GATX
Irv Jenkins/Shell Oil
Terry Fisk/GeoEngineers
Paul Woods/SECOR
Gregory Kupillas/Hart Crowser

Table 1a
Water Level Monitoring Data
Unocal

Date: 12/28/95

Time Begin:_____ Time End:_____

Field Staff: DWC

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network						
B-1	34.79 b	16.75 M	16.91 M	0.16	16.78	18.01
B-2	35.35 b		16.56 M			18.79
B-17	35.59 b	M	16.85 M			18.74
B-35	33.58 a	15.60 M	15.61 M	0.01	15.60	17.98
B-36	30.97 a		13.91 M			17.06
RES-New Well Network						
B-1	34.79 b	16.75	16.91	0.16	16.78	18.01
B-4	34.79 b	0.00 M	0.00 M			NM-1
B-17	35.59 b		16.85	0.00	0.00	18.74
B-18	35.79 b		18.66 M			17.13
B-22	34.68 b	18.30 M	18.31 M	0.01	18.30	16.38
B-25	35.83 b		18.59 M			17.24
B-37	35.24 a	19.66	19.66 M	0.00	19.66	15.58
B-40	33.19 a	17.23 M	17.23 M	0.00	17.23	15.96
B-41	34.64 a	0.00 M	0.00 M			NM-1
RES - New	38.58	22.59	22.61 M	0.02	22.59	15.99
General Groundwater Monitoring						
U-2	35.02 a		15.06 Q			19.96
U-3	35.25 a	12.71	12.71 Q	0.00	12.71	22.54
U-4	34.46 a	0.00 M	0.00 M			NM-1
U-5A	33.77 a	5.97 M	6.39 M			27.38
U-5	34.2 a	18.43	18.48 Q	0.05	18.44	15.76
B-1	34.79 b	16.75	16.91	0.16	16.78	18.01
B-4	34.79 b	0.00	0.00			NM-1
B-17	35.59 b		16.85	0.00	0.00	18.74
B-18	35.79 b		18.66			17.13
B-22	34.68 b	18.30	18.31	0.01	18.30	16.38
B-27	35.74 c	0.00 M	0.00 M			NM-1
B-35	33.58 a	15.60	15.61	0.01	15.60	17.98
B-36	30.97 a		13.91			17.06
B-37	35.24 a	19.66	19.66	0.00	19.66	15.58
B-38	34.75 a	0.00 M	0.00 M			NM-1
B-39	33.92 a	18.05 M	18.23 M	0.18	18.09	15.83
B-40	33.19 a	17.23	17.23	0.00	17.23	15.96
B-41	34.64 a	0.00	0.00			NM-1
RES - Old	34.05 d	17.53 M	17.54 M	0.01	17.53	16.52

Notes:

1 outlined cell indicates data entry location

2 a = Measuring point elevation from CH2M Hill field survey

3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey

4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum

6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60

7 M = monthly on fourth monday. Q = quarterly on fourth monday.

8 NM-1 = Well not monitored because product recovery equipment in well

Table 1b
Water Level Monitoring Data
Chevron

Date: 12/29/95
Time Begin: 13:30 **Time End:** 16:30
Field Staff: CTC

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench						
B-7	33.96 b		17.74 M			16.22
B-9	33.95 b		15.86 M			18.09
B-16	35.82 b		16.82 M			19.00
B-19	34.71 b		15.75 M			18.96
B-21	34.79 b		16.07 M			18.72
B-31	33.86 d		14.36 M			19.50
B-32	34.23 a		16.09 M			18.14
River Stage	e		25.90 M			10.81
General Groundwater Sampling						
B-7	33.96 b	17.74 M	17.74 M			16.22
B-9	33.95 b		15.86 M			18.09
B-10	34.74 b	15.01 M	15.01 M	0.00	15.01	19.73
B-11	34.95 b		Q			
B-14	36.59 b		Q			
B-16	35.82 b		Q			
B-19	34.71 b		Q			
B-20	33.4 b	16.17 M	16.18 M	0.01	16.17	17.23
B-24	34.7 b	15.90 M	15.90 M	0.00	15.90	18.80
B-26	35.3 b		Q			
B-28	35.25 b		Q			
B-30	35.35 b		Q			
B-32	34.23 a	16.09 M	16.09 M	0.00	16.09	18.14
CR-3	34.32 a		Q			
CR-4	34.93 a		Q			
CR-6	35.61 a	8.81	8.81 M	0.00	8.81	26.80
CR-7	35.57 a	10.23 M	10.28 M	0.05	10.24	25.33
CR-8	33.14 a		Q			
CR-10	35.57 a	7.54 M	7.54 M	0.00	7.54	28.03
CR-11	34.43 a	1.83 M	1.83 M	0.00	1.83	32.60
River Stage	e		25.90 Q			10.81

Notes:

1 ☐ outlined cell indicates data entry location
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3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8 e = River stage 16.00 equals elevation 20.71

Table 1c
Groundwater Monitoring Requirements
Shell/GATX

Date: December 28, 1995
Time Begin: 7:34 a.m. **Time End:** 8:37 a.m.
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	3.76	M	3.95	M	0.19	3.80	29.54
MW-7	34.12 c	8.13	M	8.16	M	0.03	8.14	25.99
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	5.65	M	5.65	M	0.00	5.65	30.82
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	3.23	M	3.23	M	0.00	3.23	30.16
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	3.26	M	3.26	M	0.00	3.26	32.39
MW-23	36.06 c	4.27	M	4.27	M			31.79
MW-24	35.15 c		M		M			NM-1
MW-28	34.39 c	4.25	M	4.25	M	0.00	4.25	30.14
MW-29	35.77 c				Q			
MW-31	37.55 c	5.90	M	5.90	M	0.00	5.90	31.65
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

5 NM-1 = Well not monitored because product recovery equipement in well

Table 2a
Water Level Monitoring Data
Unocal

Date: January 22, 1996
Time Begin: 1200 Time End:
Field Staff:

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network						
B-1	34.79 b	16.73 M	16.85 M	0.12	16.75	18.04
B-2	35.35 b	16.48	16.50 M	0.02	16.48	18.85
B-4	34.79 b	17.60 M	17.64 M	0.04	17.61	17.18
B-17	35.59 b	0.00 M	16.78 M	0.00	16.78	18.81
B-35	33.58 a	15.52 M	15.57 M	0.05	15.53	18.05
B-36	30.97 a	0.00	13.93 M	0.00	13.93	17.04
RES-New Well Network						
B-1	34.79 b	16.73	16.85	0.12	16.75	18.04
B-17	35.59 b	0.00	16.78	0.00	16.78	18.81
B-18	35.79 b	0.00	18.20 M	0.00	15.53	17.59
B-22	34.67 b	0.00 M	17.39 M	0.00	17.39	17.28
B-25	35.83 b	0.00	18.88 M	0.00	18.88	16.95
B-37	35.24 a	18.20	18.23 M	0.03	18.21	17.01
B-40	33.19 a	0.00 M	16.40 M	0.00	16.40	16.79
B-41	34.64 a	17.38 M	17.42 M	0.04	17.39	17.25
U-5	34.20	15.57	15.65 Q	0.08	15.59	18.61
RES - New	38.58	20.91 M	20.94 M	0.03	20.92	17.66
General Groundwater Monitoring						
U-2	35.02 a	0.00	16.44 Q	0.00	16.44	18.58
U-3	35.25 a	16.56	16.58 Q	0.02	16.56	18.67
U-4	34.46 a	17.60 M	17.64 M	0.04	17.61	16.85
U-5A	33.77 a	6.43 M	6.50 M	0.07	6.44	27.33
U-5	34.20 a	15.57	15.65	0.08	15.59	18.61
B-1	34.79 b	16.73	16.85	0.12	16.75	18.04
B-4	34.79 b	17.60	17.64	0.04	17.61	17.18
B-5	34.79 b	0.00	16.18	0.00	16.18	18.61
B-6	35.41 b	0.00	16.44	0.00	16.44	18.97
B-16	35.82 b	0.00	16.75 M	0.00	16.75	19.07
B-17	35.59 b	0.00	16.78	0.00	16.78	18.81
B-18	35.79 b	0.00	18.20	0.00	18.20	17.59
B-22	34.67 b	0.00	17.39	0.00	17.39	17.28
B-27	35.74 c	17.44 M	17.87 M	0.43	17.53	18.21
B-35	33.58 a	15.52	15.57	0.05	15.53	18.05
B-36	30.97 a	0.00	13.93	0.00	13.93	17.04
B-37	35.24 a	18.20	18.23	0.03	18.21	17.01
B-38	34.75 a	18.89 M	19.03 M	0.14	18.92	15.83
B-39	33.92 a	17.03	17.10 M	0.07	17.04	16.88
B-40	33.19 a	0.00	16.40	0.00	16.40	16.79
B-41	34.64 a	17.38	17.42	0.04	17.39	17.25
RES - Old	36.03 d	17.42 M	17.49 M	0.07	17.43	18.60

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
8 NM-1 = Well not monitored because product recovery equipment in well.

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Table 2b
Water Level Monitoring Data
Chevron

Date: 01/22/96
Time Begin: 0900 Time End: 1130
Field Staff: EAA/CTC

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network						
B-7	33.96 b	15.82 M	15.82 M	0.00	15.82	18.14
B-9	33.95 b		15.31 M			18.64
B-19	34.71 b		15.54 M			19.17
B-21	34.79 b		15.91 M			18.88
B-31	33.86 d		14.40 M			19.46
B-32	34.23 a		15.73 M			18.50
River Stage	e		M			
General Groundwater Sampling						
B-7	33.96 b	15.82 M	15.82 M	0.00	15.82	18.14
B-9	33.95 b		15.31 M			18.64
B-10	34.74 b	14.67 M	14.67 M	0.00	14.67	20.07
B-11	34.95 b		15.73 Q			19.22
B-14	36.59 b		17.21 Q			19.38
B-19	34.71 b		15.54 M			19.17
B-20	33.40 b	15.20 M	15.20 M	0.00	15.20	18.20
B-24	34.70 b	15.71 M	15.71 M	0.00	15.71	18.99
B-26	35.30 b		15.23 Q			20.07
B-28	35.25 b		15.25 Q			20.00
B-30	35.35 b		14.51 Q			20.84
B-32	34.23 a		15.73 M			18.50
CR-3	34.32 a		10.42 Q			23.90
CR-4	34.93 a		4.70 Q			30.23
CR-6	35.61 a	12.02	12.03 M	0.01	12.02	23.59
CR-7	35.57 a	9.91 M	10.12 M	0.21	9.95	25.62
CR-8	33.14 a		6.21 Q			26.93
CR-10	35.57 a	6.96 M	7.01 M	0.05	6.97	28.60
CR-11	34.43 a	1.78 M	1.78 M	0.00	1.78	32.65
River Stage	e		14.75 M			19.46

Notes:

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4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 2c
Groundwater Monitoring Requirements
Shell/GATX

Date: January 22, 1996

Time Begin: 8:32 a.m. **Time End: 4:49 p.m.**

Field Staff: Doann Hamilton and Greg Kupillas

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring						
MW-1	35.43 c		2.92 Q			32.51
MW-3	36.02 c	8.96 M	8.96 M	0.00	8.96	27.06
MW-4	36.39 c		5.20 Q			31.19
MW-5	33.52 c		4.32 Q			29.20
MW-6	33.34 c	2.50 M	2.85 M	0.35	2.57	30.77
MW-7	34.12 c	7.44 M	7.44 M	0.00	7.44	26.68
MW-8	33.95 c		6.45 Q			27.50
MW-9	36.53 c		9.57 Q			26.96
MW-10	35.82 c		7.31 Q			28.51
MW-11	36.47 c	4.50 M	4.50 M	0.00	4.50	31.97
MW-12	35.95 c		3.83 Q			32.12
MW-13	37.89 c		3.65 Q			34.24
MW-14	36.28 c		2.71 Q			33.57
MW-16	34.93 c		2.44 Q			32.49
MW-18	33.76 c		1.08 Q			32.68
MW-19	33.39 c	2.18 M	2.18 M	0.00	2.18	31.21
MW-20	34.76 c		8.50 Q			26.26
MW-21	34.33 c		1.08 Q			33.25
MW-22	35.65 c	2.77 M	2.77 M	0.00	2.77	32.88
MW-23	36.06 c		3.49 Q			32.57
MW-24	35.15 c	M	M			NM-1
MW-28	34.39 c	2.29 M	2.29 M	0.00	2.29	32.10
MW-29	35.77 c		12.70 Q			23.07
MW-31	37.55 c	4.62 M	4.62 M	0.00	4.62	32.93
MW-32	37.01 c		3.23 Q			33.78
MW-33	39.34 c		19.07 Q			20.27
MW-34	39.67 c		18.71 Q			20.96
MW-36	34.88 c		13.74 Q			21.14
MW-37	34.86 c		14.22 Q			20.64

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

5 NM-1 = Well not monitored because product recovery equipment in well.

Table 3a
Water Level Monitoring Data
Unocal

Date: Feb. 26, 1996
Time Begin: 1400 Time End: 1530
Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network						
B-1	34.79 b	13.40 M	13.42 M	0.02	13.40	21.39
B-2	35.35 b		M			
B-4	34.79 b	0.00 M	13.68 M	0.00	13.68	21.11
B-17	35.59 b	13.35 M	13.36 M	0.00	13.36	22.23
B-35	33.58 a	13.50 M	13.55 M	0.05	13.51	20.07
B-36	30.97 a	0.00	10.75 M	0.00	10.75	20.22
RES-New Well Network						
B-1	34.79 b	13.40	13.42	0.02	13.40	21.39
B-17	35.59 b	13.35	13.36	0.00	13.36	22.23
B-18	35.79 b	0.00	18.38 M	0.00	13.51	17.41
B-22	34.67 b	12.48 M	12.55 M	0.07	12.49	22.18
B-25	35.83 b	0.00	12.05 M	0.00	12.05	23.78
B-37	35.24 a	0.00	14.15 M	0.00	14.15	21.09
B-40	33.19 a	0.00 M	12.75 M	0.00	12.75	20.44
B-41	34.64 a	13.40 M	13.81 M	0.41	13.48	21.16
U-5	34.20	13.55	13.70 Q	0.15	13.58	20.62
RES - New	38.58	23.34 M	24.10 M	0.76	23.49	15.09
General Groundwater Monitoring						
U-2	35.02 a	0.00	14.35 Q	0.00	14.35	20.67
U-3	35.25 a	0.00	14.15 Q	0.00	14.15	21.10
U-4	34.46 a	12.85 M	13.15 M	0.30	12.91	21.55
U-5A	33.77 a	8.50 M	8.53 M	0.03	8.51	25.26
U-5	34.20 a	13.55	13.70	0.15	13.58	20.62
B-1	34.79 b	13.40	13.42	0.02	13.40	21.39
B-4	34.79 b	0.00	13.68	0.00	13.68	21.11
B-5	34.79 b	0.00	4.40	0.00	4.40	30.39
B-6	35.41 b	0.00	5.60	0.00	5.60	29.81
B-16	35.82 b	0.00	13.30 M	0.00	13.30	22.52
B-17	35.59 b	13.35	13.36	0.00	13.36	22.23
B-18	35.79 b	0.00	18.38	0.00	18.38	17.41
B-22	34.67 b	12.48	12.55	0.07	12.49	22.18
B-27	35.74 c	13.38 M	13.69 M	0.31	13.44	22.30
B-35	33.58 a	13.50	13.55	0.05	13.51	20.07
B-36	30.97 a	0.00	10.75	0.00	10.75	20.22
B-37	35.24 a	0.00	14.15	0.00	14.15	21.09
B-38	34.75 a	13.70 M	14.07 M	0.37	13.77	20.98
B-39	33.92 a	13.54	14.00 M	0.46	13.63	20.29
B-40	33.19 a	0.00	12.75	0.00	12.75	20.44
B-41	34.64 a	13.40	13.81	0.41	13.48	21.16
RES - Old	36.03 d	12.50 M	12.61 M	0.11	12.52	23.51

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
8 NM-1 = Well not monitored because product recovery equipment in well.

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Table 3b
Water Level Monitoring Data
Chevron

Date: 02/26/96
Time Begin: 0900 **Time End: 1200**
Field Staff: CTC

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network									
B-7	33.96	b	14.09	M	14.13	M	0.04	14.10	19.86
B-9	33.95	b			13.20	M			20.75
B-19	34.71	b			12.95	M			21.76
B-21	34.79	b			13.30	M			21.49
B-31	33.86	d			12.56	M			21.30
B-32	34.23	a			12.72	M			21.51
River Stage		e				M			NM-1
General Groundwater Sampling									
B-7	33.96	b	14.09	M	14.13	M	0.04	14.10	19.86
B-9	33.95	b			13.20	M			20.75
B-10	34.74	b	12.18	M	12.18	M	0.00	12.18	22.56
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-19	34.71	b			12.95	M			21.76
B-20	33.40	b	13.55	M	13.56	M	0.01	13.55	19.85
B-24	34.70	b	13.98	M	13.98	M	0.00	13.98	20.72
B-26	35.30	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a			12.72	M			21.51
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a	10.71		10.71	M	0.00	10.71	24.90
CR-7	35.57	a	8.50	M	9.00	M	0.50	8.60	26.97
CR-8	33.14	a				Q			
CR-10	35.57	a	6.76	M	6.93	M	0.17	6.79	28.78
CR-11	34.43	a	1.13	M	1.13	M	0.00	1.13	33.30
River Stage		e				M			NM-1

Notes:

1 ☐ outlined cell indicates data entry location

2 a = Measuring point elevation from CH2M Hill field survey

3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey

4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21

6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60

7 Wells not monitored: B-12, B-13, B-33 and CR-9

8 NM-1 = Not monitored because river staff gauge removed during recent dock construction work.

Table 3c
Groundwater Monitoring Requirements
Shell/GATX

Date: February 26, 1996
Time Begin: 8:51 a.m. Time End: 10:42 a.m.
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q	0.00	0.00	
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	2.07	M	2.08	M	0.01	2.07	31.27
MW-7	34.12 c	6.20	M	6.20	M	0.00	6.20	27.92
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	3.69	M	3.69	M	0.00	3.69	32.78
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	1.57	M	1.57	M	0.00	1.57	31.82
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	2.42	M	2.42	M	0.00	2.42	33.23
MW-23	36.06 c	3.59	M	3.59	M			
MW-24	35.15 c		M		M	0.00	0.00	NM-1
MW-27	35.67 c	3.94	M	3.94	M	0.00	3.94	31.73
MW-28	34.39 c	3.78	M	3.78	M	0.00	3.78	30.61
MW-29	35.77 c				Q			
MW-31	37.55 c	4.92	M	4.92	M	0.00	4.92	32.63
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			
MW-39	na c		M		M	0.00	0.00	na
MW-40	na c	10.99	M	10.99	M	0.00	10.99	na

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).
4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38
5 NM-1 = Well not monitored because product recovery equipment in well.

Table 4a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Recovery Trench Well Network									
B-17	Jan-95	200		17		4.5		26	
	Apr-95	590		17		7.7		16	
	Jul-95	670		22		11		20	
	Oct-95	830		36		16		43	
B-35	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-36	Jan-95								
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
RES-New Well Network									
B-4	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-37	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	F		F		F		F	
Res-New	Jan-95	4		0.6		3.4		4.5	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
General Groundwater Monitoring									
U-2	Jan-95	3.8		0.5	U	4.9		2.9	
	Apr-95	0.66		0.5	U	1.2		1.2	
	Jul-95	2.6		0.5	U	0.62		4	
	Oct-95	6.8		0.5	U	0.5	U	1	U
U-3	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	F		F		F		F	
U-4	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
U-5A	Jan-95	20		6.5		3.7		7.2	
	Apr-95	28		7.8		5		20	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
U-5	Jan-95	15		2		0.5		3	
	Apr-95	1.9		1.4		0.5	U	1.7	
	Jul-95	2.7		1.2		0.5	U	1.8	
	Oct-95	F		F		F		F	
B-18	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
B-22	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-27	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	

F- Sample was not obtained because of the presence of free (floating) product.

Table 4b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Recovery Trench Well Network									
B-7	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.73		0.5	U	0.5	U
	Jul-95	0.5	U	0.57		0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	0.5	U
B-9	Jan-95	0.5	U	0.9		0.5	U	1.5	
	Apr-95	0.5	U	0.88		0.5	U	1.3	
	Jul-95	0.5	U	1		0.5	U	0.52	
	Oct-95	0.5	U	1		0.5	U	2.5	
General Groundwater Monitoring									
B-10	Jan-95	8.6		2.9		0.7		5.2	
	Apr-95	11		5.7		14		17	
	Jul-95	8.3		3.6		4.3		11	
	Oct-95	22		4.3		1.8		13	
B-11	Jan-95	12		2.8		52		9.9	
	Apr-95	140		8.2		2.6		6.3	
	Jul-95	140		9.3		2.3		9.5	
	Oct-95	320		7.8		2.5	U	8.1	
B-14	Jan-95	190		15		78		46	
	Apr-95	140		7.6		170		83	
	Jul-95	190		21		91		55	
	Oct-95	240		20		45		22	
B-28	Jan-95	10		0.7		17		2	
	Apr-95	19		0.86		48		7.8	
	Jul-95	1.7		0.82		32		5.6	
	Oct-95	3		0.5	U	0.93		0.5	U
B-30	Jan-95	51		7.6		3.1		17	
	Apr-95	28		3.1		1.6		9.9	
	Jul-95	12		2		0.71		4.5	
	Oct-95	43		4.6		0.94		11	
CR-8	Jan-95	0.5	U	0.5	U	3.9		5.8	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	0.54	
CR-11	Jan-95	94		3.9		2.4		3.4	
	Apr-95	110		3.6		5.4		17	
	Jul-95	94		4.4		3		9.1	
	Oct-95	130		8.5		4.2		8.8	

Notes

Table 4c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l)							
		Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-95	0.5	U	0.5	U	18		30	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	1	U	1	U	1	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-8	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.96		0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1.1	
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-10	Jan-95	1.7		0.7		0.5	U	1	
	Apr-95	0.5	U	0.5	U	0.5	U	1.3	
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1.3	
MW-11	Jan-95	8900		4500		2500		11000	
	Apr-95	7400		4900		2500		12000	
	Jul-95	5400		2400		2600		8000	
	Oct-95	7100		2800		2400		8700	
MW-22	Jan-95	2400		8100		4700		16000	
	Apr-95	2200		7100		4500		15000	
	Jul-95	2000		5800		4500		15000	
	Oct-95	2300		6300		5200		19000	
MW-23	Jan-95	72		20		210		180	
	Apr-95	150		38		240		140	
	Jul-95	99		20		240		140	
	Oct-95	120		18		230		120	
MW-26	Jan-95	1.7		0.5	U	24		33	
	Apr-95	8.7		7.3		13		19	
	Jul-95	6.4		10		9.6		12	
	Oct-95	0.5	U	0.85		1.6		4.9	
MW-28	Jan-95	0.9		0.6		8.5		20	
	Apr-95	2.5	U	2.5	U	20		15	
	Jul-95	7.6		2.7		2.6		7.9	
	Oct-95	2.8		2.6		7.2		20	
MW-31	Jan-95	1.3		1.6		1.2		3.8	
	Apr-95	9.3		4.7		0.99		3.1	
	Jul-95	2.8		1.3		0.64		1.4	
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-32	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-33	Jan-95	0.5	U	0.5	U	0.5	U	0.5	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-37	Jan-95	0.5	U	0.5	U	2.2		7.1	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	140		2.5	U	2.5	U	2.5	U
	Oct-95	14		0.5	U	0.5	U	1	U

Notes: U = Not Detected Above Method Detection Limit

Table 5a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Holbrook Slough Recovery Trench Well Network									
B-4	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
B-17	Jan-96	550		9.8		11		12	
	Apr-96								
	Jul-96								
	Oct-96								
B-35	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
B-36	Jan-96	480		8.9		8.2		9.6	
	Apr-96								
	Jul-96								
	Oct-96								
RES-New Well Network									
B-18	Jan-96	1	U	0.5	U	0.5	U	0.5	U
	Apr-96								
	Jul-96								
	Oct-96								
B-22	Jan-96	15		1.6		2.3		5.3	
	Apr-96								
	Jul-96								
	Oct-96								
B-37	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
Res-New	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
General Groundwater Monitoring									
U-2	Jan-96	1		0.5	U	2.9		1.2	
	Apr-96								
	Jul-96								
	Oct-96								
U-3	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
U-4	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
U-5A	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
U-5	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								
B-27	Jan-96	F		F		F		F	
	Apr-96								
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 5b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Holbrook Slough Recovery Trench Well Network									
B-7	Jan-96	0.5	U	0.5	U	0.5		1	U
	Apr-96								
	Jul-96								
	Oct-96								
B-9	Jan-96	0.63		0.66		0.5	U	1.8	
	Apr-96								
	Jul-96								
	Oct-96								
General Groundwater Monitoring									
B-10	Jan-96	8.6		2.1		0.5	U	5.4	
	Apr-96								
	Jul-96								
	Oct-96								
B-11	Jan-96	260		4		140		24	
	Apr-96								
	Jul-96								
	Oct-96								
B-14	Jan-96	230		9.5		51		27	
	Apr-96								
	Jul-96								
	Oct-96								
B-28	Jan-96	4.6		0.5	U	19		6.6	
	Apr-96								
	Jul-96								
	Oct-96								
B-30	Jan-96	50		7.1		2.4		14	
	Apr-96								
	Jul-96								
	Oct-96								
CR-8	Jan-96	1.2		0.5	U	0.59		1.8	
	Apr-96								
	Jul-96								
	Oct-96								
CR-11	Jan-96	78		2.3		1.9		4.8	
	Apr-96								
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 5c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l)							
		Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-96	5.0	U	5.0	U	5.0	U	5.0	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-8	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-10	Jan-96	2.3		0.68		0.50	U	1.1	
	Apr-96								
	Jul-96								
	Oct-96								
MW-11	Jan-96	7,400		4,500		2,100		10,000	
	Apr-96								
	Jul-96								
	Oct-96								
MW-22	Jan-96	1,800		5,300		4,100		15,000	
	Apr-96								
	Jul-96								
	Oct-96								
MW-26	Jan-96	1.0	U	4.2		16		20	
	Apr-96								
	Jul-96								
	Oct-96								
MW-23	Jan-96	32		1.0	U	180		156	
	Apr-96								
	Jul-96								
	Oct-96								
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-32	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-33	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96								
	Jul-96								
	Oct-96								
MW-37	Jan-96	140		1.0		1.0	U	1.8	
	Apr-96								
	Jul-96								
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 6a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Recovery Trench Well Network																	
B-17	Jan-95	0.5 U	1.1	0.5 U	0.5 U	0.5 U	1 U	0.5 U	2.5 U	5.2	34	23	56	0.5 U	5 U	25	0.5 U
	Apr-95	1 U	1 U	1 U	1 U	1 U	2 U	2 U	10 U	2 U	5 U	11	10 U	2 U	30 U	13	1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	13	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	14	34	0.5 U	5 U	15	0.1 U
B-35	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
B-36	Jan-95																
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
RES-New Well Network																	
B-4	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
B-37	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1 U	0.1 U	0.5 U	0.2	1 U	0.13	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
General Groundwater Monitoring																	
U-2	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1	0.1 U	3.6	0.1 U	1 U	0.1 U	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.23	1 U	0.2 U	0.5 U	0.5 U	9.8	0.2 U	3 U	1 U	1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.21	0.12	0.31	0.15	0.27	0.1 U	0.1 U	5 U	5 U	0.45	5 U	5 U	0.5 U	5 U	5 U	0.1 U
U-3	Jan-95	0.1 U	0.4	0.7	0.3	0.1 U	0.6	0.7	0.5 U	0.05 U	0.9	0.9	0.6	0.8	1 U	0.65	0.1 U
	Apr-95	1.6	1.1	1.4	0.71	1.1	0.4	2.3	2 U	0.4 U	1.8	1.8	2.2	1.7	6 U	0.99	1.4
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
U-4	Jan-95	1 U	1 U	1 U	2 U	2.3	2 U	1 U	7	5 U	72	24	5 U	1 U	10 U	44	1 U
	Apr-95	1 U	1 U	1 U	2 U	1 U	2 U	2 U	10 U	10 U	5 U	5 U	10 U	2 U	30 U	2 U	1 U
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
U-5A	Jan-95	0.2 U	0.2 U	0.1 U	0.2 U	0.2 U	0.4 U	0.2 U	1.8	0.63	2.7	8	1.1	0.5	2 U	2.6	0.2 U
	Apr-95	1 U	1 U	0.1 U	1 U	1 U	2 U	2 U	10 U	2 U	5 U	17	10 U	2 U	30 U	2 U	1 U
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
U-5	Jan-95	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.2 U	0.5 U	0.5 U	0.16	0.4	1	2.5	0.1 U	1 U	0.13	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	1.6	1 U	0.2 U	3 U	0.4 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F
B-18	Jan-95	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	2.5 U	0.88	7	2.3	2.5 U	0.5 U	5 U	3.6	0.5 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	2	1 U	0.2 U	3 U	5 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
B-22	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
B-27	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

F- Sample was not obtained because of the presence of free (floating) product.

COPPOR00006160

Table 6b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
Recovery Trench Well Network																																	
B-7	Jan-95	0.7		0.5		0.5	U	0.5	U	1.2		1	U	0.5	U	3.4		4.1		59		23		2.4	U	0.5	U	4.8	U	28		0.5	U	
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	15		10	U	2	U	30	U	2	U	1	U	
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	17		5	U	0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.12		0.1		0.12		0.1		0.2		0.1	U	0.2	U	4.6		1.8		0.8		26		0.1	U	0.83		1.1		23		0.11		
B-9	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	2.4	U	0.65		3.3		4.3		2.4	U	0.5	U	4.8	U	0.48		0.5	U	
	Apr-95	0.1	U	0.1	U	0.16		0.1	U	0.37		0.2	U	0.24		1	U	0.2	U	0.5	U	8.1		1	U	0.2	U	3	U	0.2	U	0.26		
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	10		5	U	0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.13		0.1	U	0.16		0.12		0.18		0.1	U	0.14		2.9		0.49		0.4		10		0.1	U	0.32		0.6		0.94		0.16		
General Groundwater Monitoring																																	
B-10	Jan-95	0.2		0.1		0.1		0.1	U	0.3		0.2	U	0.2		1.2		2		15		7.6		13		0.1	U	1	U	9.4		0.1	U	
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	3.9		1	U	0.2	U	3	U	0.2	U	0.1	U	
	Jul-95	0.11		0.1	U	0.26		0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5.1		5	U	0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.58		0.52		3.3		0.1	U	0.39		0.28		4.2		0.1	U	
B-11	Jan-95	0.9		0.2		0.5		0.3		0.3		0.2	U	0.5		0.5	U	0.3		2.1		1.4		0.9		0.6		1	U	1.4		0.3		
	Apr-95	0.11		0.1	U	0.14		0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	1.8		1	U	0.2	U	3	U	1.3		0.1	U	
	Jul-95	0.15		0.1	U	0.28		0.11		0.24		0.1	U	0.25		5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.22		
	Oct-95	0.2		0.12		0.32		0.23		0.25		0.1	U	0.27		0.9		0.14		0.32		1.4		0.1	U	0.33		0.16		1.3		0.34		
B-14	Jan-95	0.1	U	0.3		0.1	U	0.1	U	0.7		0.2	U	0.1	U	0.6		0.27		2.2		2		12		0.5		1	U	2.7		0.1	U	
	Apr-95	0.15		0.24		0.12		0.1	U	0.2		0.2	U	0.2	U	12		0.2	U	0.5	U	2.3		12		0.2	U	3	U	2.2		0.1	U	
	Jul-95	0.1	U	0.16		0.1	U	0.1	U	0.13		0.1	U	0.1	U	5	U	5	U	0.74		5	U	9.8		0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.1	U	0.12		0.1	U	0.1	U	0.12		0.1	U	0.2	U	1		0.3		0.85		1.4		6.7		0.99		0.17		1.2		0.1	U	
B-28	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1	U	0.1	U	2		0.1	U	1	U	0.05	U	0.1	U	
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	13		0.2	U	3	U	0.2	U	0.1	U	
	Jul-95	0.1	U	0.1	U	0.11		0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	12		0.5	U	5	U	5	U	0.11		
	Oct-95	0.1		0.1	U	0.12		0.1		0.12		0.1	U	0.2	U	0.1	U	0.1	U	0.17		0.1	U	0.36		0.14		0.1	U	0.1	U	0.12		
B-30	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1	U	0.1	U	0.5	U	0.1	U	1	U	0.05	U	0.1	U	
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	1	U	0.2	U	3	U	0.2	U	0.1	U	
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.12		0.1	U	
CR-8	Jan-95	9.2		1.9		3.4		1.9		2.2		0.4		5.3		0.5	U	0.41		3		0.9		0.5	U	3.8		1	U	1.4		2.6		
	Apr-95	0.32		0.18		0.19		0.1	U	0.21		0.2	U	0.24		1	U	0.2	U	0.73		0.5	U	1	U	1.1		3	U	0.2	U	0.38		
	Jul-95	6.8		4.4		6.9		3.2		5.7		0.5	U	9.2		25	U	25	U	8.6		25	U	25	U	12		25	U	25	U	11		
	Oct-95	6.4		2.5		4		2.9		3.3		0.77		4.2		0.28		0.42		5.2		0.42		0.1	U	6.3		0.43		0.9		6.4		
CR-11	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.6		0.7		0.6		2		0.5	U	0.1	U	1	U	1.3		0.1	U	
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	1.7		1	U	0.2	U	3	U	0.2	U	0.1	U	
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U	
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.68		0.14		0.1	U	2		0.1	U	0.1	U	0.17		1.6		0.1	U	

Notes

COPPOR0006161

Table 6c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																																	
MW-7	Jan-95	1.9		1.0	U	1.0	U	1.0	U	1.0	U	0.2	U	1.0	U	5	U	5.1		37		16		5	U	8.1		10	U	19		1.0	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	56		20	U	4	U	60	U	83		2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	26		25	U	2.5	U	25	U	76		0.5	U
	Oct-95	2	U	2	U	2	U	2	U	2	U	2	U	2	U	100	U	100	U	2	U	100	U	100	U	10	U	100	U	100	U	2	U
MW-11	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	<0.1	U	2.8		0.14		0.2		0.1	U	190		0.1	U	29		0.05	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	500		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	420		0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	450		0.5	U	5	U	5	U	0.1	U
MW-22	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.07		0.2		0.3		0.5	U	0.1	U	1	U	0.34		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	290		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	100	U	5	U	0.1	U	100	U	440		0.5	U	100	U	100	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	430		0.5	U	5	U	5	U	0.1	U
MW-23	Jan-95	0.6		0.5	U	0.5		0.5	U	0.9		1	U	0.5	U	2.5	U	2.6		11		11		8.5		2.7		48		11		0.5	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	12		0.2	U	3	U	4	U	0.1	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	33		2.5	U	25	U	25	U	0.5	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	6.6		50		0.5	U	5	U	5	U	0.1	U
MW-24	Jan-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Apr-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Jul-95	5	U	5	U	5	U	5	U	5	U	5	U	5	U	50	U	50	U	1	U	58		50	U	25	U	50	U	72		5	U
	Oct-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
MW-26	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	3.4		0.26		1.1		1.3		6.4		0.3		1	U	2.3		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	3.4		10		0.2	U	3	U	2.3		0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5.3		0.1	U
MW-28	Jan-95	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.4	U	0.2	U	2.9		0.94		1.8		0.2	U	1	U	8.6		6.1		1.2		0.2	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	12		20	U	4	U	60	U	4	U	2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	25	U	2.5	U	25	U	25	U	0.5	U
	Oct-95	10	U	10	U	10	U	10	U	10	U	10	U	10	U	500	U	500	U	10	U	500	U	500	U	50	U	500	U	500	U	10	U
MW-31	Jan-95	1	U	1	U	1	U	1	U	1	U	2	U	1	U	5	U	15		56		32		5	U	1	U	10	U	46		1	U
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	17		10	U	2	U	30	U	25	U	1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5.7		0.1	U
MW-37	Jan-95	0.2		0.2		0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	2.2		0.32		3.7		4.9		0.5	U	0.1	U	1	U	3.2		0.1	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	10	U	20	U	4	U	60	U	4	U	2	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.14		0.1	U	0.1	U	0.2		5	U	5	U	0.1	U	20		5	U	0.5	U	5	U	7.8		0.36	
	Oct-95	0.2		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1		5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	8		0.1	U

Notes: U = Not Detected Above Method Detection Limit.
ns = Not Sampled.

COPPOR0006162

Table 7a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
B-17	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96																
	Jul-96																
	Oct-96																
B-35	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
B-36	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96																
	Jul-96																
	Oct-96																
RES-New Well Network																	
B-18	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96																
	Jul-96																
	Oct-96																
B-22	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96																
	Jul-96																
	Oct-96																
B-37	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
General Groundwater Monitoring																	
U-2	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96																
	Jul-96																
	Oct-96																
U-3	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
U-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
U-5A	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
U-5	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																
B-27	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96																
	Jul-96																
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS-1 - not sampled for PAH analyses due mis-communication.

COPPOR0000163

Table 7b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-7	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
B-9	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
General Groundwater Monitoring																	
B-10	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
B-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	9.2	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
B-14	Jan-96	0.1 U	0.11	0.1 U	0.1 U	0.36	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7.6	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
B-28	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7	5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
B-30	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																
CR-8	Jan-96	1.9	0.54	1.4	0.56	0.82	0.1 U	2.1	5 U	5 U	1.2	5 U	5 U	1.6	5 U	5 U	2.3
	Apr-96																
	Jul-96																
	Oct-96																
CR-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96																
	Jul-96																
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

COPPOR00006164

Table 7c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

		Concentration (ug/l)																													
Sample Location	Sample Date	Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																															
MW-7	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-11	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	470		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-22	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	480		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-23	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-26	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	22		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96																														
	Jul-96																														
	Oct-96																														
MW-37	Jan-96	2.8		1.2		2.3		1.0		3.6		1.0	U	1.6		50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.3	
	Apr-96																														
	Jul-96																														
	Oct-96																														

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

COPPOR00006165

Table 8
Free Product Recovered
Interim Action Plan
Willbridge Facilities

Week Ending	PRODUCT REMOVED (gallons)				COMMENTS
	Unocal	Chevron	Shell/GATX	Holbrook Recovery Trench	
May 1995	---	---	1.50	off	SHELL/GATX installed Phase I recovery systems MW-6 and MW-24
June 1995	0.50	0.00	1.35	nr	
July 1995	0.55	0.04	0.37	nr	
August 1995	5.21	0.57	0.78	nr	
September 1995	0.00	0.12	26.03	nr	
October 1995	0.00	0.00	3.10	700	Trench recovery quantities totaled in Jan. 1996
November 1995	5.50	0.00	0.03	off	
December 1995	6.31	0.00	0.25	off	
1/5/96	0.34	nc	0.12	off	
1/12/96	5.59	nc	0.06	off	
1/19/96	nc	nc	nr	off	
1/26/96	nc	0.16	0.62	off	CR-10 - Petrobelt broken
2/2/96	1.95	nc	0.00	off	
2/9/96	nc	nc	nr	off	
2/16/96	nc	nc	nr	off	
2/23/96	42.04	0.28	0.00	off	MW-6: moved PRC from MW-19 to MW-6
3/1/96	nc	nc	nc	off	
Product Recovered	67.99	1.16	34.21	700	
			Total Recovered	803.4	

Symbols:

--- = no product recovery systems installed.

nc = product recovery systems not checked that week.

nr = system checked, data reported cumulative on the nextreport submitted.

COPPOR0006166

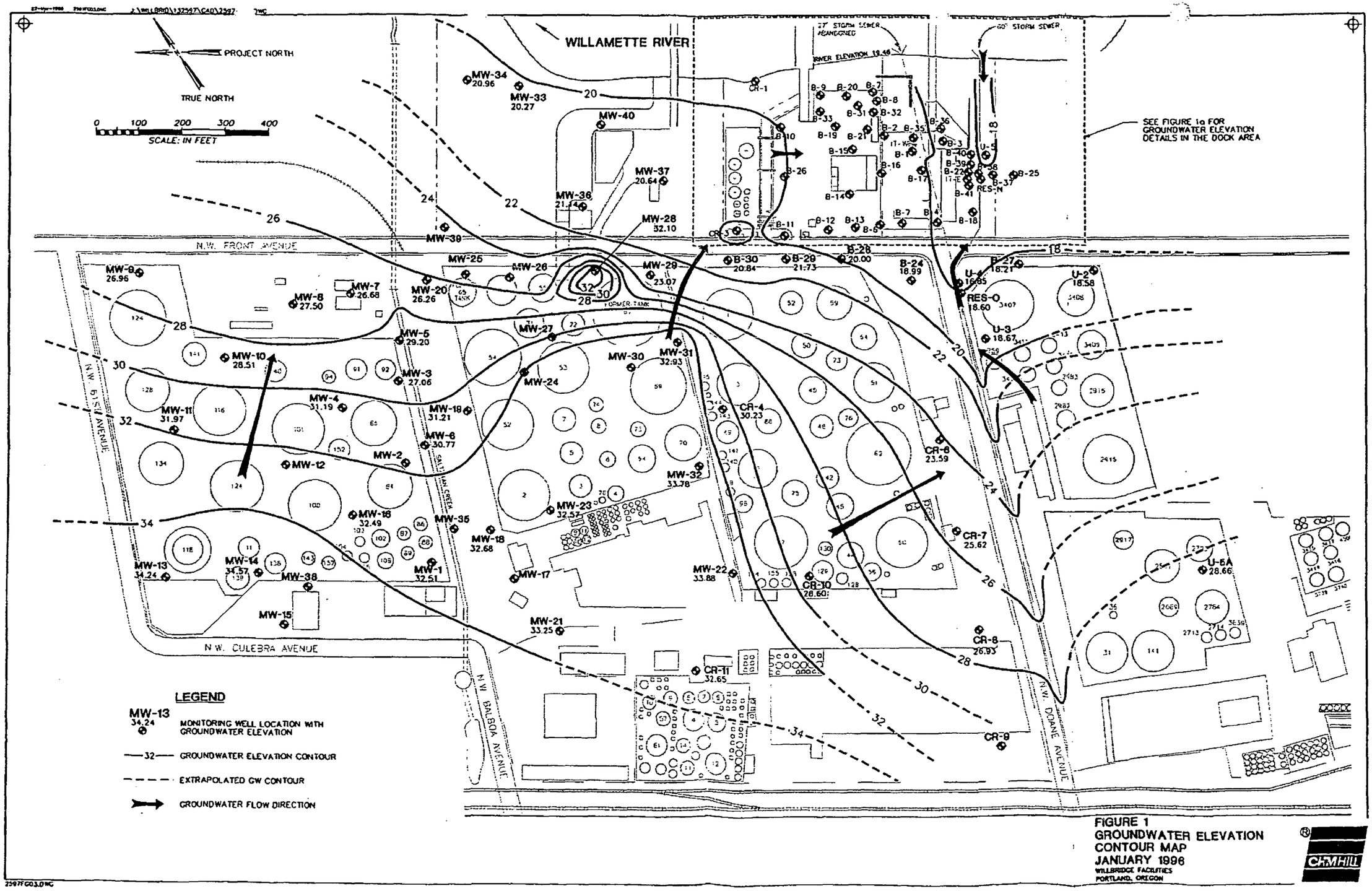


FIGURE 1
GROUNDWATER ELEVATION CONTOUR MAP
JANUARY 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

2597FG03.DWG

COPPOR0006167

05-APR-1996

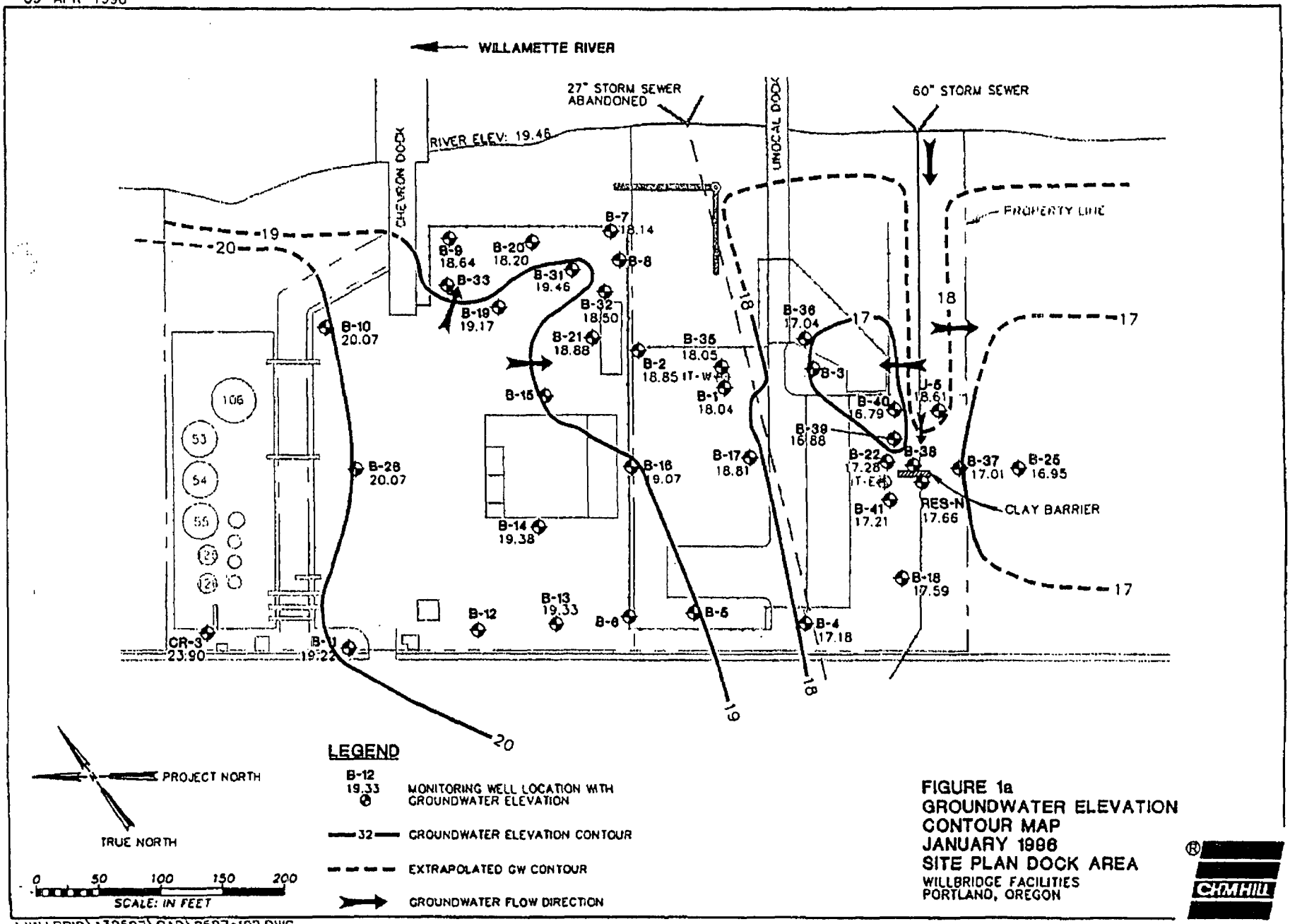


FIGURE 1a
GROUNDWATER ELEVATION CONTOUR MAP
JANUARY 1996
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

J: WILLBRID\132597\CAD\2597g102.DWG

COPPOR0006168

PROJECT NORTH

TRUE NORTH

0 100 200 300 400

SCALE: IN FEET

27" STORM SEWER ABANDONED

60" STORM SEWER

SEE FIGURE 2a FOR FREE PRODUCT THICKNESS DETAILS IN THE DOCK AREA

N.W. 61ST AVENUE

N.W. CULEBRA AVENUE

N.W. BALBOA AVENUE

SALTZMAN CREEK

FORMER GS TANK

FORMER TANK 67

LEGEND

THICKNESS (FT)

LOW GW	HIGH GW	
-	0.10	JANUARY 1996
0.43	-	OCTOBER 1995
0.11	-	JULY 1995
-	0.12	APRIL 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

* = PRODUCT RECOVERY EQUIPMENT PRESENT IN THE WELL

ND = NOT DETECTED DURING MEASUREMENT PERIOD

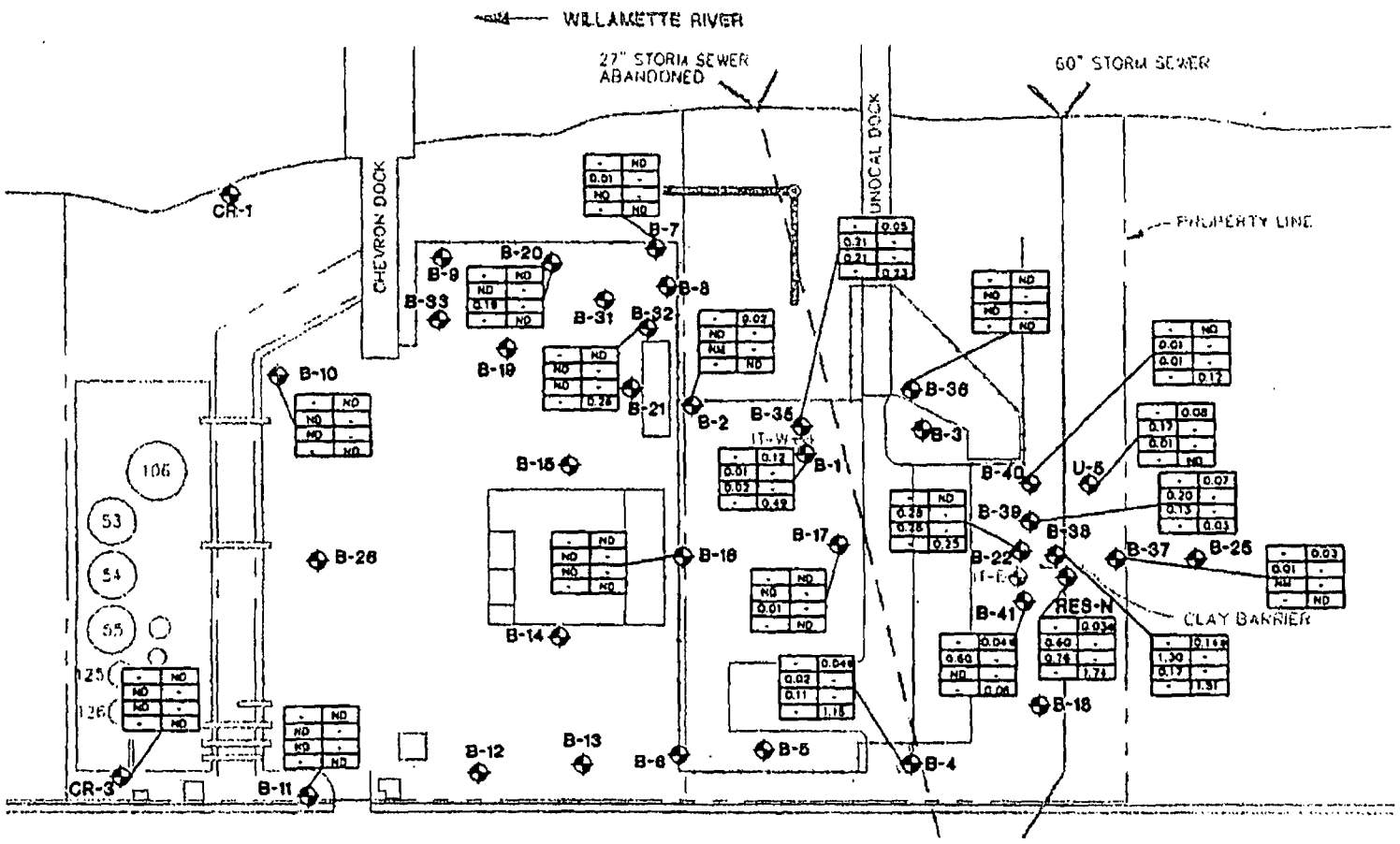
NM = NOT MEASURED

\\WILLBRID\ \92B1FG02.DWG

FIGURE 2
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS APRIL 1995 TO JANUARY 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR0006169



LEGEND

THICKNESS (FT)
LOW GW HIGH GW

JANUARY 1996
OCTOBER 1995
JULY 1995
APRIL 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

ND = NOT DETECTED DURING MEASUREMENT PERIOD
• = PRODUCT RECOVERY EQUIPMENT PRESENT IN THE WELL
NM = NOT MEASURED

PROJECT NORTH

TRUE NORTH

0 50 100 150 200
SCALE: IN FEET

WILLBRID\132597\CAD\DOCKM14A.DWG

FIGURE 2a
APPARENT FREE PRODUCT THICKNESS MEASUREMENT APRIL 1995 JANUARY 1996
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR00006170

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CH2MHILL

October 3, 1996

132597.II.01

Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. Fourth Avenue, Suite 400
Portland, OR 97204

Dear Ms. Kiernan:

Subject: **Willbridge RI/FS Interim Action,**
Quarterly Report for June through August 1996

This letter presents the quarterly progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Unocal, and GATX/Shell Willbridge facilities in Portland, Oregon. This report presents a summary of the following:

- Actions taken under the Consent Order from June to August 1996.
- Sampling, test results, and other data generated between June and August 1996.
- A description of problems experienced and the manner in which they were resolved or are being addressed.
- Actions scheduled to be taken under the Consent Order from September to November 1996.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

Action Taken from June through August 1996

The following work was performed from June through August 1996:

- Performed quarterly groundwater sampling, monthly monitoring, and bi-weekly seep and sheen observations at the Chevron, GATX/Shell, and Unocal facilities.

- Continued to operate the Holbrook Slough cutoff trench at the Old Doane Avenue storm water outfall for groundwater and free product recovery when river stage levels allowed operation of the system.
- Recovered approximately 4.4 gallons of product from monitoring wells at the Unocal, Chevron, and GATX/Shell facilities from June through August 1996.
- Completed two phases of the Doane Avenue Storm Sewer Investigation (smoke testing and video surveying storm sewer system). This investigation is part of the *Willbridge Facilities Riverfront Interim Action Work*.
- Implemented monthly product and groundwater elevation monitoring of additional wells (Wells B-5, B-6, B-11 through B-16, B-26 and CR-3) adjacent to possible sources in an attempt to identify new releases in response to the continued detection of elevated dissolved BTEX concentrations in the Riverfront area.
- Implemented a Product Characterization Program (Technical Memorandum #5-dated August 30, 1996) that will develop a baseline data set for the various types of product currently found in the monitoring wells at the site, implement a testing schedule, and initiate a program for evaluating future events such as new release or changes in the product distribution or appearances at the site.
- Initiated aerial photography and associated survey work for construction of a detailed topographic map of the Willbridge Riverfront Area for use in remedial design work.
- Obtained elevations of monitoring wells MW-39 and MW-40 at the GATX/Shell facility using the topographic mapping survey crew.
- Submitted a draft Riverfront Subsurface Investigation Work Plan to the PRP group for review.

Sampling, Test Results, and Data Generated from June through August 1996

Interim action monitoring activities performed this quarter included water level and product thickness measurements and groundwater sampling from selected wells, as outlined in the Field Coordination Plan (FCP) dated April 1995. Groundwater samples were not obtained from wells with free product.

Groundwater Levels and Flow

Water level measurements performed in June , July, and August 1996 are presented in Tables 1a to 1c, Tables 2a to 2c, and Tables 3a to 3c, respectively. Measurements were

corrected for free product where present. A groundwater contour map using the July 1996 data is presented in Figures 1 and 1a.

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the river front. The groundwater table elevations beneath the site were dropping during the end of spring 1996 (last quarter) from the high elevations of the winter months. During this summer quarter (June to August 1996) the water table elevation beneath the site dropped approximately 2 feet from the spring measurements in response to the reduced rainfall and infiltration associated with the annual precipitation cycles in Portland.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX/Shell south tank farm, and apparent elongated groundwater depressions (troughs) beneath N.W. Doane Avenue, and the Saltzman Creek flume. These troughs may be caused by groundwater drainage through the backfill associated with the Doane Avenue storm sewer conduit and the Saltzman Creek flume. The groundwater mound in the GATX/Shell tank farm may be caused by a difference in hydraulic conductivity of the stratigraphic units beneath the GATX/Shell south tank farm (silt/clay) and the remainder of the site (sandy fill).

River Stage Data

The Willamette River stage (measured on the river gauge at the Unocal dock and converted to City of Portland datum) ranged from approximately 15.9 in June to 6.1 feet during August 1996. The river stage steadily decreased throughout this quarter.

Product Thickness Measurements

Free product thicknesses were measured at selected wells on a monthly and quarterly basis (see Tables 1a to 3c). These data were compiled with apparent free product thickness data for October 1995, and January, April and July 1996 and are shown in Figures 2 and 2a.

Riverfront Area

The presence of free product in the riverfront area historically is often associated with the former and current alignments of the Doane Avenue stormwater outfall and possibly the Holbrook slough. Wells B-1, B-4, B-17 and B-35 are located in the dock area nearest the Old Doane Avenue storm drain alignment and Well B-7 is located nearest the historic Holbrook slough outfall. Wells B-38, B-39, B-40, and U-5, are adjacent to the New Doane Avenue storm drain in the riverfront area. RES-New is constructed in the backfill of the storm drain in the riverfront area.

The July 1996 product measurements generally show product thicknesses that are similar to last quarters measurements in wells located in the general riverfront area of the site (Table

2a, 2b, and 2c) with the exception of Wells B-7, B-17, B-35 and RES-New. No product measured in these wells in July 1996.

Tank Farm Portion of Site

Product is present in the Unocal Tank farm area in Wells U-5A, U-4 and B-27 in July 1996. Product was also measured along the perimeter of the Chevron tank farm in Wells CR-6, CR-7, and CR-10 in July. In the GATX/Shell facility product was observed in Wells MW-7, MW-23, and MW-26 in July 1996. Product is occasionally observed in MW-7 throughout the year, and in MW-23 during the summer months, however, product has not been previously observed in Well MW-26.

Water Quality

Groundwater samples collected from selected locations in the monitoring well network were tested for benzene, toluene, ethylbenzene, and xylenes (BTEX) (EPA method SW8020) and polycyclic aromatic hydrocarbons (PAHs) (EPA method SW8310), as described in the FCP. July 1996 BTEX results are presented in Tables 4a to 4c. July 1996 PAHs results are presented in Tables 5a to 5c. Wells that contained free product were not sampled (free product designated by an F in the Tables).

BTEX

The July 1996 BTEX testing results appear to be consistent with the April 1996 results. The increasing BTEX concentrations noted in Wells B-11, B-14, and B-17 during late 1995 have stabilized over the last two quarters. However, Wells MW-8 and MW-37 on the GATX/Shell facility have elevated BTEX concentrations compared to last quarter's water sampling results.

PAHs

The July 1996 PAHs testing results appear to be consistent with the April 1996 results, with the exception of B-36. Previously water sampling rounds detected no PAHs in Well B-36. Laboratory analysis detected several PAH compounds during the July 1996 water sample event.

Product Recovery

The recovery program began in May 1995. The well locations included in the product recovery program and the corresponding product recovery equipment are described in Chapter 3 of the FCP. Approximately 115 gallons of free product has been recovered by product recovery equipment in monitoring wells since the recovery program began in late May 1995. Approximately 700 gallons of product was also recovered from the Holbrook recovery trench in 1995. Product recovery data for each site are presented in Table 6.

Product recovery quantities vary from month to month. The passive PRC product recovery equipment consistently recovers small quantities of product per well each month (less than 1 gallon) while the more aggressive active product recovery equipment, Petro-belt, recovers larger quantities of product per month (2 to 20 gallons) on an irregular basis.

GATX/Shell Site

A Petro-belt is operating in Well MW-24 and product recovery canisters (PRCs) are present in Wells MW-7, MW-6 and MW-28. Approximately 0.4 gallons of product was recovered from the GATX/Shell site this quarter.

Unocal Site

PRCs are present in Wells U-4, B-4, B-27 and B-41. A hand bailing program has been implemented in Wells B-1, B-22, B-35, B-39, U-5, U-5A and RES-Old. Hand bailing is also being conducted in wells that are either observed to have product, or if additional product is found in a well that a PRC has not recovered. A product skimmer is present in RES-New. However, the Petro-belt has been removed from Well B-38 because of excessive drag on the belt from the crooked well casing. A total of 1.9 gallons of product was recovered from the wells at the Unocal site this quarter.

Chevron Site

PRCs are installed in Wells B-24, CR-6, and CR-7. A Petro-belt is present in Well CR-10. A total of 1.3 gallons of product was recovered from the Chevron site this quarter.

Holbrook Recovery Trench

The river stage controls operation of the Holbrook Slough recovery trench, located along the shoreline near the old Doane Avenue outfall location. The trench is shut off as the river stage rises above approximately 8 to 9 feet, City of Portland datum (measured on the river gauge staff on the Unocal dock). River stage levels this quarter ranged between 15.9 to 6.1 feet. The trench began operating in the middle of July, as the river stage dropped below approximately 9 feet. Quantities of water and/or product recovered will be reported and calculated when the data becomes available (typically early winter).

Seep and Sheen Monitoring

Weekly to biweekly site visits were performed to document the location and extent of hydrocarbon seeps and sheens at the riverbank. Field observations were recorded on the seep/sheen form. Monitoring indicates that several site conditions, including the river stage and the recovery trench operation (tied to the river stage), affect the presence and magnitude of hydrocarbon seeps and the resulting sheens observed at the river's edge.

Sheens that are observed on the water surface are controlled with containment booms and recoverable product is removed from the water surface in these areas by adsorbent pads.

The containment booms currently encompass the shoreline between the Chevron and Unocal docks, and from the south edge of the Unocal dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). In addition, secondary containment booms are located inside of the first boom around the new Doane Avenue outfall pipe.

Holbrook Recovery Trench Shoreline. Light sheens were occasionally observed near the recovery trench while it was submerged during the beginning of this quarter. No sheens were observed in this area after the river stage dropped below 6 feet and the trench began operating.

New Doane Avenue Outfall. In June and early July 1996 heavy to moderate sheens were observed inside the containment booms at the outfall. However, no sheens were observed on the waters surface in the containment boom area during the month of August, following the drop in the river stage. During these visits, sheens were observed on the surface of the soil below the end of the outfall pipe, but not in the water. These sheens are believed to be produced from product seep discharge from the backfill surrounding the pipe.

No sheen were observed north of the of the Chevron or GATX/Shell docks.

Problems Experienced from June through August 1996

The Petro-belt is not operating properly in Well B-38 because of excessive drag on the belt from the crooked well casing. The Petro-belt will be removed from the well. Access to the water table through the crooked casing using a small bailer is being evaluated. Following accessibility evaluation of the crooked casing, if possible, the well will be included in the hand-bailing program. If it is determined that the well is not accessible using a short bailer, additional alternatives will be evaluated.

The PAHs laboratory analysis for the monitoring wells at the GATX/Shell facility were analyzed after the holding times had expired. A quality control/quality assurance review is conducted by the field consultants and all data is flagged appropriately on Tables 4a to 5c.

Actions Scheduled for September through November 1996

The following actions are scheduled for September through November 1996:

- Continue the interim action monitoring program at the Chevron, GATX/Shell, and Unocal facilities, as described in the Interim Action Plan, the FCP, and modifications discussed in quarterly reports. The next water quality sampling event is scheduled for October 28, 1996.
- Continue operation of the Holbrook Slough cutoff trench as an interim action if river levels are below the automatic shut-off level.
- Complete the last phase of the Doane Avenue Storm Sewer System Investigation work, sampling the storm water run-off during a rainstorm.
- Submit the Waterfront Subsurface Investigation Work Plan to DEQ.
- Continue review of existing information and interim action monitoring data.
- Begin evaluation of the Interim Action monitoring program that was developed in January 1995

Please call me at 503/235-5000 if you have any questions.

Sincerely,

CH2M HILL

Ross Rieke/lml

Ross D. Rieke, P.E.
Project Manager

Enclosures

Tables 1b to 1c, Water Level Monitoring Data: June 1996
Tables 2a to 2c, Water Level Monitoring Data: July 1996
Tables 3a to 3c, Water Level Monitoring Data: August 1996
Tables 4a to 4c, Water Quality Monitoring Results, Aromatic Volatiles, 1996
Tables 5a to 5c, Water Quality Monitoring Results, PAHs, 1996
Table 6, Free Product Recovered
Figure 1, Groundwater Elevation Contour Map
Figure 1a, Groundwater Elevation Contour Map-Dock Area
Figure 2, Apparent Free Product Thickness Measurements
Figure 2a, Apparent Free Product Thickness Measurements-Dock Area

cc: Rene White/Chevron
Andrew Holbrook/GATX
Joe Comstock/UNOCAL
Irv Jenkins/Shell Oil
Terry Fisk/GeoEngineers
Gregory Kupillas/Hart Crowser
Paul Woods/SECOR
Dave Bartz/Schwabe Williamson
Bruce Brody-Heine/CH2M HILL

Table 1a
Water Level Monitoring Data
Unocal

Date: 06/24/96
Time Begin: **Time End:**
Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network								
B-1	34.79 b	16.68	M	16.69	M	0.01	16.68	18.11
B-2	35.35 b			16.50	M			18.85
B-4	34.79 b		M		M			NM-1
B-17	35.59 b	16.40	M	16.40	M	0.00	16.40	19.19
B-35	33.58 a		M	15.54	M		15.54	18.04
B-36	30.97 a			13.84	M			17.13
RES-New Well Network								
B-1	34.79 b	16.68		16.69		0.01	16.68	18.11
B-17	35.59 b			16.72		0.00	16.40	19.19
B-18	35.79 b			18.35	M			17.44
B-22	34.67 b		M	17.99	M		17.99	16.68
B-25	35.83 b			18.12	M			17.71
B-37	35.24 a			19.13	M			16.11
B-40	33.19 a	16.99	M	17.14	M	0.15	17.02	16.17
B-41	34.64 a		M		M			NM-1
U-5	34.20	18.10		18.11	Q	0.01	18.10	16.10
RES - New	38.58	22.41	M	22.41	M	0.00	22.41	16.17
General Groundwater Monitoring								
U-2	35.02 a			14.36	Q			20.66
U-3	35.25 a			12.69	Q			22.56
U-4	34.46 a		M		M			NM-1
U-5A	33.77 a	5.79	M	6.11	M	0.32	5.85	27.92
U-5	34.20 a	18.10		18.11		0.01	18.10	16.10
B-1	34.79 b	16.68		16.69		0.01	16.68	18.11
B-4	34.79 b							NM-1
B-5	34.79 b			dry				dry
B-6	35.41 b			16.47				18.94
B-16	35.82 b			16.71	M			19.11
B-17	35.59 b			16.72		0.00	16.40	19.19
B-18	35.79 b			18.35				17.44
B-22	34.67 b			17.99		0.00	17.99	16.68
B-27	35.74 c		M		M			NM-1
B-35	33.58 a			15.54		0.00	15.54	18.04
B-36	30.97 a			13.84				17.13
B-37	35.24 a			19.13				16.11
B-38	34.75 a		M		M			NM-1
B-39	33.92 a	17.67	M	18.39	M	0.72	17.81	16.11
B-40	33.19 a	16.99		17.14		0.15	17.02	16.17
B-41	34.64 a							NM-1
RES - Old	36.03 d	17.18	M	17.19	M	0.01	17.18	18.85

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
8 NM-1 = Well not monitored because product recovery equipment in well.

Table 1b
Water Level Monitoring Data
Chevron

Date: 06/24/96
Time Begin: 1030 **Time End: 1430**
Field Staff: EAA

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network									
B-7	33.96	b	17.96	M	17.96	M	0.00	17.96	16.00
B-9	33.95	b			16.09	M			17.86
B-19	34.71	b			15.79	M			18.92
B-21	34.79	b			16.01	M			18.78
B-31	33.86	d			14.04	M			19.82
B-32	34.23	a			16.01	M			18.22
River Stage		e				M			
General Groundwater Sampling									
B-7	33.96	b	17.96	M	17.96	M	0.00	17.96	16.00
B-9	33.95	b			16.09	M			17.86
B-10	34.74	b	15.03	M	15.03	M	0.00	15.03	19.71
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-19	34.71	b			15.79	M			18.92
B-20	33.40	b	16.29	M	16.29	M	0.00	16.29	17.11
B-24	34.70	b	15.57	M	15.57	M	0.00	15.57	19.13
B-26	35.30	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a			16.01	M			18.22
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a	11.35		11.35	M	0.00	11.35	24.26
CR-7	35.57	a	10.78	M	10.98	M	0.20	10.82	24.75
CR-8	33.14	a				Q			
CR-10	35.57	a		M		M	0.00	0.00	NM-1
CR-11	34.43	a	2.39	M	2.39	M	0.00	2.39	32.04
River Stage		e			0.00	M			

Notes:

1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 1c
Water Level Monitoring Data
Shell/GATX

Date: June 24, 1996

Time Begin: 8:16 a.m. **Time End: 9:47 a.m.**

Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	4.35	M	4.35	M	0.00	4.35	28.99
MW-7	34.12 c	8.36	M	8.48	M	0.12	8.38	25.74
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	6.27	M	6.27	M	0.00	6.27	30.20
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	2.93	M	2.93	M	0.00	2.93	30.46
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	3.93	M	3.93	M	0.00	3.93	31.72
MW-23	36.06 c	4.46	M	4.46	M	0.00	4.46	31.60
MW-24	35.15 c		M		M	0.00	0.00	NM-1
MW-27	35.67 c	5.34	M	5.34	M	0.00	5.34	30.33
MW-28	34.39 c	6.01	M	6.01	M	0.00	6.01	28.38
MW-29	35.77 c				Q			
MW-31	37.55 c	6.72	M	6.72	M	0.00	6.72	30.83
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			
MW-39	35.02 c	13.01	M	13.01	M	0.00	13.01	22.01
MW-40	33.65 c	13.81	M	13.81	M	0.00	13.81	19.84

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).

4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38

5 NM-1 = Well not monitored because product recovery equipment in well.

Table 2a
Water Level Monitoring Data
Unocal

Date: 07/22/96
Time Begin: **Time End:**
Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network						
B-1	34.79 b	17.20 M	17.22 M	0.02	17.20	17.59
B-2	35.35 b		16.99 M			18.36
B-4	34.79 b	0.00 M	0.00 M	0.00		
B-17	35.59 b	17.16 M	17.16 M	0.00	17.16	18.43
B-35	33.58 a	M	16.06 M		16.06	17.52
B-36	30.97 a		15.01 M			15.96
RES-New Well Network						
B-1	34.79 b	17.20	17.22	0.02	17.20	17.59
B-17	35.59 b		17.16	0.00	17.16	18.43
B-18	35.79 b		18.97 M			16.82
B-22	34.67 b	M	18.94 M		18.94	15.73
B-25	35.83 b		19.09 M			16.74
B-37	35.24 a		20.13 M			15.11
B-40	33.19 a	18.32 M	18.44 M	0.12	18.34	14.85
B-41	34.64 a	0.00 M	0.00 M	0.00	0.00	
U-5	34.20	19.39	19.42 Q	0.03	19.40	14.80
RES - New	38.58	22.88 M	22.88 M	0.00	22.88	15.70
General Groundwater Monitoring						
U-2	35.02 a		14.96 Q			20.06
U-3	35.25 a		13.02 Q			22.23
U-4	34.46 a	0.00 M	0.00 M	0.00	0.00	
U-5A	33.77 a	6.47 M	6.54 M	0.07	6.48	27.29
U-5	34.20 a	19.39	19.42	0.03	19.40	14.80
B-1	34.79 b	17.20	17.22	0.02	17.20	17.59
B-4	34.79 b	0.00	0.00	0.00		
B-5	34.79 b		dry			
B-6	35.41 b		16.91			18.50
B-16	35.82 b		17.19 M			18.63
B-17	35.59 b		17.16	0.00	17.16	18.43
B-18	35.79 b		18.97			16.82
B-22	34.67 b		18.94	0.00	18.94	15.73
B-27	35.74 c	0.00 M	0.00 M	0.00	0.00	
B-35	33.58 a		16.06	0.00	16.06	17.52
B-36	30.97 a		15.01			15.96
B-37	35.24 a		20.13			15.11
B-38	34.75 a	19.59 M	20.84 M	1.25	19.84	14.91
B-39	33.92 a	18.68 M	18.71 M	0.03	18.69	15.23
B-40	33.19 a	18.32	18.44	0.12	18.34	14.85
B-41	34.64 a	0.00	0.00	0.00	0.00	
RES - Old	36.03 d	17.53 M	17.54 M	0.01	17.53	18.50

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
0 NM-1 = Well not monitored because product recovery equipment in well.

COPPOR00006182

Table 2b
Water Level Monitoring Data
Chevron

Date: 07/22/96
Time Begin: 800 **Time End: 1330**
Field Staff: EAA/TDR

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network						
B-7	33.96 b	18.79 M	18.79 M	0.00	18.79	15.17
B-9	33.95 b		16.61 M			17.34
B-19	34.71 b		16.35 M			18.36
B-21	34.79 b		16.53 M			18.26
B-31	33.86 d		15.84 M			18.02
B-32	34.23 a		16.86 M			17.37
General Groundwater Sampling						
B-7	33.96 b	18.79 M	18.79 M	0.00	18.79	15.17
B-9	33.95 b		16.61 M			17.34
B-10	34.74 b	15.64 M	15.64 M	0.00	15.64	19.10
B-11	34.95 b		15.40 Q			19.55
B-14	36.59 b		17.70 Q			18.89
B-19	34.71 b		16.35 M			18.36
B-20	33.40 b	17.13 M	17.13 M	0.00	17.13	16.27
B-24	34.70 b	15.95 M	15.95 M	0.00	15.95	18.75
B-26	35.30 b		16.03 Q			19.27
B-28	35.25 b		15.51 Q			19.74
B-30	35.35 b		15.22 Q			20.13
B-32	34.23 a		16.86 M			17.37
CR-3	34.32 a		14.62 Q			19.70
CR-4	34.93 a		6.48 Q			28.45
CR-6	35.61 a	12.57	12.58 M	0.01	12.57	23.04
CR-7	35.57 a	11.35 M	11.57 M	0.22	11.39	24.18
CR-8	33.14 a		7.08 Q			26.06
CR-10	35.57 a	1.28 M	1.23 M	0.05	1.19	34.38
CR-11	34.43 a	3.35 M	3.35 M	0.00	3.35	31.08

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-12, B-13, B-33 and CR-9
8 NM-1 = Well not monitored because product recovery equipment in well.
9 e = River stage 16.00 equals elevation 20.71

Table 2c
Water Level Monitoring Data
Shell/GATX

Date: July 22, 1996

Time Begin: 7:20 a.m. **Time End: 12:47 p.m.**

Field Staff: Doann Hamilton & Stacey Callison

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c			6.92	Q			28.51
MW-3	36.02 c			8.47	Q			27.55
MW-4	36.39 c			7.97	Q			28.42
MW-5	33.52 c			6.98	Q			26.54
MW-6	33.34 c	5.08	M	5.08	M	0.00	5.08	28.26
MW-7	34.12 c	8.98	M	9.28	M	0.30	9.04	25.08
MW-8	33.95 c			8.30	Q			25.65
MW-9	36.53 c			10.34	Q			26.19
MW-10	35.82 c			9.87	Q			25.95
MW-11	36.47 c	7.04	M	7.04	M	0.00	7.04	29.43
MW-12	35.95 c			7.15	Q			28.80
MW-13	37.89 c			6.28	Q			31.61
MW-14	36.28 c			5.68	Q			30.60
MW-16	34.93 c			5.63	Q			29.30
MW-18	33.76 c			2.83	Q			30.93
MW-19	33.39 c	3.61	M	3.61	M	0.00	3.61	29.78
MW-20	34.76 c			10.41	Q			24.35
MW-21	34.33 c			2.24	Q			32.09
MW-22	35.65 c	4.55	M	4.55	M	0.00	4.55	31.10
MW-23	36.06 c	5.02	M	5.05	M	0.03	5.03	31.04
MW-24	35.15 c		M		M	0.00	0.00	
MW-26	34.78 c	11.39		11.82		0.43	11.48	23.30
MW-27	35.67 c	5.73	M	5.73	M	0.00	5.73	29.94
MW-28	34.39 c	6.77	M	6.77	M	0.00	6.77	27.62
MW-29	35.77 c			13.64	Q			22.13
MW-31	37.55 c	7.38	M	7.38	M	0.00	7.38	30.17
MW-32	37.01 c			5.45	Q			31.56
MW-33	39.34 c			20.26	Q			19.08
MW-34	39.67 c			19.74	Q			19.93
MW-36	34.88 c			14.90	Q			19.98
MW-37	34.86 c			15.28	Q			19.58
MW-39	35.02 c	13.45	M	13.45	M	0.00	13.45	21.57
MW-40	33.65 c	14.32	M	14.32	M	0.00	14.32	19.33

Notes:

1 ☐ outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).

4 NM-1 = Well not monitored because product recovery equipment in well.

Table 3a
Water Level Monitoring Data
Unocal

Date: 08/23/96
Time Begin:10:30 **Time End:13:00**
Field Staff: RFI

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrook Slough Recovery Trench Well Network									
B-1	34.79	b	17.49	M	17.52	M	0.03	17.50	17.29
B-2	35.35	b			17.48	M			17.87
B-4	34.79	b	18.35	M	18.35	M	0.00	18.35	16.44
B-17	35.59	b	17.57	M	17.57	M	0.00	17.57	18.02
B-35	33.58	a		M	16.85	M		16.85	16.73
B-36	30.97	a			15.81	M			15.16
RES-New Well Network									
B-1	34.79	b	17.49		17.52		0.03	17.50	17.29
B-17	35.59	b			17.57		0.00	17.57	18.02
B-18	35.79	b			17.50	M			18.29
B-22	34.67	b		M	18.89	M		18.89	15.78
B-25	35.83	b			19.03	M			16.80
B-37	35.24	a			20.15	M			15.09
B-40	33.19	a	18.87	M	18.93	M	0.06	18.88	14.31
B-41	34.64	a		M		M			
U-5	34.20					Q			
RES - New	38.58			M	22.21	M			16.37
General Groundwater Monitoring									
U-2	35.02	a			15.10	Q			19.92
U-3	35.25	a			13.15	Q			22.10
U-4	34.46	a	16.31	M	16.47	M	0.16	16.34	18.12
U-5A	33.77	e	7.21	M	8.10	M	0.89	7.39	26.38
U-5	34.20	a							
B-1	34.79	b	17.49		17.52		0.03	17.50	17.29
B-4	34.79	b	18.35		18.35		0.00	18.35	16.44
B-5	34.79	b			Dry	M			
B-6	35.41	b			17.99	M			17.42
B-16	35.82	b				M			
B-17	35.59	b			17.57		0.00	17.57	18.02
B-18	35.79	b			17.50				18.29
B-22	34.67	b			18.89		0.00	18.89	15.78
B-27	35.74	c	18.12	M	18.68	M	0.56	18.23	17.51
B-35	33.58	a			16.85		0.00	16.85	16.73
B-36	30.97	a			15.81				15.16
B-37	35.24	a			20.15				15.09
B-38	34.75	a	18.70	M	18.73	M	0.03	18.71	16.04
B-39	33.92	a	19.18	M	20.05	M	0.87	19.35	14.57
B-40	33.19	a	18.87		18.93		0.06	18.88	14.31
B-41	34.64	a							
RES - Old	36.03	d	18.10	M	18.11	M	0.01	18.10	17.93
River Gauge	3.115					M			

Notes:

1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
0 NM-1 = Well not monitored because product recovery equipment in well.

Table 3b
Water Level Monitoring Data
Chevron

Date: 08/26/96
Time Begin: 0930 Time End: 1200
Field Staff: EAA

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Holbrock Slough Recovery Trench Well Network								
B-7	33.96 b	19.18	M	19.18	M	0.00	19.18	14.78
B-9	33.95 b			17.26	M			16.69
B-19	34.71 b			16.84	M			17.87
B-21	34.79 b			16.95	M			17.84
B-31	33.86 d			16.71	M			17.15
B-32	34.23 a			17.37	M			16.86
General Groundwater Sampling								
B-7	33.96 b	19.18	M	19.18	M	0.00	19.18	14.78
B-9	33.95 b				M			16.69
B-10	34.74 b	16.12	M	16.12	M	0.00	16.12	18.62
B-11	34.95 b			15.91	M			19.04
B-12	35.11 b			16.37	M			18.74
B-13	34.76 b			16.36	M			18.40
B-14	36.59 b			18.15	M			18.44
B-15	35.55 b			17.32	M			18.23
B-19	34.71 b				M			17.87
B-20	33.40 b	17.62	M	17.62	M	0.00	17.62	15.78
B-24	34.70 b	16.35	M	16.35	M	0.00	16.35	18.35
B-26	35.30 b	16.52	M	16.52	M	0.00	16.52	18.78
B-28	35.25 b				Q			
B-30	35.35 b				Q			
B-32	34.23 a			17.37	M			16.86
CR-3	34.32 a			15.13	M			19.19
CR-4	34.93 a				Q			
CR-6	35.61 a	13.03		13.05	M	0.02	13.03	22.58
CR-7	35.57 a	11.84	M	11.96	M	0.12	11.86	23.71
CR-8	33.14 a				Q			33.14
CR-10	35.57 a		M		M	0.00	0.00	NM-1
CR-11	34.43 a	4.10	M	4.10	M	0.00	4.10	30.33

Notes:

1 ☐ outlined cell indicates data entry location.
2 a = Measuring point elevation from CH2M Hill field survey -Top of Casing (TOC).
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey - TOC.
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum - TOC.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21.
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60.
7 Wells not monitored: B-12, B-13, B-33 and CR-9.
8 NM-1 = Well not monitored because product recovery equipment in well.

Table 3c
Water Level Monitoring Data
Shell/GATX

Date: August 26, 1996
Time Begin: 9:35 a.m. **Time End: 11.32 a.m.**
Field Staff: Stacey Callison

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	5.89	M	5.89	M	0.00	5.89	27.45
MW-7	34.12 c	9.52	M	9.82	M	0.30	9.58	24.54
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	7.86	M	7.86	M	0.00	7.86	28.61
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	4.31	M	4.31	M	0.00	4.31	29.08
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	6.85	M	6.85	M	0.00	6.85	28.80
MW-23	36.06 c	5.80	M	5.82	M	0.02	5.80	30.24
MW-24	35.15 c		M		M	0.00	0.00	NM-1
MW-27	35.67 c	5.96	M	5.96	M	0.00	5.96	29.71
MW-28	34.39 c	7.56	M	7.56	M	0.00	7.56	26.83
MW-29	35.77 c				Q			
MW-31	37.55 c	8.02	M	8.02	M	0.00	8.02	29.53
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			
MW-39	35.02 c	13.90	M	13.90	M	0.00	13.90	21.12
MW-40	33.65 c	14.77	M	14.77	M	0.00	14.77	18.88

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum (City of Portland datum).
4 Wells not monitored: MW2, MW15, MW17, MW25, MW30, MW35, MW38
5 NM-1 = Well not monitored because product recovery equipment in well.

Table 4a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Holbrook Slough Recovery Trench Well Network									
B-4	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
B-17	Jan-96	550		9.6		11		12	
	Apr-96	580		19		12		32	
	Jul-96	520		22		12		20	
	Oct-96								
B-35	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	11		7.2		1.2		8.3	
	Oct-96								
B-36	Jan-96	480		8.9		8.2		9.6	
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-96								
RES-New Well Network									
B-18	Jan-96	1	U	0.5	U	0.5	U	0.5	U
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-96								
B-22	Jan-96	15		1.6		2.3		5.3	
	Apr-96	F		F		F		F	
	Jul-96	14		0.93		0.52		0.56	
	Oct-96								
B-37	Jan-96	F		F		F		F	
	Apr-96	31		0.54		0.72		1.3	
	Jul-96	4.5		0.5	U	0.5	U	0.52	
	Oct-96								
B-40	Jan-96	2.9		1.9		16		7.5	
	Apr-96	1.6		0.77		1.6		2.6	
	Jul-96	F		F		F		F	
	Oct-96								
Res-New	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	NS		NS		NS		NS	
	Oct-96								
General Groundwater Monitoring									
U-2	Jan-96	1		0.5	U	2.9		1.2	
	Apr-96	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-96	7.5		1.9		10		4.2	
	Oct-96								
U-3	Jan-96	F		F		F		F	
	Apr-96	220		7.9		49		26	
	Jul-96	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-96								
U-4	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
U-5A	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
U-5	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
B-27	Jan-96	F		F		F		F	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 4b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l)			
		Benzene Q	Toluene Q	Ethylbenzene Q	Xylenes Q
Holbrook Slough Recovery Trench Well Network					
B-7	Jan-96	0.5 U	0.5 U	0.5	1 U
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U
	Jul-96	5.4	0.64	0.5 U	0.5 U
	Oct-96				
B-9	Jan-96	0.63	0.66	0.5 U	1.8
	Apr-96	1	1.3	0.5 U	2.7
	Jul-96	1.8	0.86	0.5 U	0.93
	Oct-96				
General Groundwater Monitoring					
B-10	Jan-96	8.6	2.1	0.5 U	5.4
	Apr-96	33	5.6	1.3	15
	Jul-96	30	4.5	6.6	15
	Oct-96				
B-11	Jan-96	260	4	140	24
	Apr-96	340	9.8	38	14
	Jul-96	250	7.3	2.4	13
	Oct-96				
B-14	Jan-96	230	9.5	51	27
	Apr-96	260	14	93	52
	Jul-96	230	15	100	67
	Oct-96				
B-28	Jan-96	4.6	0.5 U	19	6.6
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U
	Jul-96	14	0.74	64	13
	Oct-96				
B-30	Jan-96	50	7.1	2.4	14
	Apr-96	25	7.4	3.2	15
	Jul-96	38	4.2	1.9	9
	Oct-96				
CR-8	Jan-96	1.2	0.5 U	0.59	1.8
	Apr-96	1.7	0.98	1.1	2.2
	Jul-96	0.5 U	0.5 U	0.58	1.6
	Oct-96				
CR-11	Jan-96	78	2.3	1.9	4.8
	Apr-96	91	5.2	4	3.8
	Jul-96	92	5.3	12	23
	Oct-96				

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

Table 4c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l)							
		Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-96	5.0	U	5.0	U	5.0	U	5.0	U
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
MW-8	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	970		64		6.3		20	
	Jul-96	1,100		440		39		140	
	Oct-96								
MW-10	Jan-96	2.3		0.68		0.50	U	1.1	
	Apr-96	6.5		0.88		0.5	U	0.62	
	Jul-96	0.50	U	0.50	U	0.50	U	0.50	U
	Oct-96								
MW-11	Jan-96	7,400		4,500		2,100		10,000	
	Apr-96	7,000		3,800		2,500		11,000	
	Jul-96	4,900		2,000		2,400		8,100	
	Oct-96								
MW-22	Jan-96	1,800		5,300		4,100		15,000	
	Apr-96	1,800		4,400		3,800		12,000	
	Jul-96	2,200		4,300		4,700		15,000	
	Oct-96								
MW-26	Jan-96	1.0	U	4.2		16		20	
	Apr-96	F		F		F		F	
	Jul-96	F		F		F		F	
	Oct-96								
MW-23	Jan-96	32		1.0	U	180		156	
	Apr-96	35		16		140		140	
	Jul-96	F		F		F		F	
	Oct-96								
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	4.2	
	Jul-96	2.0		0.95		0.73		1.8	
	Oct-96								
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U
	Apr-96	1.0	U	1.0	U	1.0	U	1.0	U
	Jul-96	2.5		1.1		0.54		1.9	
	Oct-96								
MW-32	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96	0.50	U	0.50	U	0.50	U	0.50	U
	Oct-96								
MW-33	Jan-96	0.50	U	0.50	U	0.50	U	0.50	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96	0.50	U	0.50	U	0.50	U	0.50	U
	Oct-96								
MW-36	Jan-96	NS		NS		NS		NS	
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U
	Jul-96	0.50		0.50	U	0.50	U	0.50	U
	Oct-96								
MW-37	Jan-96	140		1.0		1.0	U	1.8	
	Apr-96	92		1.0	U	1.0	U	1.0	U
	Jul-96	450		6.4		2.5	U	4.8	
	Oct-96								

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled due to limited well access.

Table 5a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-96																
B-17	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.80	5.0 U	0.50 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13.0 U	13.0 U	0.25 U	13.00	22.00	1.30 U	13.00 U	16.00	0.25 U
	Oct-96																
B-35	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	1.90	18.00	2.10	3.80	14.00	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	44.00	25.00	0.50 U	5.00 U	120.00	2.20
	Oct-96																
B-36	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	1.00 U	7.50	1.00 U	1.00 U	5.50	1.00 U	1.00 U	50.0 U	50.0 U	64.00	50.0 U	50.0 U	76.0	50.0 U	50.0 U	1.00 U
	Oct-96																
RES-New Well Network																	
B-18	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Oct-96																
B-22	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13.0 U	13.0 U	0.25 U	13.00 U	13.00 U	1.30 U	13.00 U	13.00 U	0.25 U
	Oct-96																
B-37	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Oct-96																
General Groundwater Monitoring																	
U-2	Jan-96	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1	NS-1
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	8.3	0.5 U	5.0 U	5.0 U	0.10 U
	Oct-96																
U-3	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.10 U
	Jul-96	0.74	0.66	0.98	0.52	0.87	0.10 U	0.70	5.0 U	5.0 U	0.10 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	0.95
	Oct-96																
U-4	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-96																
U-5A	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-96																
U-5	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-96																
B-27	Jan-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-96	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - 1 not sampled for PAH analyses due to mis-communication.

COPPOR00006191

Table 5b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Holbrook Slough Recovery Trench Well Network																	
B-7	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	25 U	25 U	0.5 U	25 U	5 U	2.5 U	25 U	25 U	0.5 U
	Jul-96	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13 U	13 U	0.25 U	13 U	13 U	1.3 U	13 U	13 U	0.25 U
	Oct-96																
B-9	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.28	0.17	0.43	0.18	0.34	0.19	0.33	5 U	5 U	0.64	5 U	5 U	0.58	5 U	5 U	0.38
	Jul-96	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13 U	13 U	0.25 U	13 U	13 U	1.3 U	13 U	13 U	0.25 U
	Oct-96																
General Groundwater Monitoring																	
B-10	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	25 U	25 U	0.5 U	25 U	5 U	2.5 U	25 U	25 U	0.5 U
	Jul-96	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	13 U	13 U	0.25 U	13 U	13 U	1.3 U	13 U	13 U	0.25 U
	Oct-96																
B-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	9.2	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	2.4	5 U	5 U	4.1	5 U	5 U	0.1
	Jul-96	0.16	0.22	0.17	0.1 U	0.22	0.1 U	0.2	5 U	5 U	2.4	5 U	5 U	3	5 U	5 U	0.24
	Oct-96																
B-14	Jan-96	0.1 U	0.11	0.1 U	0.1 U	0.36	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7.6	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.21	0.1 U	0.1 U	0.64	0.1 U	0.1 U	5 U	5 U	2.4	5 U	7.6	3.3	5 U	5 U	0.1 U
	Jul-96	0.12	0.13	0.1 U	0.1 U	0.15	0.1 U	0.1 U	5 U	5 U	2.2	5 U	12	1.9	5 U	5 U	0.25
	Oct-96																
B-28	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	7	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Jul-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	41	0.5 U	5 U	5 U	0.1 U
	Oct-96																
B-30	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Jul-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-96																
CR-8	Jan-96	1.9	0.54	1.4	0.56	0.82	0.1 U	2.1	5 U	5 U	1.2	5 U	5 U	1.6	5 U	5 U	2.3
	Apr-96	3	1.1	2.1	1	1.4	2.7	2.9	5 U	5 U	1.7	5 U	5 U	2.5	5 U	5 U	3.8
	Jul-96	1.2	0.61	1	0.38	0.77	0.1 U	1.2	5 U	5 U	0.98	5 U	5 U	1.4	5 U	5 U	1.8
	Oct-96																
CR-11	Jan-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Apr-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Jul-96	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-96																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled.

COPPOR00006192

Table 5c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																																	
MW-7	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-96	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-96																																
MW-11	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	470		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	25	U	5.0	U	0.10	U	5.0	U	540		0.50	U	25	U	5.0	U	0.10	U
	Jul-96	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	10	UJ	10	UJ	0.20	UJ	10	UJ	280	J	1.0	UJ	10	UJ	10	UJ	0.20	UJ
	Oct-96																																
MW-22	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	480		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	25	U	5.0	U	0.10	U	5.0	U	370		0.50	U	25	U	5.0	U	0.10	U
	Jul-96	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	10	UJ	10	UJ	0.20	UJ	10	UJ	240	J	1.0	UJ	10	UJ	10	UJ	0.20	UJ
	Oct-96																																
MW-23	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	17		0.50	U	5.0	U	5.0	U	0.10	U
	Jul-96	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-96																																
MW-26	Jan-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	22		0.50	U	5.0	U	5.0	U	0.10	U
	Apr-96	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-96	F		F		F		-		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-96																																
MW-28	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	25	U	25	U	0.50	U	25	U	25	U	2.5	U	25	U	25	U	0.50	U
	Jul-96	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	25	UJ	25	UJ	0.50	UJ	25	UJ	25	UJ	2.5	UJ	25	UJ	25	UJ	0.50	UJ
	Oct-96																																
MW-31	Jan-96	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.0	U
	Apr-96	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	25	U	25	U	0.50	U	25	U	25	U	2.5	U	25	U	25	U	0.50	U
	Jul-96	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	25	UJ	25	UJ	0.50	UJ	25	UJ	25	UJ	2.5	UJ	25	UJ	25	UJ	0.50	UJ
	Oct-96																																
MW-36	Jan-96	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
	Apr-96	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	5.0	U	5.0	U	0.10	U	5.0	U	5.0	U	0.50	U	5.0	U	5.0	U	0.10	U
	Jul-96	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	5.0	UJ	5.0	UJ	0.10	UJ	5.0	UJ	5.0	UJ	0.50	UJ	5.0	UJ	5.0	UJ	0.10	UJ
	Oct-96																																
MW-37	Jan-96	2.8		1.2		2.3		1.0		3.6		1.0	U	1.6		50	U	50	U	1.0	U	50	U	50	U	5.0	U	50	U	50	U	1.3	
	Apr-96	0.91		0.77		0.85		0.44		2.6		0.10	U	0.77		5.0	U	5.0	U	0.10	U	5.0	U	5.0	U	0.50	U	5.0	U	5.0	U	1.0	
	Jul-96	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	25	UJ	25	UJ	0.50	UJ	25	UJ	25	UJ	2.5	UJ	25	UJ	25	UJ	0.50	UJ
	Oct-96																																

Notes:
F - Sample was not obtained because of the presence of free (floating) product.
U - Not detected above detection limit, detection limit listed beside the letter.
NS - not sampled due to limited well access.
J - estimated value.
[1] - July 1996 PAHs analyses analyzed after holding time expired.

COPPOR00006193

Table 6
Free Product Recovered
Interim Action Plan
Willbridge Facilities

Week Ending	PRODUCT REMOVED (gallons) Unocal	Chevron	Shell/GATX	Holbrook Recovery Trench	COMMENTS
May 1995	---	---	1.50	off	SHELL/GATX installed Phase I recovery systems MW-6 and MW-24
June 1995	0.50	0.00	1.35	nr	
July 1995	0.55	0.04	0.37	nr	
August 1995	5.21	0.57	0.78	nr	
September 1995	0.00	0.12	26.03	nr	
October 1995	0.00	0.00	3.10	700	Trench recovery quantities totaled in Jan. 1996
November 1995	5.50	0.00	0.03	off	
December 1995	6.31	0.00	0.25	off	
January 1996	5.93	0.16	0.80	off	
February 1996	43.99	0.28	0.00	off	
3/1/96	nc	nc	nc	off	
3/29/96	nc	5.17	0.38	off	B-38: petrobelt not operating properly - excessive drag in the crooked well.
4/5/96	0.32	nc	nc	off	
4/19/96	1.19	nc	nc	off	
4/26/96	0.00	0.07	0.32	off	
5/10/96	0.11	nc	nc	off	
5/31/96	0.00	0.31	0.38	off	
6/14/96	0.34	nc	nc	off	
6/21/96	0.27	nc	nc	off	
6/28/96	nc	0.69	0.31	off	
7/26/96	0.14	0.46	0.06	off	
8/30/96	1.14	0.15	0.00	off	
Product Recovered	71.50	8.01	35.66	700	
			Total Recovered	815.2	

Symbols:

--- = no product recovery systems installed.

nc = product recovery systems not checked that week.

nr = system checked, data reported cumulative at end of summer/fall.

COPPOR00006194

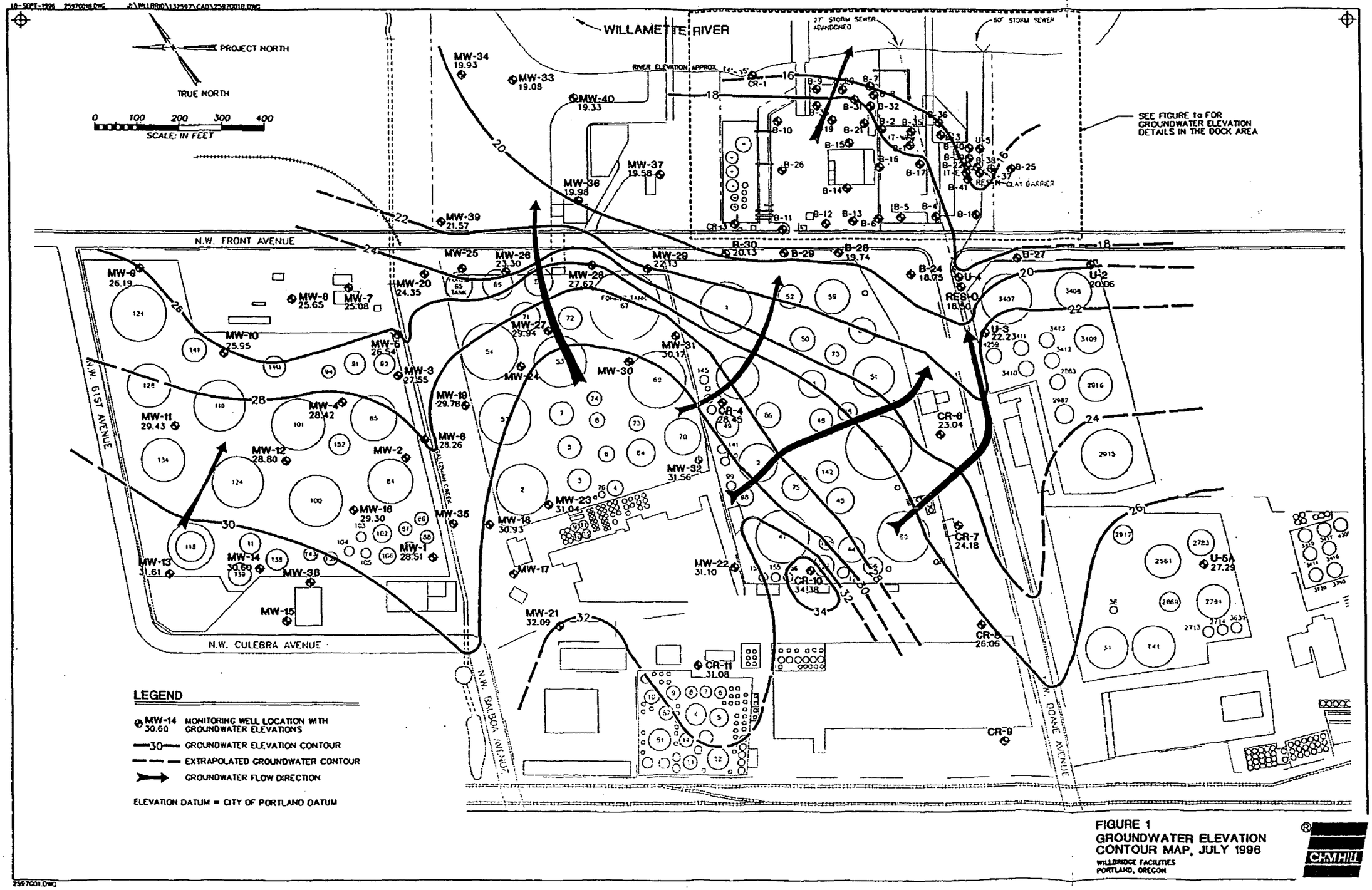

FIGURE 1
GROUNDWATER ELEVATION CONTOUR MAP, JULY 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

2597G01.DWG

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17-SEPT-1996

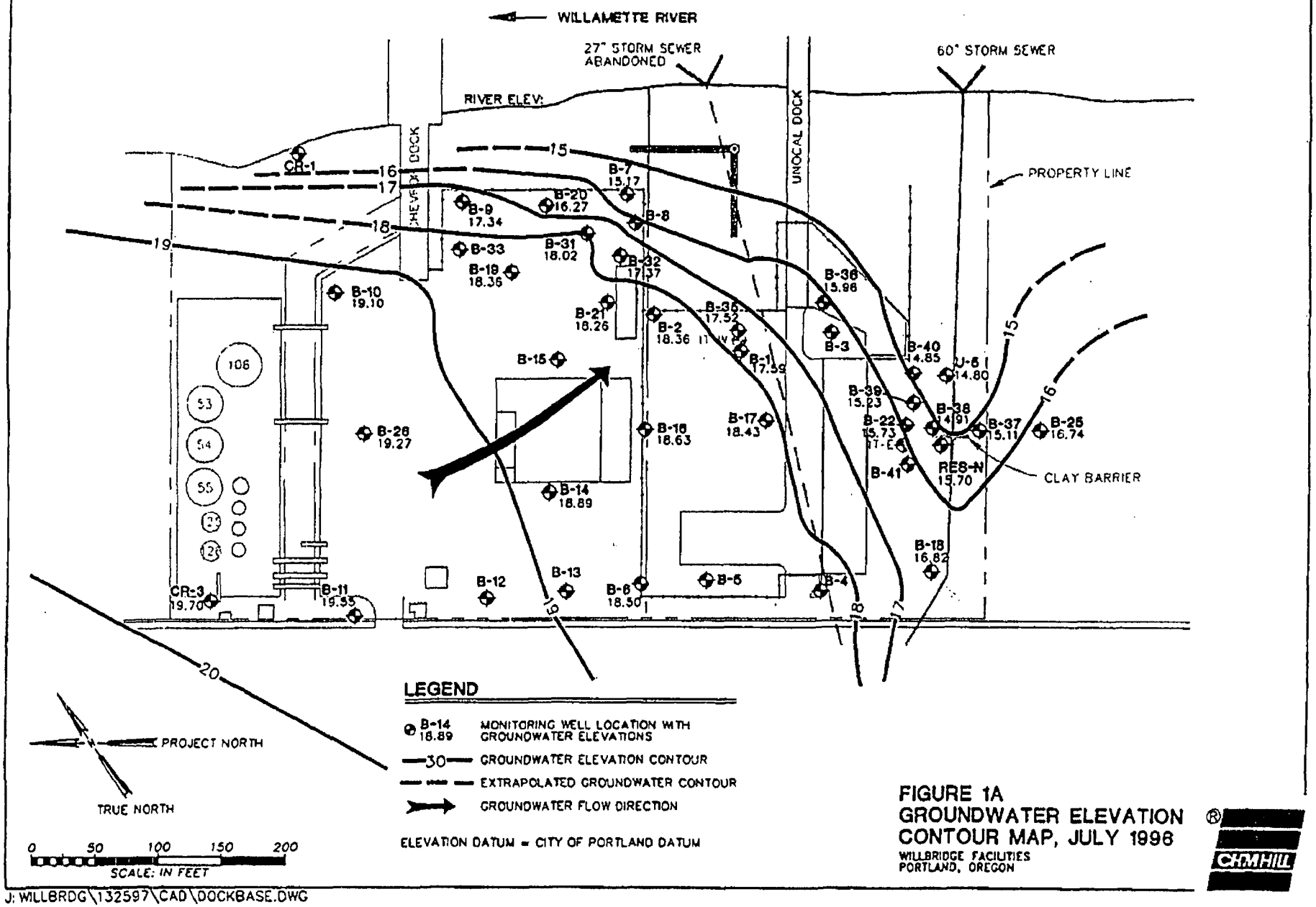

FIGURE 1A
GROUNDWATER ELEVATION CONTOUR MAP, JULY 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

J:\WILLBRDG\132597\CAD\DOCKBASE.DWG

COPPOR0006196

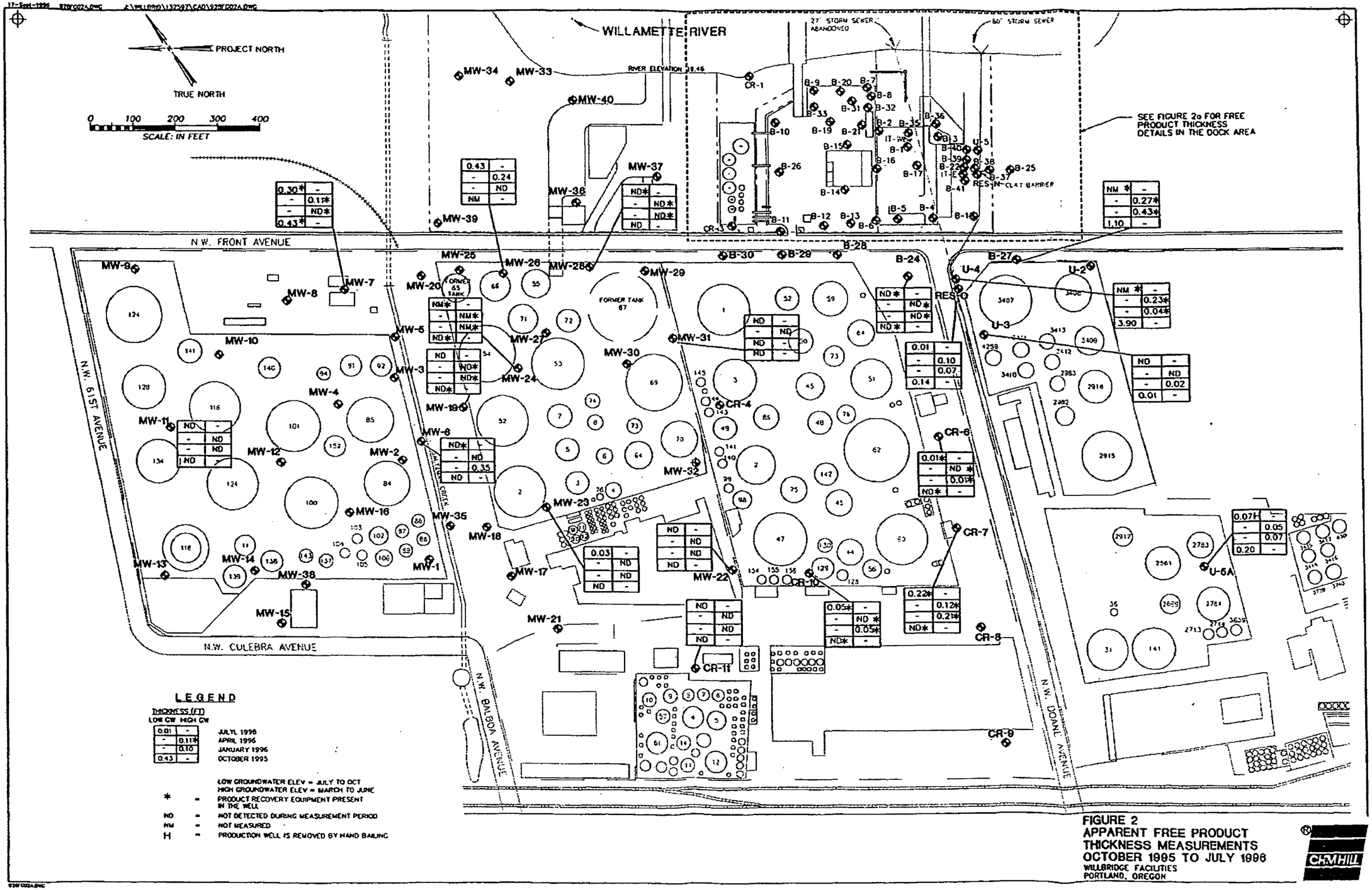

FIGURE 2
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS OCTOBER 1995 TO JULY 1996
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

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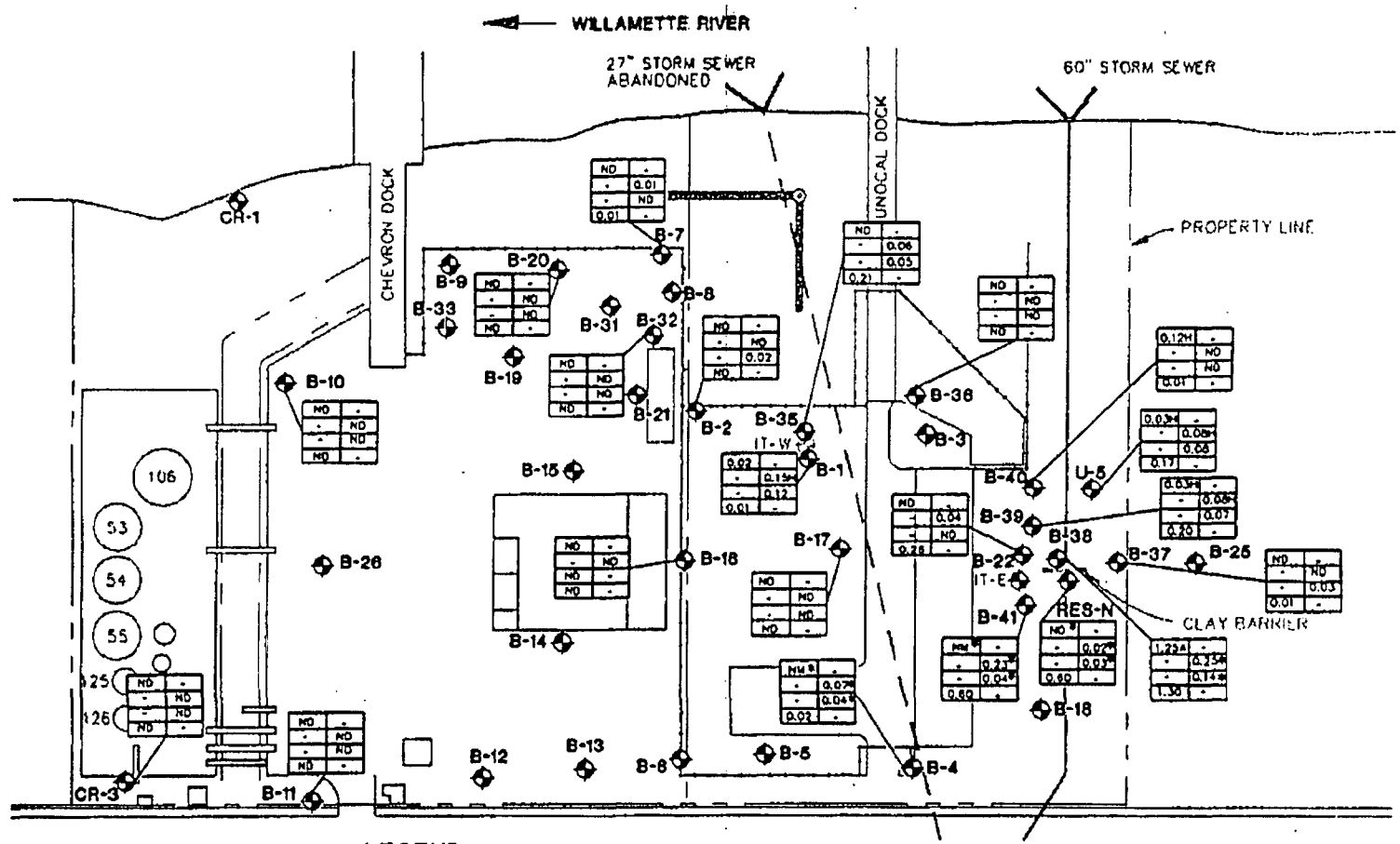
17-SEPT-1996



LEGEND

THICKNESS (FT)
LOW GW HIGH GW

0.10	-
-	0.20
-	0.10
0.01	-

JULY 1996
APRIL 1996
JANUARY 1996
OCTOBER 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

ND = NOT DETECTED DURING MEASUREMENT PERIOD
* = PRODUCT RECOVERY EQUIPMENT PRESENT IN THE WELL
H = PRODUCT IN WELL IS REMOVED BY HAND BAILING
NM = NOT MEASURED
A = UNABLE TO ACCCESS WELL WITH PRODUCT RECOVERY EQUIPMENT DUE TO LARGE BEND IN THE WELL CASING

PROJECT NORTH
TRUE NORTH

0 50 100 150 200
SCALE: IN FEET

FIGURE 2a
APPARENT FREE PRODUCT THICKNESS MEASUREMENT OCTOBER 1995 TO JULY 1996 SITE PLAN DOCK AREA

WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

J:\WILLBRID\132597\CAD\DOCKM14A.DWG

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WRF/ASR

Engineers
Planners
Economists
Scientists

Portland Office

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December 22, 1995

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Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. 4th Avenue, Suite 400
Portland, OR 97204

Subject: Willbridge RI/FS
Quarterly Report for September through November 1995

Dear Ms. Kiernan:

This letter presents the quarterly progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Unocal, and GATX Willbridge facilities in Portland, Oregon. This report presents a summary of the following:

- Actions taken under the Consent Order from September to November 1995.
- Sampling, test results, and other data generated between September and November 1995.
- A description of problems experienced and the manner in which they were resolved or are being addressed.
- Actions scheduled to be taken under the Consent Order from December 1995 to February 1996.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

Action Taken from September through November 1995

The following work was performed from September through November 1995:

- Performed groundwater monitoring monthly and seep and sheen observations bi-weekly at the Chevron, GATX, and Unocal facilities.

Serving Oregon and Southwest Washington from two locations:

Portland Office	825 N.E. Multnomah, Suite 1300, Portland, OR 97232-2146	503.235.5000	503.235.2445 FAX
Corvallis Office	2300 NW Walnut Blvd., Corvallis, OR 97330-3538	503.752.4271	503.752.0276 FAX

- Continued to operate the Holbrook Slough cutoff trench at the Old Doane Avenue storm water outfall for groundwater and free product recovery until river stage levels covered the manhole.

- Completed implementation of Phase II of the free product recovery program.

- Recovered approximately 35 gallons of product from the Unocal, Chevron, and GATX facilities from September through November.

- Installed and evaluated the Petro-belt product recovery technology.

- Met with Jill Kiernan and Mavis Kent from DEQ on November 9, 1995, at the site for a brief site inspection and to discuss possible future interim actions along the Willbridge site waterfront and review overall project approach, scope, and schedule.

Sampling, Test Results, and Data Generated from September through November 1995

Interim action monitoring activities performed this quarter included water level and product thickness measurements and groundwater sampling from selected wells, as described in Tables 3-1a, 3-1b, and 3-1c of the Field Coordination Plan (FCP) dated April 1995.

Groundwater Levels and Flow

Water level measurements performed in September, October, and November 1995 (Tables 1a to 1c, Tables 2a to 2c, and Tables 3a to 3c, respectively) were corrected for free product where present, and the October 1995 data were used to prepare a groundwater contour map (Figures 1 and 1a).

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the river front. The groundwater elevations were dropping during the end of the summer (last quarter). The groundwater elevations continued to drop during the month of September and reached a seasonal low. During October and November the water levels began rising and are currently 1 to 3 feet higher than during the seasonal low. The largest water level changes were observed in the Shell/Chevron main tank farm area (from increased precipitation in November) and the wells along the river front (from the river stage rise).

The Willamette River stage (measured on the river gauge at the Unocal dock) ranged from approximately 2.5 to 4.0 feet during September and October. The river began to rise during November as a result of heavy precipitation and reached a maximum of approximately 18

feet during flood stage. As a result of the 18 foot river flood stage, which is above the groundwater elevation in the dock area, water levels in some of the wells along the Doane Avenue storm drain near the river rose approximately 2 to 3 feet during the flood at the end of November.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX south tank farm, and an apparent elongated groundwater depressions (troughs) beneath N.W. Doane Avenue, and the Saltzman Creek flume. These troughs may be caused by groundwater drainage through the backfill associated with these structures.

Product Thickness Measurements

Free product thicknesses were measured at selected wells on a monthly and quarterly basis (see Tables 1a to 3c). These data were compiled with apparent free product thickness data for January, April, July, and October 1995 and are shown in Figures 2 and 2a. The measurements generally show decreased levels of product in wells located in the dock area and Doane Avenue-Front Street intersection. The decrease in the product thickness in some wells is probably associated with the product recovery program and the operation of the Holbrook Slough recovery trench. Initiation of the revised product recovery program in the New Doane Avenue storm drain area was completed in late October.

The presence of free product appears to be associated with the former and current alignments of the Doane Avenue stormwater outfall. Wells B-1, B-4 and B-35 are located in the dock area nearest the Old Doane Avenue storm drain alignment. Wells B-1, B-4, and B-35, located along the old storm drain alignment, contained 0.01, 0.02, and 0.21 feet of floating product, respectively (October 23, 1995, measurements).

Wells B-38, B-39, U-5, and RES-New appear to be directly connected to the New Doane Avenue storm drain backfill material (based on water level measurements). Product thickness measurements on October 23, 1995, show that Wells B-38, B-39, U-5, and RES-New contained 1.03, 0.20, 0.17, and 0.60 feet of floating product, respectively. The October monitoring also indicated that Well U-4, located at the intersection of Doane Avenue and Front Street adjacent to the new storm drain alignment, contained 3.90 feet of product (Table 2a, 2b, and 2c).

Product recovery equipment was installed in wells adjacent to the New Doane Avenue storm drain and at the Front Avenue intersection at the end of October.

Water Quality

Groundwater samples collected from selected locations in the monitoring well network were tested for benzene, toluene, ethylbenzene, and xylene (BTEX) (EPA method SW8020) and

polycyclic aromatic hydrocarbons (PAHs) (EPA method SW8310), as described in Tables 3-1a, 3-1b, and 3-1c of the FCP. Two-inch diameter wells identified in the FCP that contain free product are not sampled. Test results are presented in Tables 4a to 4c, and 5a to 5c. Groundwater samples were not collected in October from 4-inch-diameter Wells U-4, U-5A, and RES-New because of the presence of free product or product recovery equipment in the well.

The water quality monitoring program in the Interim Action Plan included multiple samplings for BTEX concentrations at several 4-inch-diameter wells that contain free product. The purpose of this sampling was to establish actual BTEX concentrations in groundwater in areas where free product exists in different portions of the site. This portion of the water quality sampling program was designed to be conducted during 1995. Wells U-5A, U-4, and RES New, were sampled during the first half of 1995, and MW-7 was sampled all four quarters of 1995. BTEX concentrations in various areas of the site with free product were generally at or just above detection limits (Table 4a, 4b, and 4c).

The water quality monitoring results appear to be consistent with past data, with the exception of BTEX concentrations in Wells B-11, B-14, and B-17. The data indicate a general trend of increasing BTEX concentrations in these wells over the past four quarters.

Product Recovery

The Phase I product recovery program began in June 1995. The well locations included in the product recovery program and the corresponding product recovery equipment are described in Chapter 3 of the FCP. Approximately 47 gallons of free product has been recovered since the recovery program began in late May 1995. Additional product is being recovered by the Holbrook Slough recovery trench; however, product quantities are currently not available. Product recovery data for each site are presented in Table 6.

Shell/GATX Site

Phase I and II Product Recovery. The Petro-belt in Well MW-24 began operation in September and recovered moderate quantities of product through the end of September (see Table 6). However, product recovery quantities from MW-24 dropped off dramatically during October (approximately 2 gallons were recovered). It appears that the Petro-belt has recovered the product within the well casing, sand pack, and from the formation within the immediate vicinity of the well. Further product recovery will depend on product movement in the vicinity of Well MW-24. A timer unit is scheduled to be installed on the system to maximize product recovery and minimize water recovery. Product recovery canisters (PRCs) are present in Wells MW-7, MW-19, and MW-28. In MW-7 the measurable product during September and October was not being recovered by the well's PRC. The depth of the PRC in

Well MW-7 was readjusted during November. Approximately 0.3 and 1.8 gallons of product have been recovered in Wells MW-19 and MW-28, respectively.

Unocal Site

Phase I and II Product Recovery. An assessment of the auto-bailer indicated that this product recovery technique was not effective at the Willbridge site. Following this assessment of the initially planned recovery equipment for this portion of the site, alternative product recovery techniques were developed for these wells. After reassessment of product recovery techniques, the following changes to the original product recovery plan presented in the FCP (Table 2-1) are recommended:

- U-4: PRC initially, and, following evaluation of product recovery rates, possibly a product skimmer
- U-5A: Remove PRC and periodically hand bail following product accumulation
- RES-New: Product skimmer
- RES-Old: combination of hand bailing and PRC
- B-22: PRC
- B-27: PRC
- B-35: PRC
- B-38: Petro-belt
- B-39: PRC/hand bailing
- B-40: Hand bailing
- B-41: PRC/ hand bailing

On October 31, 1995, the PRC from Well-5A was removed and temporarily placed in Well U-4. PRCs were installed in, or are being shared among, Wells B-4, B-22, B-27, B-39, B-40, and B-41. A Petro-belt and the product skimmer were scheduled to be installed in early December in Wells B-38 and RES-New, respectively. A total of 12.8 gallons of product has been recovered from the Unocal site.

Chevron Site

Phase I and II Product Recovery. PRCs are installed in Wells B-24, CR-6, and CR-7. A Petro-belt is operating in Well CR-10. Because of a lack of product in Well CR-11, the installation of a PRC in this well will be delayed until conditions in the well warrant the product recovery equipment. A total of less than 1 gallon of product has been recovered at the Chevron site.

Holbrook Recovery Trench

The river stage controls operation of the Holbrook Slough recovery trench, located along the shoreline near the old Doane Avenue outfall location. The trench is shut off as the river stage rises above approximately 5 to 6 feet (measured by the river gauge staff on the Unocal dock). River stage levels this quarter ranged between 2.5 and 20 feet. During the beginning of the quarter, the river stage was low. The trench was operating during September and operated sporadically because of maintenance problems during October and November. In mid-November the river stage rose above the shut-off level.

Seep and Sheen Monitoring

Weekly to biweekly visits were made to the site to document the location and extent of hydrocarbon seeps and sheens at the riverbank. Field observations were recorded on the seep/sheen form. Field observations are conducted around low tide, when possible.

In general, the presence and magnitude of the sheens observed during September through November 1995 were consistent with the sheens observed during previous quarters. Sheens were generally observed on the water surface in areas that are controlled with containment booms. Recovered product is removed by adsorbent pads and skimming equipment. The containment booms currently encompass the shoreline between the Chevron and Unocal docks, and from the south edge of the Unocal dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). In addition to the boom located south of the Unocal dock, a second containment boom located inside of the first boom is positioned around the new Doane Avenue outfall pipe.

Weekly seep and sheen monitoring indicates that several site conditions, including the river stage and the recovery trench operation (tied to the river stage), affect the presence and magnitude of hydrocarbon seeps and the resulting sheens observed at the river's edge.

Holbrook Recovery Trench Shoreline. Light sheens were occasionally observed near the rock ramp located at the edge of the recovery trench during this quarter.

Doane Avenue Outfall. Sheens were observed within the containment boom surrounding the new Doane Avenue outfall during each of the site visits. These sheens are believed to be produced from product exiting the pipe outfall and by product seep discharge from the gravel backfill surrounding the pipe.

North of the Chevron dock, along the shoreline behind the Chevron boathouse, a heavy sheen was observed during one visit, and several small, light sheens were observed during another visit. No seeps and sheens were observed north of the GATX dock.

Problems Experienced from September through November 1995

No problems were encountered this quarter.

Actions Scheduled for December 1995 through February 1996

The following actions are scheduled for December 1995 through February 1996:

- Continue the interim action monitoring program at the Chevron, GATX, and Unocal facilities, as described in the Interim Action Plan and the FCP.
- Continue operation of the Holbrook Slough cutoff trench as an interim action if river levels are below the automatic shut-off level.
- Recommend a modification to the FCP the water quality sampling program: Any monitoring well identified in the program that contain free product during the scheduled sampling event will not be sampled for water quality analyses that quarter.
- Submit to DEQ a conceptual work plan for possible additional interim action along the Willbridge waterfront.
- Begin analyzing water quality samples for low-level PAHs in wells where nondetects were obtained during previous analyses.
- Continue review of existing information and interim action monitoring data.

Please call me at 503/235-5000 if you have any questions.

Sincerely,

CH2M HILL

Ross D. Rieke

Ross D. Rieke, P.E.
Project Manager

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Attachments:

Tables 1a to 1c, Water Level Monitoring Data: September 1995
Tables 2a to 2c, Water Level Monitoring Data: October 1995
Tables 3a to 3c, Water Level Monitoring Data: November 1995
Tables 4a to 4c, Water Quality Monitoring Results, Aromatic Volatiles
Tables 5a to 5c, Water Quality Monitoring Results, PAHs
Table 6, Free Product Recovered
Figure 1, Groundwater Elevation Contour Map
Figure 1a, Groundwater Elevation Contour Map-Dock Area
Figure 2, Apparent Free Product Thickness Measurements
Figure 2a, Apparent Free Product Thickness Measurements-Dock Area

cc: Rene White, Chevron
Joe Comstock, UNOCAL
Andrew Holbrook, GATX
George Loyd, Shell Oil
Terry Fisk, GeoEngineers
Paul Woods, SECOR
Gregory Kupillas, Hart Crowser

Table 1a
Water Level Monitoring Data
Unocal

Date: 09/25/95
Time Begin:_____ Time End:_____
Field Staff: Pat Timmer

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network								
B-1	34.79 b	18.37	M	18.51	M	0.14	18.40	16.39
B-2	35.35 b			18.18	M			17.17
B-17	35.59 b		M	18.23	M			17.36
B-35	33.58 a	17.02	M	17.32	M	0.30	17.08	16.50
B-36	30.97 a			15.82	M			15.15
RES-New Well Network								
B-1	34.79 b	18.37		18.51		0.14	18.40	16.39
B-4	34.79 b	18.82	M	18.95	M	0.13	18.85	15.94
B-17	35.59 b			18.23		0.00	0.00	17.36
B-18	35.79 b			20.02	M			15.77
B-22	34.67 b	19.22	M	19.47	M	0.25	19.27	15.40
B-25	35.83 b			20.50	M			15.33
B-37	35.24 a	20.41		20.42	M	0.01	20.41	14.82
B-40	33.19 a		M	18.77	M			14.42
B-41	34.85 a	19.73	M	19.93	M	0.20	19.77	15.08
RES - New	38.58	23.75		24.25	M	0.50	23.85	14.73
General Groundwater Monitoring								
U-2	35.02 a			15.20	Q			19.82
U-3	35.25 a	16.20		16.35	Q	0.15	16.23	19.02
U-4	34.46 a	18.60	M	18.85	M	0.25	18.65	15.81
U-5A	33.77 a		M	15.61	M			18.16
U-5	33.37 a	19.27		19.52	Q	0.25	19.32	14.05
B-1	34.79 b	18.37		18.51		0.14	18.40	16.39
B-4	34.79 b	18.82		18.95		0.13	18.85	15.94
B-17	35.59 b			18.23		0.00	0.00	17.36
B-18	35.79 b			20.02				15.77
B-22	34.67 b	19.22		19.47		0.25	19.27	15.40
B-27	35.74 c	18.50	M	19.60	M	1.10	18.72	17.02
B-35	33.58 a	17.02		17.32		0.30	17.08	16.50
B-36	30.97 a			15.82				15.15
B-37	35.24 a	20.41		20.42		0.01	20.41	14.82
B-38	34.75 a	19.99	M	21.02	M	1.03	20.20	14.55
B-39	33.92 a	19.08	M	19.22	M	0.14	19.11	14.81
B-40	33.19 a			18.77		0.00	0.00	14.42
B-41	34.85 a	19.73		19.93		0.20	19.77	15.08
RES - Old	34.05 d	18.60	M	19.21	M	0.61	18.72	15.33

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.

Table 1b
Water Level Monitoring Data
Chevron

Date: 9/25/95
Time Begin: 11:00 Time End: 14:50
Field Staff: CTC

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench									
B-7	33.96	b			19.80	M			14.16
B-9	33.95	b			17.85	M			16.10
B-16	35.82	b			18.35	M			17.47
B-19	34.71	b			17.56	M			17.15
B-21	34.79	b			17.58	M			17.21
B-31	33.86	d			16.97	M			16.89
B-32	34.23	a			18.11	M			16.12
River Stage		e				M			
General Groundwater Sampling									
B-7	33.96	b	19.79	M	19.80	M	0.01	19.79	14.16
B-9	33.95	b			17.85	M			16.10
B-10	34.74	b	16.84	M	16.84	M	0.00	16.84	17.90
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-16	35.82	b			18.35	Q			17.47
B-19	34.71	b			17.56	Q			17.15
B-20	33.4	b	18.26	M	18.27	M	0.01	18.26	15.14
B-24	34.7	b	17.02	M	17.02	M	0.00	17.02	17.68
B-26	35.3	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a	18.11	M	18.11	M	0.00	18.11	16.12
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a	15.46		15.47	M	0.01	15.46	20.15
CR-7	35.57	a	12.48	M	12.48	M	0.00	12.48	23.09
CR-8	33.14	a				Q			
CR-10	35.57	a	10.82	M	10.82	M	0.00	10.82	24.75
CR-11	34.43	a	4.83	M	4.83	M	0.00	4.83	29.60
River Stage		e				Q			

Notes:

1 ☐ outlined cell indicates data entry location

2 a = Measuring point elevation from CH2M Hill field survey

3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey

4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21

6 Site Datum = City of Portland benchmark (elev = 35.995 ft) on west side of Chevron Tank #60

7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9

8 e = River stage 16.00 equals elevation 20.71

Table 1c
Groundwater Monitoring Requirements
Shell/GATX

Date: September 25, 1995

Time Begin: 11:15 am **Time End:** 1:00 pm

Field Staff: Rhonda Moore

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	6.50	M	6.50	M	0.00	6.50	26.84
MW-7	34.12 c	10.13	M	10.51	M	0.38	10.21	23.92
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	8.12	M	8.12	M	0.00	8.12	28.35
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	6.80	M	6.80	M	0.00	6.80	26.59
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	5.94	M	5.94	M	0.00	5.94	29.71
MW-23	36.06 c	5.78	M	6.00	M			30.06
MW-24	35.15 c		M		M	0.00	0.00	
MW-28	34.39 c	11.75	M	11.75	M	0.00	11.75	22.64
MW-29	35.77 c				Q			
MW-31	37.55 c	8.96	M	8.96	M	0.00	8.96	28.59
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 2a
Water Level Monitoring Data
Unocal

Date: October 23, 1995
Time Begin: 1130 **Time End:** 1700
Field Staff: Pat Timmer

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network						
B-1	34.79 b	18.30 M	18.31 M	0.01	18.30	16.49
B-2	35.35 b		18.15 M			17.20
B-17	35.59 b	M	18.21 M			17.38
B-35	33.58 a	16.94 M	17.15 M	0.21	16.98	16.60
B-36	30.97 a		15.60 M			15.37
RES-New Well Network						
B-1	34.79 b	18.30	18.31	0.01	18.30	16.49
B-4	34.79 b	18.83 M	18.85 M	0.02	18.83	15.96
B-17	35.59 b		18.21	0.00	0.00	17.38
B-18	35.79 b		20.08 M			15.71
B-22	34.67 b	19.70 M	19.98 M	0.28	19.76	14.91
B-25	35.83 b		19.96 M			15.87
B-37	35.24 a	20.44	20.45 M	0.01	20.44	14.79
B-40	33.19 a	18.74 M	18.75 M	0.01	18.75	14.44
B-41	34.85 a	19.70 M	20.30 M	0.60	19.82	15.03
RES - New	38.58	23.80	24.40 M	0.60	23.92	14.66
General Groundwater Monitoring						
U-2	35.02 a		16.57 Q			18.45
U-3	35.25 a	14.20	14.21 Q	0.01	14.20	21.05
U-4	34.46 a	17.35 M	21.25 M	3.90	18.13	16.33
U-5A	33.77 a	15.30 M	15.50 M	0.20	15.34	18.43
U-5	33.37 a	19.32	19.49 Q	0.17	19.35	14.02
B-1	34.79 b	18.30	18.31	0.01	18.30	16.49
B-4	34.79 b	18.83	18.85	0.02	18.83	15.96
B-17	35.59 b		18.28	0.00	0.00	17.38
B-18	35.79 b		20.08			15.71
B-22	34.67 b	19.70	19.98	0.28	19.76	14.91
B-27	35.74 c	18.59 M	19.69 M	1.10	18.81	16.93
B-35	33.58 a	16.94	17.15	0.21	16.98	16.60
B-36	30.97 a		15.60			15.37
B-37	35.24 a	20.44	20.45	0.01	20.44	14.79
B-38	34.75 a	20.00 M	21.03 M	1.03	20.21	14.54
B-39	33.92 a	19.09 M	19.29 M	0.20	19.13	14.79
B-40	33.19 a	18.74	18.75	0.01	18.75	14.44
B-41	34.85 a	19.70	20.30	0.60	19.82	15.03
RES - Old	34.05 d	18.90 M	19.04 M	0.14	18.93	15.12

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.

Table 2b
Water Level Monitoring Data
Chevron

Date: 10/23/95
Time Begin: 11:05 Time End: 16:30
Field Staff: CTC/ERDC

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench						
B-7	33.96 b	19.56	19.57 M	0.01	19.56	14.40
B-9	33.95 b		17.45 M			16.50
B-16	35.82 b		18.30 M			17.52
B-19	34.71 b		17.45 M			17.26
B-21	34.79 b		17.53 M			17.26
B-31	33.86 d		16.44 M			17.42
B-32	34.23 a		17.98 M			16.25
River Stage	e		M			
General Groundwater Sampling						
B-7	33.96 b	19.56 M	19.57 M	0.01	19.56	14.40
B-9	33.95 b		17.45 M			16.50
B-10	34.74 b	16.70 M	16.70 M	0.00	16.70	18.04
B-11	34.95 b		16.64 Q			18.31
B-14	36.59 b		18.84 Q			17.75
B-16	35.82 b		18.30 Q			17.52
B-19	34.71 b		17.45 Q			17.26
B-20	33.4 b	18.04 M	18.04 M	0.00	18.04	15.36
B-24	34.7 b	17.05 M	17.05 M	0.00	17.05	17.65
B-26	35.3 b		17.16 Q			18.14
B-28	35.25 b		16.40 Q			18.85
B-30	35.35 b		16.51 Q			18.84
B-32	34.23 a	17.98 M	17.98 M	0.00	17.98	16.25
CR-3	34.32 a		15.81 Q			18.51
CR-4	34.93 a		Q			
CR-6	35.61 a	15.50	15.50 M	0.00	15.50	20.11
CR-7	35.57 a	11.98 M	11.98 M	0.00	11.98	23.59
CR-8	33.14 a		8.08 Q			25.06
CR-10	35.57 a	9.44 M	9.44 M	0.00	9.44	26.13
CR-11	34.43 a	4.59 M	4.59 M	0.00	4.59	29.84
River Stage	e		Q			

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8 e = River stage 16.00 equals elevation 20.71

Table 2c
Groundwater Monitoring Requirements
Shell/GATX

Date: October 23, 1995

Time Begin: 7:44 am Time End: 4:45 pm

Field Staff: Brett Broderson & Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c			5.85	Q			29.58
MW-3	36.02 c			9.62	Q			26.40
MW-4	36.39 c			9.16	Q			27.23
MW-5	33.52 c			8.56	Q			24.96
MW-6	33.34 c	6.22	M	6.22	M	0.00	6.22	27.12
MW-7	34.12 c	7.04	M	7.47	M	0.43	7.13	27.00
MW-8	33.95 c			9.45	Q			24.50
MW-9	36.53 c			11.86	Q			24.67
MW-10	35.82 c			11.20	Q			24.62
MW-11	36.47 c	7.39	M	7.39	M	0.00	7.39	29.08
MW-12	35.95 c			8.33	Q			27.62
MW-13	37.89 c			6.67	Q			31.22
MW-14	36.28 c			5.96	Q			30.32
MW-16	34.93 c			6.73	Q			28.20
MW-18	33.76 c			3.43	Q			30.33
MW-19	33.39 c	5.48	M	5.48	M	0.00	5.48	27.91
MW-20	34.76 c			11.35	Q			23.41
MW-21	34.33 c			2.04	Q			32.29
MW-22	35.65 c	5.24	M	5.24	M	0.00	5.24	30.41
MW-23	36.06 c	5.15	M	5.15	Q			30.91
MW-24	35.15 c		M		M	0.00	0.00	
MW-28	34.39 c	7.60	M	7.60	M	0.00	7.60	26.79
MW-29	35.77 c			14.86	Q			20.91
MW-31	37.55 c	8.56	M	8.56	M	0.00	8.56	28.99
MW-32	37.01 c			6.40	Q			30.61
MW-33	39.34 c			21.05	Q			18.29
MW-34	39.67 c			20.26	Q			19.41
MW-36	34.88 c				Q			
MW-37	34.86 c			16.37	Q			18.49

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 3a
Water Level Monitoring Data
Unocal

Date: 11/27/95

Time Begin: 12:04 Time End:

Field Staff: PJT

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network						
B-1	34.79 b	17.94 M	17.97 M	0.03	17.95	16.84
B-2	35.35 b		M			
B-17	35.59 b	17.85 M	17.85 M	0.00	17.85	17.74
B-35	33.58 a	16.50 M	16.56 M	0.06	16.51	17.07
B-36	30.97 a		M			
RES-New Well Network						
B-1	34.79 b	17.94	17.97	0.03	17.95	16.84
B-4	34.79 b	18.56 M	18.62 M	0.06	18.57	16.22
B-17	35.59 b	17.85	17.85	0.00	17.85	17.74
B-18	35.79 b		M			
B-22	34.67 b	18.40 M	18.48 M	0.08	18.42	16.25
B-25	35.83 b		M			
B-37	35.24 a	19.90	19.90 M	0.00	19.90	15.34
B-40	33.19 a	17.98 M	18.00 M	0.02	18.00	15.19
B-41	34.85 a	18.50 M	18.65 M	0.15	18.53	16.32
RES - New	38.58	23.26	23.86 M	0.60	23.38	15.20
General Groundwater Monitoring						
U-2	35.02 a		Q			
U-3	35.25 a	14.20	14.20 Q	0.00	14.20	21.05
U-4	34.46 a	16.40 M	18.80 M	2.40	16.88	17.58
U-5A	33.77 a	6.34 M	6.42 M	0.08	6.36	27.41
U-5	33.37 a	18.50	18.60 Q	0.10	18.52	14.85
B-1	34.79 b	17.94	17.97	0.03	17.95	16.84
B-4	34.79 b	18.56	18.62	0.06	18.57	16.22
B-17	35.59 b	17.85	17.85	0.00	17.85	17.74
B-18	35.79 b					
B-22	34.67 b	18.40	18.48	0.08	18.42	16.25
B-27	35.74 c	18.50 M	18.80 M	0.30	18.56	17.18
B-35	33.58 a	16.50	16.56	0.06	16.51	17.07
B-36	30.97 a					
B-37	35.24 a	19.90	19.90	0.00	19.90	15.34
B-38	34.75 a	19.50 M	19.82 M	0.32	19.56	15.19
B-39	33.92 a	19.55 M	19.62 M	0.07	19.56	14.36
B-40	33.19 a	17.98	18.00	0.02	17.98	15.21
B-41	34.85 a	18.50	18.65	0.15	18.53	16.32
RES - Old	34.05 d	19.25 M	19.26 M	0.01	19.25	14.80

Notes:

1 ☐ outlined cell indicates data entry location

2 a = Measuring point elevation from CH2M Hill field survey

3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey

4 c = Measuring point elevation adjusted by CH2M Hill to common site datum

5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum

6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60

7 M = monthly on fourth monday. Q = quarterly on fourth monday.

Table 3b
Water Level Monitoring Data
Chevron

Date: 11/27/95
Time Begin: 14:15 Time End: 17:00
Field Staff: EAA

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench									
B-7	33.96	b			18.61	M			15.35
B-9	33.95	b			16.51	M			17.44
B-16	35.82	b			17.90	M			17.92
B-19	34.71	b			16.86	M			17.85
B-21	34.79	b			17.09	M			17.70
B-31	33.86	d			13.42	M			20.44
B-32	34.23	a			17.25	M			16.98
River Stage		e				M			
General Groundwater Sampling									
B-7	33.96	b	18.61	M	18.61	M	0.00	18.61	15.35
B-9	33.95	b			16.51	M			17.44
B-10	34.74	b	15.99	M	15.99	M	0.00	15.99	18.75
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-16	35.82	b			17.90	Q			17.92
B-19	34.71	b			16.86	Q			17.85
B-20	33.4	b	17.11	M	17.12	M	0.01	17.11	16.29
B-24	34.7	b	16.75	M	16.75	M	0.00	16.75	17.95
B-26	35.3	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a	17.25	M	17.25	M	0.00	17.25	16.98
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a				M	0.00	0.00	
CR-7	35.57	a	10.73	M	10.73	M	0.00	10.73	24.84
CR-8	33.14	a				Q			
CR-10	35.57	a		M		M	0.00	0.00	
CR-11	34.43	a	3.61	M	3.61	M	0.00	3.61	30.82
River Stage		e				Q			

Notes:

1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8 e = River stage 16.00 equals elevation 20.71

Table 3c
Groundwater Monitoring Requirements
Shell/GATX

Date: November 27, 1995
Time Begin: 9:39 am **Time End:** 11:12 am
Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	4.37	M	4.37	M	0.00	4.37	28.97
MW-7	34.12 c	9.00	M	9.00	M	0.00	9.00	25.12
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	5.25	M	5.25	M	0.00	5.25	31.22
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	3.79	M	3.79	M	0.00	3.79	29.60
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	4.04	M	4.04	M	0.00	4.04	31.61
MW-23	36.06 c	3.56	M	3.56	Q			32.50
MW-24	35.15 c		M		M	0.00	0.00	
MW-28	34.39 c	4.04	M	4.04	M	0.00	4.04	30.35
MW-29	35.77 c				Q			
MW-31	37.55 c	6.33	M	6.33	M	0.00	6.33	31.22
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 4a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Recovery Trench Well Network									
B-17	Jan-95	200		17		4.5		26	
	Apr-95	590		17		7.7		16	
	Jul-95	670		22		11		20	
	Oct-95	830		36		16		43	
B-35	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-36	Jan-95								
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
RES-New Well Network									
B-4	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-37	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	F		F		F		F	
Res-New	Jan-95	4		0.6		3.4		4.5	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
General Groundwater Monitoring									
U-2	Jan-95	3.8		0.5	U	4.9		2.9	
	Apr-95	0.66		0.5	U	1.2		1.2	
	Jul-95	2.6		0.5	U	0.62		4	
	Oct-95	6.8		0.5	U	0.5	U	1	U
U-3	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	F		F		F		F	
U-4	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
U-5A	Jan-95	20		6.5		3.7		7.2	
	Apr-95	28		7.8		5		20	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
U-5	Jan-95	15		2		0.5		3	
	Apr-95	1.9		1.4		0.5	U	1.7	
	Jul-95	2.7		1.2		0.5	U	1.8	
	Oct-95	F		F		F		F	
B-18	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
B-22	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	
B-27	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95	F		F		F		F	

F- Sample was not obtained because of the presence of free (floating) product.

Table 4b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l)			
		Benzene Q	Toluene Q	Ethylbenzene Q	Xylenes Q
Recovery Trench Well Network					
B-7	Jan-95	0.5 U	0.5 U	0.5 U	0.5 U
	Apr-95	0.5 U	0.73	0.5 U	0.5 U
	Jul-95	0.5 U	0.57	0.5 U	0.5 U
	Oct-95	0.5 U	0.5 U	0.5 U	0.5 U
B-9	Jan-95	0.5 U	0.9	0.5 U	1.5
	Apr-95	0.5 U	0.88	0.5 U	1.3
	Jul-95	0.5 U	1	0.5 U	0.52
	Oct-95	0.5 U	1	0.5 U	2.5
General Groundwater Monitoring					
B-10	Jan-95	8.6	2.9	0.7	5.2
	Apr-95	11	5.7	14	17
	Jul-95	8.3	3.6	4.3	11
	Oct-95	22	4.3	1.8	13
B-11	Jan-95	12	2.8	52	9.9
	Apr-95	140	8.2	2.6	6.3
	Jul-95	140	9.3	2.3	9.5
	Oct-95	320	7.8	2.5 U	8.1
B-14	Jan-95	190	15	78	46
	Apr-95	140	7.6	170	83
	Jul-95	190	21	91	55
	Oct-95	240	20	45	22
B-28	Jan-95	10	0.7	17	2
	Apr-95	19	0.86	48	7.8
	Jul-95	1.7	0.82	32	5.6
	Oct-95	3	0.5 U	0.93	0.5 U
B-30	Jan-95	51	7.6	3.1	17
	Apr-95	28	3.1	1.6	9.9
	Jul-95	12	2	0.71	4.5
	Oct-95	43	4.6	0.94	11
CR-8	Jan-95	0.5 U	0.5 U	3.9	5.8
	Apr-95	0.5 U	0.5 U	0.5 U	0.5 U
	Jul-95	0.5 U	0.5 U	0.5 U	0.5 U
	Oct-95	0.5 U	0.5 U	0.5 U	0.54
CR-11	Jan-95	94	3.9	2.4	3.4
	Apr-95	110	3.6	5.4	17
	Jul-95	94	4.4	3	9.1
	Oct-95	130	8.5	4.2	8.8

Notes

Table 4c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l)							
		Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-95	0.5	U	0.5	U	18		30	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	1	U	1	U	1	U	1	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-8	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.96		0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1.1	
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-10	Jan-95	1.7		0.7		0.5	U	1	
	Apr-95	0.5	U	0.5	U	0.5	U	1.3	
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1.3	
MW-11	Jan-95	8900		4500		2500		11000	
	Apr-95	7400		4900		2500		12000	
	Jul-95	5400		2400		2600		8000	
	Oct-95	7100		2800		2400		8700	
MW-22	Jan-95	2400		8100		4700		16000	
	Apr-95	2200		7100		4500		15000	
	Jul-95	2000		5800		4500		15000	
	Oct-95	2300		6300		5200		19000	
MW-23	Jan-95	72		20		210		180	
	Apr-95	150		38		240		140	
	Jul-95	99		20		240		140	
	Oct-95	120		18		230		120	
MW-26	Jan-95	1.7		0.5	U	24		33	
	Apr-95	8.7		7.3		13		19	
	Jul-95	6.4		10		9.6		12	
	Oct-95	0.5	U	0.85		1.6		4.9	
MW-28	Jan-95	0.9		0.6		6.5		20	
	Apr-95	2.5	U	2.5	U	20		15	
	Jul-95	7.6		2.7		2.6		7.9	
	Oct-95	2.8		2.6		7.2		20	
MW-31	Jan-95	1.3		1.6		1.2		3.8	
	Apr-95	9.3		4.7		0.99		3.1	
	Jul-95	2.8		1.3		0.64		1.4	
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-32	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-33	Jan-95	0.5	U	0.5	U	0.5	U	0.5	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95	0.5	U	0.5	U	0.5	U	1	U
MW-37	Jan-95	0.5	U	0.5	U	2.2		7.1	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	140		2.5	U	2.5	U	2.5	U
	Oct-95	14		0.5	U	0.5	U	1	U

Notes: U = Not Detected Above Method Detection Limit.

Table 5a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
Recovery Trench Well Network																																	
B-17	Jan-95	0.5	U	1.1		0.5	U	0.5	U	0.5	U	1	U	0.5	U	2.5	U	5.2		34		23		56		0.5	U	5	U	25		0.5	U
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	11		10	U	2	U	30	U	13		1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	13		0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	14		34		0.5	U	5	U	15		0.1	U
B-35	Jan-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Apr-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
B-36	Jan-95																														
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	1	U	0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
RES-New Well Network																																	
B-4	Jan-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Apr-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
B-37	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1	U	0.1	U	0.5	U	0.2		1	U	0.13		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	1	U	0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
General Groundwater Monitoring																																	
U-2	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1		0.1	U	3.6		0.1	U	1	U	0.1	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.23		1	U	0.2	U	0.5	U	0.5	U	9.8		0.2	U	3	U	1	U	1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.21		0.12		0.31		0.15		0.27		0.1	U	0.1	U	5	U	5	U	0.45		5	U	5	U	0.5	U	5	U	5	U	0.1	U
U-3	Jan-95	0.1	U	0.4		0.7		0.3		0.1	U	0.6		0.7		0.5	U	0.05	U	0.9		0.9		0.6		0.8		1	U	0.65		0.1	U
	Apr-95	1.6		1.1		1.4		0.71		1.1		0.4		2.3		2	U	0.4	U	1.8		1.8		2.2		1.7		6	U	0.99		1.4	
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
U-4	Jan-95	1	U	1	U	1	U	2	U	2.3		2	U	1	U	7		5	U	72		24		5	U	1	U	10	U	44		1	U
	Apr-95	1	U	1	U	1	U	2	U	1	U	2	U	2	U	10	U	10	U	5	U	5	U	10	U	2	U	30	U	2	U	1	U
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
U-5A	Jan-95	0.2	U	0.2	U	0.1	U	0.2	U	0.2	U	0.4	U	0.2	U	1.8		0.63		2.7		8		1.1		0.5		2	U	2.6		0.2	U
	Apr-95	1	U	1	U	0.1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	17		10	U	2	U	30	U	2	U	1	U
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F			
U-5	Jan-95	0.1	U	0.1	U	0.5	U	0.5	U	0.1	U	0.2	U	0.5	U	0.5	U	0.16		0.4		1		2.5		0.1	U	1	U	0.13		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	1.6		1	U	0.2	U	3	U	0.4	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F				F		F		F	
B-18	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	2.5	U	0.88		7		2.3		2.5	U	0.5	U	5	U	3.6		0.5	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	2		1	U	0.2	U	3	U	5	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
B-22	Jan-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Apr-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
B-27	Jan-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Apr-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Jul-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	
	Oct-95	F		F		F		F		F		F		F		F		F		F		F		F		F		F		F		F	

F- Sample was not obtained because of the presence of free (floating) product.

COPPOR0006219

Table 5b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Recovery Trench Well Network																	
B-7	Jan-95	0.7	0.5	0.5 U	0.5 U	1.2	1 U	0.5 U	3.4	4.1	59	23	2.4 U	0.5 U	4.8 U	28	0.5 U
	Apr-95	1 U	1 U	1 U	1 U	1 U	2 U	2 U	10 U	2 U	5 U	15	10 U	2 U	30 U	2 U	1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	17	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.12	0.1	0.12	0.1	0.2	0.1 U	0.2 U	4.6	1.8	0.8	26	0.1 U	0.83	1.1	23	0.11
B-9	Jan-95	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	2.4 U	0.65	3.3	4.3	2.4 U	0.5 U	4.8 U	0.48	0.5 U
	Apr-95	0.1 U	0.1 U	0.16	0.1 U	0.37	0.2 U	0.24	1 U	0.2 U	0.5 U	8.1	1 U	0.2 U	3 U	0.2 U	0.26
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	10	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.13	0.1 U	0.16	0.12	0.18	0.1 U	0.14	2.9	0.49	0.4	10	0.1 U	0.32	0.6	0.94	0.16
General Groundwater Monitoring																	
B-10	Jan-95	0.2	0.1	0.1	0.1 U	0.3	0.2 U	0.2	1.2	2	15	7.6	13	0.1 U	1 U	9.4	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	3.9	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.11	0.1 U	0.26	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5.1	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.58	0.52	3.3	0.1 U	0.39	0.28	4.2	0.1 U
B-11	Jan-95	0.9	0.2	0.5	0.3	0.3	0.2 U	0.5	0.5 U	0.3	2.1	1.4	0.9	0.6	1 U	1.4	0.3
	Apr-95	0.11	0.1 U	0.14	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	1.8	1 U	0.2 U	3 U	1.3	0.1 U
	Jul-95	0.15	0.1 U	0.28	0.11	0.24	0.1 U	0.25	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.22
	Oct-95	0.2	0.12	0.32	0.23	0.25	0.1 U	0.27	0.9	0.14	0.32	1.4	0.1 U	0.33	0.16	1.3	0.34
B-14	Jan-95	0.1 U	0.3	0.1 U	0.1 U	0.7	0.2 U	0.1 U	0.6	0.27	2.2	2	12	0.5	1 U	2.7	0.1 U
	Apr-95	0.15	0.24	0.12	0.1 U	0.2	0.2 U	0.2 U	12	0.2 U	0.5 U	2.3	12	0.2 U	3 U	2.2	0.1 U
	Jul-95	0.1 U	0.16	0.1 U	0.1 U	0.13	0.1 U	0.1 U	5 U	5 U	0.74	5 U	9.8	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.12	0.1 U	0.1 U	0.12	0.1 U	0.2 U	1	0.3	0.85	1.4	6.7	0.99	0.17	1.2	0.1 U
B-28	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1 U	0.1 U	2	0.1 U	1 U	0.05 U	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	13	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.11	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	12	0.5 U	5 U	5 U	0.11
	Oct-95	0.1	0.1 U	0.12	0.1	0.12	0.1 U	0.2 U	0.1 U	0.1 U	0.17	0.1 U	0.36	0.14	0.1 U	0.1 U	0.12
B-30	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1 U	0.1 U	0.5 U	0.1 U	1 U	0.05 U	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12	0.1 U
CR-8	Jan-95	9.2	1.9	3.4	1.9	2.2	0.4	5.3	0.5 U	0.41	3	0.9	0.5 U	3.8	1 U	1.4	2.6
	Apr-95	0.32	0.18	0.19	0.1 U	0.21	0.2 U	0.24	1 U	0.2 U	0.73	0.5 U	1 U	1.1	3 U	0.2 U	0.38
	Jul-95	6.8	4.4	6.9	3.2	5.7	0.5 U	9.2	25 U	25 U	8.6	25 U	25 U	12	25 U	25 U	11
	Oct-95	6.4	2.5	4	2.9	3.3	0.77	4.2	0.28	0.42	5.2	0.42	0.1 U	6.3	0.43	0.9	6.4
CR-11	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.6	0.7	0.6	2	0.5 U	0.1 U	1 U	1.3	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	1.7	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.68	0.14	0.1 U	2	0.1 U	0.1 U	0.17	1.6	0.1 U

Notes

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Table 5c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																																	
MW-7	Jan-95	1.9		1.0	U	1.0	U	1.0	U	1.0	U	0.2	U	1.0	U	5	U	5.1		37		16		5	U	8.1		10	U	19		1.0	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	56		20	U	4	U	60	U	83		2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	26		25	U	2.5	U	25	U	76		0.5	U
	Oct-95	2	U	2	U	2	U	2	U	2	U	2	U	2	U	100	U	100	U	2	U	100	U	100	U	10	U	100	U	100	U	2	U
MW-11	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	<0.1	U	2.8		0.14		0.2		0.1	U	190		0.1	U	29		0.05	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	500		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	420		0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	450		0.5	U	5	U	5	U	0.1	U
MW-22	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.07		0.2		0.3		0.5	U	0.1	U	1	U	0.34		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	290		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	100	U	5	U	0.1	U	100	U	440		0.5	U	100	U	100	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	430		0.5	U	5	U	5	U	0.1	U
MW-23	Jan-95	0.6		0.5	U	0.5		0.5	U	0.9		1	U	0.5	U	2.5	U	2.6		11		11		8.5		2.7		48		11		0.5	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	12		0.2	U	3	U	4	U	0.1	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	33		2.5	U	25	U	25	U	0.5	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	6.6		50		0.5	U	5	U	5	U	0.1	U
MW-24	Jan-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Apr-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Jul-95	5	U	5	U	5	U	5	U	5	U	5	U	5	U	50	U	50	U	1	U	58		50	U	25	U	50	U	72		5	U
	Oct-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
MW-26	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	3.4		0.26		1.1		1.3		6.4		0.3		1	U	2.3		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	3.4		10		0.2	U	3	U	2.3		0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5.3		0.1	U
MW-28	Jan-95	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.4	U	0.2	U	2.9		0.94		1.8		0.2	U	1	U	8.6		6.1		1.2		0.2	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	12		20	U	4	U	60	U	4	U	2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	25	U	2.5	U	25	U	25	U	0.5	U
	Oct-95	10	U	10	U	10	U	10	U	10	U	10	U	10	U	500	U	500	U	10	U	500	U	500	U	50	U	500	U	500	U	10	U
MW-31	Jan-95	1	U	1	U	1	U	1	U	1	U	2	U	1	U	5	U	15		56		32		5	U	1	U	10	U	46		1	U
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	17		10	U	2	U	30	U	25	U	1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5.7		0.1	U
MW-37	Jan-95	0.2		0.2		0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	2.2		0.32		3.7		4.9		0.5	U	0.1	U	1	U	3.2		0.1	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	10	U	20	U	4	U	60	U	4	U	2	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.14		0.1	U	0.1	U	0.2		5	U	5	U	0.1	U	20		5	U	0.5	U	5	U	7.8		0.36	
	Oct-95	0.2		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1		5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	8		0.1	U

Notes: U = Not Detected Above Method Detection Limit.
ns = Not Sampled.

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Table 6
Free Product Recovered
Interim Action Plan
Willbridge Facilities

Week Ending	PRODUCT REMOVED (gal) Unocal	Chevron	Shell/GATX	Holbrook Recovery Trench	COMMENTS
5/26/95	---	---	1.50	off	SHELL/GATX installed Phase I recovery systems MW-6 and MW-24
6/2/95	---	---	0.41	off	
6/9/95	---	---	nc	off	
6/16/95	---	---	0.63	off	
6/23/95	---	---	0.25	off	
6/30/95	0.50	---	0.06	off	UNOCAL installed Phase I recovery systems U-5A and B-41(auto-bailer)
7/7/95	0.00	---	0.00	off	
7/14/95	0.00	---	nc	on	
7/21/95	0.554	0.00	0.37	on	SHELL/GATX installed Phase II recovery systems MW-7, MW-19, and MW-28 (removed from MW-6 and 24) CHEVRON installed Phase I recovery systems B-24, CR-6, CR-7, and CR-10 (petro-belt)
7/28/95	0.00	0.04	0.00	on	
8/4/95	nc	0.13	nc	on	
8/11/95	nc	0.03	nc	on	
8/18/95	3	0.005	0.78	on	UNOCAL removed product from U-4 with a Vac-truck
8/25/95	2.21	0.404	nc	on	UNOCAL - 2 day trial of auto-bailer on U-4
9/1/95	nc	0.008	0.50	on	
9/8/95	nc	nc	0.50	on	
9/15/95	nc	0.02	5.03	on	Shell/GATX began operating petro-belt in MW-24
9/22/95	0.00	0.02	11.00	on	
9/29/95	nc	0.07	9.00	off	
10/6/95	nc	nc	3.00	off	
10/13/95	nc	nc	0.00	off	
10/20/95	nc	nc	0.10	off	Shell/GATX petro-belt recovering water (22 gallons)
10/27/95	nc	0.00	0.00	off	UNOCAL installed PRCs in wells U-4, B-22, B-27 and B-39, on 10/31/95: and began hand-bailing test
11/3/95	1.50	nc	0.00	off	
11/10/95	nc	nc	0.00	off	
11/17/95	0.33	nc	0.00	off	UNOCAL moved PRC from B-39 to B-22
11/24/95	3.67	nc	0.03	off	UNOCAL moved PRC from B-22 to B-41
12/1/95	1.07	0.00	0.00	off	
Product Recovered	12.83	0.73	33.16	?	
			Total Recovered	46.72	

Symbols:
-- = no product recovery systems installed.
nc = product recovery systems not checked that week.

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PROJECT NORTH

0 100 200 300 400
SCALE: IN FEET

SEE FIGURE 2a FOR FREE PRODUCT THICKNESS DETAILS IN THE DOCK AREA

N.W. 61ST AVENUE

N.W. CULEBRA AVENUE

N.W. BALBOA AVENUE

N.W. DOANE AVENUE

FORMER GS TANK

FORMER TANK

SALTMAN CREEK

LEGEND

- MW-13 31.22 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION
- FLOW LINE
- 32 — GROUNDWATER ELEVATION CONTOURS
- EXTRAPOLATED GW CONTOUR LINES

FIGURE 1
GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 1995
WILLBRIDGE FACILITIES, PORTLAND, OREGON

CH2MHILL

COPPOR0006223

22-Dec-1995

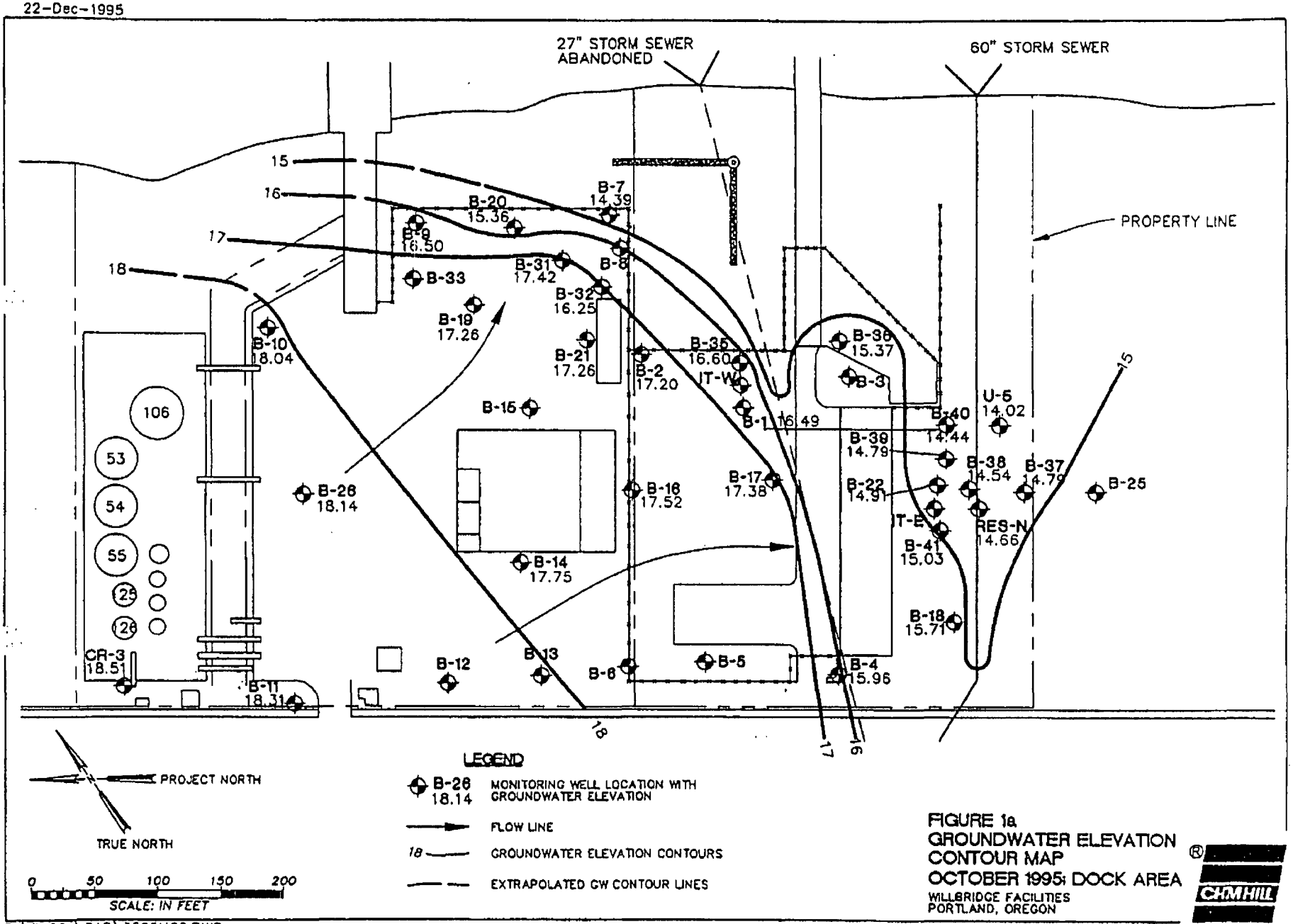

FIGURE 1a
GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 1995: DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

P:\39281\CAD\3595M02.DWG

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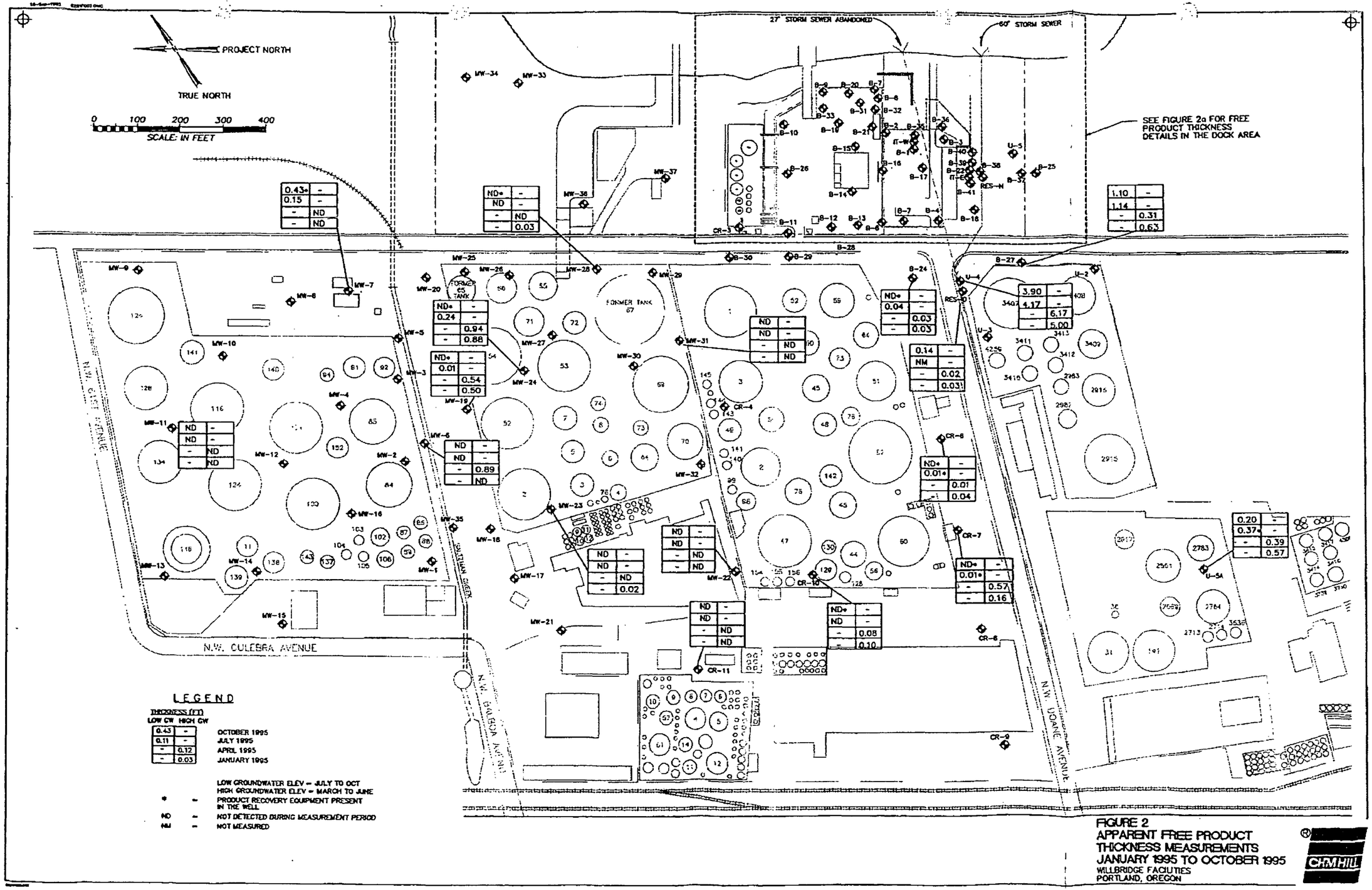

FIGURE 2
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS JANUARY 1995 TO OCTOBER 1995
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2M HILL

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SITE RESPONSE SECTION

PROJECT STATUS AND ISSUE REPORT

REPORTING PERIOD: April - June 1995

PROJECT: Chevron - Willbridge Distribution Terminal
5531 NW Doane AVE
Portland 97210

PROJECT MANAGER: Sheree Stewart

BACKGROUND

FACILITIES

Chevron - Willbridge Distribution Termin
Receives and redistributes petroleum products; receives, warehouses, and distributes tires, batteries, and automotive accessories Years of operation: 1912 to present

HAZARDOUS SUBSTANCES/WASTE TYPES
petroleum hydrocarbons weathered gasoline products tank bottoms

MANNER AND TIME OF RELEASE
Past operating practices; spills, leaks to storm sewer, sludge burial; 13 spills between 6/73 and 9/84; ongoing seepage 10/28/91.

CONTAMINATION
Past activities (inland spills, tank bottoms burial practices, leaky petroleum transmission lines at main distribution terminal) have allowed petroleum products to permeate fill sands and accumulate at top of shallow aquifer. Actual source of groundwater contamination is obscure. Shell and Union Oil have tank farms adjoining this site and may have contributed. (City of Portland) facility fined five times by Coast Guard as a result of oil seeps at edge of Willamette River. Waste in form of weatherized gasoline products, tank bottoms, and API separator product; leachate from old sludge burial pits. (11/13/91 RP/NWR) Petroleum seepage into Willamette River observed by DEQ staff 10/28/91.

PATHWAY INFORMATION
Groundwater contamination, surface water, potential soil contamination.

ENVIRONMENTAL/HEALTH THREATS
Seepage of contaminated groundwater into the Willamette River.

STATUS OF REMEDIAL ACTION

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

AUG 22 1995

NORTHWEST REGION

ECSI #1479) and is locat[illegible] upgradient and cross gradient [illegible]m a number of private and public wells (18 municipal wells are within a 2-mile radius of the site). Alternate water supplies have been provided to residences with contaminated wells. Principal source areas are beneath parking lot pavement and main plant. Therefore, direct contact to contaminated soil not significant concern.

ENVIRONMENTAL/HEALTH THREATS

~~Groundwater contamination w/TCE and other chlorinated solvents~~ threatening/possibly impacting private and public drinking water sources.

STATUS OF REMEDIAL ACTION

PROJECT STATUS SUMMARY

~~(4/10/95 BAG/SRS) Interim removal action implemented in 1992 (3 extraction wells~~ and an air stripper installed for on-site extraction and treatment of contaminated groundwater). Fourth well added to extraction well network in 1994. Off-site trench installed during the summer of 1994 to capture portion of TGA plume not captured by on-site system. Final RI Report received March 10, 1995. Draft FS Report received March 1, 1995. Finalization of FS and DEQ issuance of public notice of proposed final remedial action anticipated in June/July 1995. Final remedy should be selected by August.

WRF/QSR

Engineers
Planners
CH2MHILL Economists
Scientists

Portland Office

October 3, 1995

113595.II.CN

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
OCT 9 1995
NORTHWEST REGION

Ms. Jill Kiernan, P.E.
Oregon Department of Environmental Quality
Waste Management and Cleanup
2020 S.W. 4th Avenue, Suite 400
Portland, OR 97204

Subject: Willbridge RI/FS
Quarterly Report for June through August 1995

Dear Ms. Kiernan:

This letter presents the quarterly progress report for the remedial investigation/feasibility study (RI/FS) work being performed at the Chevron, Unocal, and GATX Willbridge facilities in Portland, Oregon. This report presents a summary of the following:

- Actions taken under the Consent Order from June to August 1995.
- Sampling, test results, and any other data generated between June and August 1995.
- A description of problems experienced and the manner in which they were resolved or are being addressed.
- Action scheduled to be taken under the Consent Order from September to November 1995.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

Action Taken from June to August 1995

The following work was performed from June to August 1995:

Serving Oregon and Southwest Washington from two locations:
Portland Office 825 N.E. Multnomah, Suite 1300, Portland, OR 97232-2146 503.235.5000 503.235.2445 FAX
Corvallis Office 2300 NW Walnut Blvd., Corvallis, OR 97330-3538 503.752.4271 503.752.0276 FAX

- Performed groundwater monitoring and seep and sheen observations at the Chevron, GATX, and Unocal facilities.
- Continued to operate the Holbrook Slough cutoff trench at the Old Doane Avenue storm water outfall for groundwater and free product recovery.
- Completed implementation of Phase I of the free product recovery program.
- Recovered approximately 11 gallons of product from the Unocal, Chevron, and GATX facilities.

Sampling, Test Results, and Data Generated from June 1995 to August 1995

Interim action monitoring activities performed this quarter included water level and product thickness measurements and groundwater sampling from selected wells, as described in Tables 3-1a, 3-1b, and 3-1c of the Field Coordination Plan (FCP).

Groundwater Flow

Water level measurements performed in June, July, and August 1995 (Tables 1a to 1c, Tables 2a to 2c, and Tables 3a to 3c, respectively) were corrected for free product where present, and the July 1995 data were used to prepare a groundwater flow map (Figures 1 and 1a). Water levels beneath the site are influenced primarily by river stage fluctuations and annual precipitation cycles. As a result of the controlled dam releases on the Columbia River system, the river stage remained at a fairly high level (between 7 to 8 feet) during June (measured on the river gauge at the Unocal dock). This is consistent with the data from the last quarter of monitoring. However, in early July, the river stage quickly dropped to approximately 4 feet. As a result of this large river stage change, the groundwater elevations dropped approximately 0.8 to 1.2 feet beneath portions of the site during July and August.

The direction of groundwater flow, inferred from the elevation contours, is generally toward the river, with a localized groundwater mound in the GATX south tank farm, the Unocal/Chevron dock area, and an apparent elongated groundwater depression (trough) beneath N.W. Doane Avenue. The trough may be caused by groundwater drainage through the gravel backfill associated with the Doane Avenue storm drain.

Product Thickness Measurements

Free product thicknesses were measured at selected wells on a monthly and quarterly basis (see Tables 1a to 3c). These data were compiled with apparent free product thickness data for 1994 and January, April, and July 1995 and are shown in Figures 2 and 2a. The measurements generally show decreased levels of product in wells located in the dock area

and Doane Avenue-Front Street intersection. The decrease in the product thickness in several wells is probably associated with the initiation of Phase I of the product recovery program, and the continuous operation of the Holbrook Slough recovery trench (after the river stage fell below the elevation of the top of the trench).

In the dock area, Wells B-1 and B-35, located along the Old Doane Avenue storm drain alignment, contained 0.02 and 0.21 feet of floating product, respectively (July measurements). Along the new Doane Avenue storm drain alignment, Wells B-38 and B-39 contained 0.17 and 0.13 feet of floating product, respectively. Well B-41 (also in the storm drain alignment) was not measured in July because the auto-bailer was installed on the well. Well U-4, located at the intersection of Doane Avenue and Front Street, contained 4.17 feet of product.

Water Quality

Groundwater samples collected from selected locations in the monitoring well network were tested for benzene, toluene, ethylbenzene, and xylene (BTEX) (EPA SW8020) and polycyclic aromatic hydrocarbons (PAHs) (EPA SW8310), as described in Tables 3-1a, 3-1b, and 3-1c of the FCP. Groundwater samples were not collected in July from Wells B-4, B-35, B-22, B-27, U-4, and U-5a at the Unocal site because of the presence of free product. Test results are presented in Tables 4a to 4c, and 5a to 5c. The water quality monitoring results appear to be consistent with past data.

Product Recovery

The Phase I product recovery program began in June 1995. The well locations included in the product recovery program and the corresponding product recovery equipment are described in Chapter 3 of the FCP. Approximately 11.17 gallons of free product were recovered during May, June, July, and August 1995. Additional product is being recovered by the Holbrook Slough recovery trench; however, product quantities are currently not available. Product recovery data for each site are presented in Table 6.

Shell/GATX Site

Phase I Product Recovery. The product recovery canister in Well MW-6 was removed because product was no longer being recovered. The product recovery canister in Well MW-24, which was not functioning properly because of the high viscosity of the product, was removed from the well. A petro-belt has been delivered to MW-24 and the electrical connection will be installed in September 1995.

Phase II Product Recovery. Product recovery canisters are currently present in Wells MW-7, MW-19, and MW-28.

Unocal Site

Phase I Product Recovery. A product recovery canister was installed in Well U-5A in the last week of June 1995. The product in this well has a high viscosity. The canister recovered 0.5 gallons of product during the first week; however, approximately one tenth of a gallon has been recovered in the subsequent weeks. In response to the low recovery rate, the hydrophobic filter was cleaned during the third week in August.

The Phase I auto-bailer was installed and calibrated in Well B-41 during the second week in July. During this equipment trial period, no product was recovered because of malfunctions with the equipment and inefficient operation of the auto-bailer. In addition, during an attempt to install the auto-bailer in Well B-38, it was discovered that the machine could not operate because of bends in the monitoring well casing. The auto-bailer also could not be used in Well B-40 because the explosion-proof power cord was not long enough. If the petro-belt technology being used at the other sites is found to be effective, it may be applicable to use a shared petro-belt for these two wells.

Use of the auto-bailer in Well U-4 has been delayed by the lack of permission from the city to expand the current security fencing. During the third week of August, the product in Well U-4 was removed by using a Vac-truck, and the auto-bailer was temporarily moved to the well to test the equipment in a well with product. Power was supplied by a portable generator. Approximately 2.2 gallons were recovered with the auto-bailer during a 2-day trial run period.

Phase II Product Recovery. Phase II product recovery will begin following a review of the Phase I product recovery technologies (auto-bailers and petro-belts). During Phase II of the recovery program, a shared auto-bailer was scheduled to be used in Well B-27; however, because the well touches the edge of the sidewalk, it is not possible to install a security enclosure around the well without blocking the sidewalk. A product recovery canister will be used for product recovery in this well. Installation of the product recovery canisters for Phase II will be coordinated for September to October 1995.

Chevron Site

Phase I Product Recovery. Product recovery canisters were installed in Wells B-24, CR-6, and CR-7 during the third week in July. A petro-belt was installed and operating by the first week in August in Well CR-10.

Phase II Product Recovery. Installation of the product recovery canister for Phase II will be coordinated for September to October 1995.

Seep and Sheen Monitoring

Weekly to biweekly visits were made to the site to document the location and extent of hydrocarbon seeps and sheens at the riverbank. Field observations were recorded on the seep/sheen form. Field observations are conducted around low tide, when possible.

Sheens that are observed on the water surface are controlled with containment booms and the recovered product removed by adsorbent pads and skimming equipment. The containment booms currently encompass the shoreline between the Chevron and Unocal docks, and from the south edge of the Unocal dock to the southern property line (beyond the new Doane Avenue storm sewer outfall). In addition to the boom located south of the Unocal dock, a second containment boom located inside of the first boom is positioned around the new Doane Avenue outfall pipe.

Weekly seep and sheen monitoring indicates that several site conditions, including the river stage and the recovery trench operation (tied to the river stage), control hydrocarbon seeps and the resulting sheens observed at the river's edge.

High river stage can affect the production of sheens at the shoreline by hydraulically inhibiting product movement through seepage points into the river. Seep and sheen monitoring has shown that the quantity and size of sheens generally decrease as the river stage rises.

Holbrook Recovery Trench Shoreline. The river stage also controls operation of the Holbrook Slough recovery trench, located along the shoreline near the old Doane Avenue outfall location. The trench is shut off as the river stage rises above approximately 5 to 6 feet (measured by the river gauge staff on the Unocal dock). River stage levels this quarter ranged between 3.0 and 8.0 feet. During the beginning of the quarter, the river stage was high (7 to 8.0 feet). Because of high river levels, the trench did not operate during June and early July. Moderate to light sheens were occasionally observed near the rock ramp located at the edge of the recovery trench during this period. As the river level stages dropped below 5 feet in early July, the cutoff trench began operating. As a result of the trench operating, the quantity of sheens in this area decreased.

Doane Avenue Outfall. Sheens were observed within the containment boom surrounding the new Doane Avenue outfall during each of the site visits. These sheens are believed to be produced from product exiting the pipe outfall and by product seep discharge from the gravel backfill surrounding the pipe.

No seeps and sheens were observed north of the GATX or between the GATX and Chevron docks.

Problems Experienced from June to August 1995

Installation and operation of the auto-bailer for the Phase I product recovery program at the Unocal site was delayed for the following reasons: (1) the auto-bailer not functioning in Wells B-38 and B-41 for the reasons described earlier; (2) difficulties in permitting the security enclosure expansion around Well U-4; and (3) a lack of product in available wells. It was also determined that product recovery in Well B-27 cannot be conducted with the auto-bailer and that a product recovery canister is the most appropriate product recovery method.

Product thickness has also begun to accumulate in Well RES-New on the Unocal site. This well was not targeted for the product recovery in the draft Interim Action Plan. However, after the Phase I product recovery techniques have been evaluated, an appropriate method for product recovery in this well will be considered.

Actions Scheduled for September through November 1995

The following actions are scheduled for September through November 1995:

- Continue the interim action monitoring program at the Chevron, GATX, and Unocal facilities, as described in the Interim Action Plan and the FCP.
- Continue operation of the Holbrook Slough cutoff trench as an interim action.
- Complete initiation of Phase II of the free product recovery program. Begin collecting, reviewing, and evaluating Phase I product recovery data as outlined in the Interim Action Plan and the FCP.
- Continue review of existing information and interim action monitoring data.

Please call at 503/235-5000 if you have any questions.

Sincerely,

CH2M HILL

Ross D. Rieke, P.E.
Project Manager

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Attachments:

Tables 1a to 1c, Water Level Monitoring Data: March 1995
Tables 2a to 2c, Water Level Monitoring Data: April 1995
Tables 3a to 3c, Water Level Monitoring Data: May 1995
Tables 4a to 4c, Water Quality Monitoring Results, Aromatic Volatiles
Tables 5a to 5c, Water Quality Monitoring Results, PAHs
Table 6, Free Product Recovered
Figure 1, Groundwater Elevation Contour Map
Figure 1a, Groundwater Elevation Contour Map-Dock Area
Figure 2, Apparent Free Product Thickness Measurements
Figure 2a, Apparent Free Product Thickness Measurements-Dock Area

cc: Rene White, Chevron
Joe Comstock, UNOCAL
Andrew Holbrook, GATX
George Loyd, Shell Oil
Scott McKinley, CH2M HILL/CVO
Terry Fisk, GeoEngineers
Paul Woods, SEACOR
Gregory Kupillas, Hart Crowser

Table 1a
Water Level Monitoring Data
Unocal

Date: June 26, 1995

Time Begin: 0800 Time End: 1200

Field Staff: Pat Timmer

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network						
B-1	34.79 b	17.75 M	18.23 M	0.48	17.85	16.94
B-2	35.35 b		17.48 M			17.87
B-17	35.59 b	17.61 M	17.61 M	0.00	17.61	17.98
B-35	33.58 a	16.45 M	16.68 M	0.23	16.50	17.08
B-36	30.97 a		15.24 M			15.73
RES-New Well Network						
B-1	34.79 b	17.75	18.23	0.48	17.85	16.94
B-4	34.79 b	18.27 M	19.28 M	1.01	18.47	16.32
B-17	35.59 b		17.61	0.00	17.61	17.98
B-18	35.79 b		19.56 M			16.23
B-22	34.67 b	19.09 M	19.36 M	0.27	19.14	15.53
B-25	35.83 b		19.26 M			16.57
B-37	35.24 a		19.75 M			15.49
B-40	33.19 a	17.95 M	18.06 M	0.11	17.97	15.22
B-41	34.85 a	19.11 M	19.17 M	0.06	19.12	15.73
RES - New		23.26	24.01 M	0.75	23.41	15.17
General Groundwater Monitoring						
U-2	35.02 a		15.52 Q			19.50
U-3	35.25 a	13.89	13.90 Q	0.01	13.89	21.36
U-4	34.46 a	15.96 M	22.12 M	6.16	17.19	17.27
U-5A	33.77 a	6.97 M	M			
U-5	33.37 a		8.42 Q			24.95
B-1	34.79 b	17.50	18.23	0.48	17.85	16.94
B-4	34.79 b	18.27	19.28	1.01	18.47	16.32
B-17	35.59 b		17.61	0.00	17.61	17.98
B-18	35.79 b		19.56			16.23
B-22	34.67 b	19.09	19.36	0.27	19.14	15.53
B-27	35.74 c	17.91 M	19.03 M	1.12	18.13	17.61
B-35	33.58 a	16.45	16.68	0.23	16.50	17.08
B-36	30.97 a		15.24			15.73
B-37	35.24 a		19.75			15.49
B-38	34.75 a	19.30 M	20.46 M	1.16	19.53	15.22
B-39	33.92 a	18.43 M	18.52 M	0.09	18.45	15.47
B-40	33.19 a	17.95	18.06	0.11	17.97	15.22
B-41	34.85 a	19.11	19.17	0.06	19.12	15.73
RES - Old	36.03 d	18.26 M	18.28 M	0.02	18.26	17.77

Notes:

1 [ ] outlined cell indicates data entry location.

2 a = Measuring point elevation from CH2M Hill field survey.

3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey.

4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum.

6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60.

7 M = monthly on fourth monday. Q = quarterly on fourth monday.

Table 1b
Water Level Monitoring Data
Chevron

Date: 6/19/95
Time Begin:_____ Time End:_____
Field Staff: Erik Chapman & Randy Miller

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench									
B-7	33.96	b			18.77	M			15.19
B-9	33.95	b			16.59	M			17.36
B-16	35.82	b			17.59	M			18.23
B-19	34.71	b			16.70	M			18.01
B-21	34.79	b			16.83	M			17.96
B-31	33.86	d			16.74	M			17.12
B-32	34.23	a			17.10	M			17.13
River Stage		e			6.50	M			11.21
General Groundwater Sampling									
B-7	33.96	b	18.77	M	18.77	M	0.00	18.77	15.19
B-9	33.95	b			16.59	M			17.36
B-10	34.74	b	15.96	M	15.96	M	0.00	15.96	18.78
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-16	35.82	b			17.59	Q			18.23
B-19	34.71	b			16.70	Q			18.01
B-20	33.4	b	17.20	M	17.20	M	0.00	17.20	16.20
B-24	34.7	b	16.39	M	16.41	M	0.02	16.39	18.31
B-26	35.3	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a	17.10	M	17.10	M	0.00	17.10	17.13
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a	10.16		10.16	M	0.00	10.16	25.45
CR-7	35.57	a	11.25	M	11.40	M	0.15	11.28	24.29
CR-8	33.14	a				Q			
CR-10	35.57	a	6.30	M	6.38	M	0.08	6.32	29.25
CR-11	34.43	a	2.94	M	2.94	M	0.00	2.94	31.49
River Stage		e			6.50	Q			11.21

Notes:

1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8 e = River stage 16.00 equals elevation 20.71

Table 1c
Groundwater Monitoring Requirements
Shell/GATX

Date: June 26, 1995
Time Begin: 12:30 pm Time End: 4:30 pm
Field Staff: Rhonda Moore

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	4.64	M	4.64	M	0.00	4.64	28.70
MW-7	34.12 c	8.93	M	9.32	M	0.39	9.01	25.11
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	6.52	M	6.52	M	0.00	6.52	29.95
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	3.87	M	4.48	M	0.61	3.99	29.40
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	4.34	M	4.34	M	0.00	4.34	31.31
MW-23	36.06 c	4.75	M	4.75	Q	0.00	4.75	31.31
MW-24	35.15 c	6.50	M	8.40	M	1.90	6.88	28.27
MW-28	34.39 c	6.50	M	6.59	M	0.09	6.52	27.87
MW-29	35.77 c				Q			
MW-31	37.55 c	7.26	M	7.26	M	0.00	7.26	30.29
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			

Notes:
1 [ ] outlined cell indicates data entry location
2 M = monthly on fourth monday. Q = quarterly on fourth monday
3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 2a
Water Level Monitoring Data
Unocal

Date: July 24, 1995
Time Begin: 0800 Time End: 1200
Field Staff: Pat Timmer

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network								
B-1	34.79 b	17.98	M	18.00	M	0.02	17.98	16.81
B-2	35.35 b				M			
B-17	35.59 b	17.79	M	17.80	M	0.01	17.79	17.80
B-35	33.58 a	16.65	M	16.86	M	0.21	16.69	16.89
B-36	30.97 a			15.47	M			15.50
RES-New Well Network								
B-1	34.79 b					0.02	17.98	16.81
B-4	34.79 b	18.53	M	18.64	M	0.11	18.55	16.24
B-17	35.59 b					0.01	17.79	17.80
B-18	35.79 b			19.74	M			16.05
B-22	34.67 b	19.35	M	19.63	M	0.28	19.41	15.26
B-25	35.83 b			nm	M			
B-37	35.24 a			20.08	M			15.16
B-40	33.19 a	18.36	M	18.37	M	0.01	18.36	14.83
B-41	34.85 a		M	nm	M			
RES - New		23.45		24.21	M	0.76	23.60	
General Groundwater Monitoring								
U-2	35.02 a			15.75	Q			19.27
U-3	35.25 a			14.02	Q			21.23
U-4	34.46 a	16.33	M	20.50	M	4.17	17.16	17.30
U-5A	33.77 a	9.86	M	10.23	M	0.37	9.93	23.84
U-5	33.37 a	18.90		18.91	Q			14.46
B-1	34.79 b					0.02	17.98	16.81
B-4	34.79 b					0.11	18.55	16.24
B-17	35.59 b					0.01	17.79	17.80
B-18	35.79 b							16.05
B-22	34.67 b					0.28	19.41	15.26
B-27	35.74 c	18.11	M	19.25	M	1.14	18.34	17.40
B-35	33.58 a					0.21	16.69	16.89
B-36	30.97 a							15.50
B-37	35.24 a							15.16
B-38	34.75 a	19.75	M	19.92	M	0.17	19.78	14.97
B-39	33.92 a	18.73	M	18.86	M	0.13	18.76	15.16
B-40	33.19 a					0.01	18.36	14.83
B-41	34.85 a			nm		0.00	0.00	
RES - Old	36.03 d		M	nm	M			

Notes:
1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.
8 NM=not measured

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Table 2b
Water Level Monitoring Data
Chevron

Date: 7/24-25/95
Time Begin: 1340-7/24 **Time End:** 1355-7/25
Field Staff: Chris Chatburn & Tim Ree

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench									
B-7	33.96	b			19.74	M			14.22
B-9	33.95	b			17.45	M			16.50
B-16	35.82	b			17.89	M			17.93
B-19	34.71	b			17.09	M			17.62
B-21	34.79	b			17.18	M			17.61
B-31	33.86	d			16.89	M			16.97
B-32	34.23	a			17.59	M			16.64
River Stage		e			4.50	M			9.21
General Groundwater Sampling									
B-7	33.96	b	19.74	M	19.74	M	0.00	19.74	14.22
B-9	33.95	b			17.45	M			16.50
B-10	34.74	b	16.26	M	16.26	M	0.00	16.26	18.48
B-11	34.95	b			16.08	Q			18.87
B-14	36.59	b			18.35	Q			18.24
B-16	35.82	b			17.89	Q			17.93
B-19	34.71	b			17.09	Q			17.62
B-20	33.4	b	17.95	M	18.14	M	0.19	17.99	15.41
B-24	34.7	b	16.56	M	16.60	M	0.04	16.57	18.13
B-26	35.3	b			16.69	Q			18.61
B-28	35.25	b			16.14	Q			19.11
B-30	35.35	b			15.96	Q			19.39
B-32	34.23	a	17.59	M	17.59	M	0.00	17.59	16.64
CR-3	34.32	a			15.25	Q			19.07
CR-4	34.93	a			6.90	Q			28.03
CR-6	35.61	a	14.86		14.87	M	0.01	14.86	20.75
CR-7	35.57	a	11.80	M	11.81	M	0.01	11.80	23.77
CR-8	33.14	a			8.22	Q			24.92
CR-10	35.57	a	9.22	M	9.22	M	0.00	9.22	26.35
CR-11	34.43	a	3.68	M	3.68	M	0.00	3.68	30.75
River Stage		e			4.50	Q			9.21

Notes:

1. ☐ outlined cell indicates data entry location
2. a = Measuring point elevation from CH2M Hill field survey
3. b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4. c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5. d = Measuring point elevation adjusted -1.53 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6. Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7. Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8. e = River stage 16.00 equals elevation 20.71

Table 2c
Groundwater Monitoring Requirements
Shell/GATX

Date: July 24, 1995
Time Begin: 9:15 am Time End: 5:20 pm
Field Staff: Brett Brodersen & Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c			6.26	Q			29.17
MW-3	36.02 c			8.63	Q			27.39
MW-4	36.39 c			8.17	Q			28.22
MW-5	33.52 c			7.12	Q			26.40
MW-6	33.34 c	5.15	M	5.15	M	0.00	5.15	28.19
MW-7	34.12 c	9.35	M	9.50	M	0.15	9.38	24.74
MW-8	33.95 c			8.53	Q			25.42
MW-9	36.53 c			10.85	Q			25.68
MW-10	35.82 c			10.25	Q			25.57
MW-11	36.47 c	7.10	M	7.10	M	0.00	7.10	29.37
MW-12	35.95 c			7.30	Q			28.65
MW-13	37.89 c			6.29	Q			31.60
MW-14	36.28 c			5.62	Q			30.66
MW-16	34.93 c			5.78	Q			29.15
MW-18	33.76 c			3.02	Q			30.74
MW-19	33.39 c	4.41	M	4.42	M	0.01	4.41	28.98
MW-20	34.76 c			10.73	Q			24.03
MW-21	34.33 c			2.21	Q			32.12
MW-22	35.65 c	4.83	M	4.83	M	0.00	4.83	30.82
MW-23	36.06 c	5.07	M	5.07	M			30.99
MW-24	35.15 c	7.25	M	7.49	M	0.24	7.30	27.85
MW-28	34.39 c	6.94	M	6.94	M	0.00	6.94	27.45
MW-29	35.77 c			14.20	Q			21.57
MW-31	37.55 c	7.74	M	7.74	M	0.00	7.74	29.81
MW-32	37.01 c			5.75	Q			31.26
MW-33	39.34 c			20.68	Q			18.66
MW-34	39.67 c			19.99	Q			19.68
MW-36	34.88 c				Q			
MW-37	34.86 c			15.88	Q			18.98

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 3a
Water Level Monitoring Data
Unocal

Date: August 28, 1995
Time Begin: 0800 **Time End:** 1400
Field Staff: Pat Timmer

Well Number	Measuring Point Elev	Depth to Product	Depth to Water	Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench Well Network						
B-1	34.79 b	18.32 M	18.34 M	0.02	18.32	16.47
B-2	35.35 b	19.58	19.84 M	0.26	19.63	15.72
B-17	35.59 b	18.78 M	18.79 M	0.01	18.78	16.81
B-35	33.58 a	17.35 M	17.52 M	0.17	17.38	16.20
B-36	30.97 a		15.35 M			15.62
RES-New Well Network						
B-1	34.79 b	18.32	18.34	0.02	18.32	16.47
B-4	34.79 b	18.62 M	18.63 M	0.01	18.62	16.17
B-17	35.59 b	18.78	18.79	0.01	18.78	16.81
B-18	35.79 b		19.43 M			16.36
B-22	34.67 b	18.50 M	18.63 M	0.13	18.53	16.14
B-25	35.83 b		NM M			
B-37	35.24 a		20.10 M			15.14
B-40	33.19 a	18.40 M	18.41 M	0.01	18.40	14.79
B-41	34.85 a	18.55 M	19.25 M	0.70	18.69	16.16
RES - New		23.64	24.32 M	0.68	23.78	14.80
General Groundwater Monitoring						
U-2	35.02 a		15.65 Q			19.37
U-3	35.25 a		19.65 Q			15.60
U-4	34.46 a	17.23 M	20.95 M	3.72	17.97	16.49
U-5A	33.77 a	9.50 M	9.95 M	0.45	9.59	24.18
U-5	33.37 a	19.13	19.25 Q	0.12	19.15	14.22
B-1	34.79 b	18.32	18.34	0.02	18.32	16.47
B-4	34.79 b	18.62	18.63	0.01	18.62	16.17
B-17	35.59 b	18.78	18.79	0.01	18.78	16.81
B-18	35.79 b		19.43			16.36
B-22	34.67 b	18.50	18.63	0.13	18.53	16.14
B-27	35.74 c	18.75 M	19.25 M	0.50	18.85	16.89
B-35	33.58 a	17.35	17.52	0.17	17.38	16.20
B-36	30.97 a		15.35			15.62
B-37	35.24 a		20.10			15.14
B-38	34.75 a	19.82 35	20.53 M	0.71	19.96	14.79
B-39	33.92 a	18.95 M	19.06 M	0.11	18.97	14.95
B-40	33.19 a	18.40	18.41	0.01	18.40	14.79
B-41	34.85 a	18.55	19.25	0.70	18.69	16.16
RES - Old	36.03 d	17.30 M	17.55 M	0.25	17.35	16.70

Notes:

1 [ ] outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match site datum
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 M = monthly on fourth monday. Q = quarterly on fourth monday.

Table 3b
Water Level Monitoring Data
Chevron

Date: 8/28/95
Time Begin: 10:00 Time End: 14:00
Field Staff: RSP

Well Number	Measuring Point Elev		Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
Recovery Trench									
B-7	33.96	b			20.03	M			13.93
B-9	33.95	b			17.85	M			16.10
B-16	35.82	b			8.10	M			27.72
B-19	34.71	b			17.37	M			17.34
B-21	34.79	b			17.43	M			17.36
B-31	33.86	d			17.15	M			16.71
B-32	34.23	a			17.94	M			16.29
River Stage		e				M			
General Groundwater Sampling									
B-7	33.96	b	20.03	M	20.03	M	0.00	20.03	13.93
B-9	33.95	b			17.85	M			16.10
B-10	34.74	b	16.26	M	16.58	M	0.32	16.32	18.42
B-11	34.95	b				Q			
B-14	36.59	b				Q			
B-16	35.82	b			8.10	Q			27.72
B-19	34.71	b			17.37	Q			17.34
B-20	33.4	b	18.30	M	18.67	M	0.37	18.37	15.03
B-24	34.7	b	16.81	M	16.81	M	0.00	16.81	17.89
B-26	35.3	b				Q			
B-28	35.25	b				Q			
B-30	35.35	b				Q			
B-32	34.23	a	17.94	M	17.94	M	0.00	17.94	16.29
CR-3	34.32	a				Q			
CR-4	34.93	a				Q			
CR-6	35.61	a	14.51		14.52	M	0.01	14.51	21.10
CR-7	35.57	a	12.20	M	12.20	M	0.00	12.20	23.37
CR-8	33.14	a				Q			
CR-10	35.57	a	10.15	M	10.15	M	0.00	10.15	25.42
CR-11	34.43	a	4.18	M	4.18	M	0.00	4.18	30.25
River Stage		e				Q			

Notes:
1 ☐ outlined cell indicates data entry location
2 a = Measuring point elevation from CH2M Hill field survey
3 b = Measuring point elevation from original well construction log and confirmed by CH2M Hill field survey
4 c = Measuring point elevation adjusted by CH2M Hill to common site datum.
5 d = Measuring point elevation adjusted -1.63 feet from Reidel elevation to match similar correlations with B-19, B-20\ and B-21
6 Site Datum = City of Portland benchmark (elev = 35.996 ft) on west side of Chevron Tank #60
7 Wells not monitored: B-2, B-12, B-13, B-33 and CR-9
8 e = River stage 16.00 equals elevation 20.71

Table 3c
Groundwater Monitoring Requirements
Shell/GATX

Date: August 28, 1995

Time Begin: 9:00 am Time End: 10:00 am

Field Staff: Doann Hamilton

Well Number	Measuring Point Elev	Depth to Product		Depth to Water		Product Thickness	Product Adjusted Depth to Water	Groundwater Elevation
General Groundwater Monitoring								
MW-1	35.43 c				Q			
MW-3	36.02 c				Q			
MW-4	36.39 c				Q			
MW-5	33.52 c				Q			
MW-6	33.34 c	5.90	M	5.90	M	0.00	5.90	27.44
MW-7	34.12 c	9.79	M	10.00	M	0.21	9.83	24.29
MW-8	33.95 c				Q			
MW-9	36.53 c				Q			
MW-10	35.82 c				Q			
MW-11	36.47 c	8.00	M	8.00	M	0.00	8.00	28.47
MW-12	35.95 c				Q			
MW-13	37.89 c				Q			
MW-14	36.28 c				Q			
MW-16	34.93 c				Q			
MW-18	33.76 c				Q			
MW-19	33.39 c	5.64	M	5.64	M	0.00	5.64	27.75
MW-20	34.76 c				Q			
MW-21	34.33 c				Q			
MW-22	35.65 c	5.35	M	5.35	M	0.00	5.35	30.30
MW-23	36.06 c	5.44	M	5.55	M			
MW-24	35.15 c	8.42	M	10.00	M	1.58	8.74	26.42
MW-28	34.39 c	8.04	M	8.05	M	0.01	8.04	26.35
MW-29	35.77 c				Q			
MW-31	37.55 c	8.41	M	8.41	M	0.00	8.41	29.14
MW-32	37.01 c				Q			
MW-33	39.34 c				Q			
MW-34	39.67 c				Q			
MW-36	34.88 c				Q			
MW-37	34.86 c				Q			

Notes:

1 [ ] outlined cell indicates data entry location

2 M = monthly on fourth monday. Q = quarterly on fourth monday

3 c = Measuring point elevation adjusted by CH2M Hill to common site datum.

4 Wells not monitored: MW2, MW15, MW17, MW25, MW27, MW30, MW35, MW38, MW39, MW40

Table 4a
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Recovery Trench Well Network									
B-17	Jan-95	200		17		4.5		26	
	Apr-95	590		17		7.7		16	
	Jul-95	670		22		11		20	
	Oct-95								
B-35	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95								
B-36	Jan-95								
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95								
RES-New Well Network									
B-4	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95								
B-37	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95								
Res-New	Jan-95	4		0.6		3.4		4.5	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95								
General Groundwater Monitoring									
U-2	Jan-95	3.8		0.5	U	4.9		2.9	
	Apr-95	0.66		0.5	U	1.2		1.2	
	Jul-95	2.6		0.5	U	0.62		4	
	Oct-95								
U-3	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95								
U-4	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	F		F		F		F	
	Oct-95								
U-5A	Jan-95	20		6.5		3.7		7.2	
	Apr-95	28		7.8		5		20	
	Jul-95	F		F		F		F	
	Oct-95								
U-5	Jan-95	15		2		0.5		3	
	Apr-95	1.9		1.4		0.5	U	1.7	
	Jul-95	2.7		1.2		0.5	U	1.8	
	Oct-95								
B-18	Jan-95	0.5	U	0.5	U	0.5	U	0.6	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1	U
	Oct-95								
B-22	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95								
B-27	Jan-95	F		F		F		F	
	Apr-95	F		F		F		F	
	Jul-95	F		F		F		F	
	Oct-95								

F- Sample was not obtained because of the presence of free (floating) product.

Table 4b
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
Recovery Trench Well Network									
B-7	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.73		0.5	U	0.5	U
	Jul-95	0.5	U	0.57		0.5	U	0.5	U
	Oct-95								
B-9	Jan-95	0.5	U	0.9		0.5	U	1.5	
	Apr-95	0.5	U	0.88		0.5	U	1.3	
	Jul-95	0.5	U	1		0.5	U	0.52	
	Oct-95								
General Groundwater Monitoring									
B-10	Jan-95	8.6		2.9		0.7		5.2	
	Apr-95	11		5.7		14		17	
	Jul-95	8.3		3.6		4.3		11	
	Oct-95								
B-11	Jan-95	12		2.8		52		9.9	
	Apr-95	140		8.2		2.6		6.3	
	Jul-95	140		9.3		2.3		9.5	
	Oct-95								
B-14	Jan-95	190		15		78		46	
	Apr-95	140		7.6		170		83	
	Jul-95	190		21		91		55	
	Oct-95								
B-28	Jan-95	10		0.7		17		2	
	Apr-95	19		0.86		48		7.8	
	Jul-95	1.7		0.82		32		5.6	
	Oct-95								
B-30	Jan-95	51		7.6		3.1		17	
	Apr-95	28		3.1		1.6		9.9	
	Jul-95	12		2		0.71		4.5	
	Oct-95								
CR-8	Jan-95	0.5	U	0.5	U	3.9		5.8	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95								
CR-11	Jan-95	94		3.9		2.4		3.4	
	Apr-95	110		3.6		5.4		17	
	Jul-95	94		4.4		3		9.1	
	Oct-95								

Notes

Table 4c
Water Quality Analysis Results
Aromatic Volatiles by SW8020
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l)							
		Benzene	Q	Toluene	Q	Ethylbenzene	Q	Xylenes	Q
General Groundwater Monitoring									
MW-7	Jan-95	0.5	U	0.5	U	18		30	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	1	U	1	U	1	U	1	U
	Oct-95								
MW-8	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.96		0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	1.1	
	Oct-95								
MW-10	Jan-95	1.7		0.7		0.5	U	1	
	Apr-95	0.5	U	0.5	U	0.5	U	1.3	
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95								
MW-11	Jan-95	8900		4500		2500		11000	
	Apr-95	7400		4900		2500		12000	
	Jul-95	5400		2400		2600		8000	
	Oct-95								
MW-22	Jan-95	2400		8100		4700		16000	
	Apr-95	2200		7100		4500		15000	
	Jul-95	2000		5800		4500		15000	
	Oct-95								
MW-23	Jan-95	72		20		210		180	
	Apr-95	150		38		240		140	
	Jul-95	99		20		240		140	
	Oct-95								
MW-26	Jan-95	1.7		0.5	U	24		33	
	Apr-95	8.7		7.3		13		19	
	Jul-95	6.4		10		9.6		12	
	Oct-95								
MW-28	Jan-95	0.9		0.6		8.5		20	
	Apr-95	2.5	U	2.5	U	20		15	
	Jul-95	7.6		2.7		2.6		7.9	
	Oct-95								
MW-31	Jan-95	1.3		1.6		1.2		3.8	
	Apr-95	9.3		4.7		0.99		3.1	
	Jul-95	2.8		1.3		0.64		1.4	
	Oct-95								
MW-32	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95								
MW-33	Jan-95	0.5	U	0.5	U	0.5	U	0.5	
	Apr-95	0.5	U	0.5	U	0.5	U	0.5	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U
	Oct-95								
MW-37	Jan-95	0.5	U	0.5	U	2.2		7.1	
	Apr-95	2.5	U	2.5	U	2.5	U	2.5	U
	Jul-95	140		2.5	U	2.5	U	2.5	U
	Oct-95								

Notes : U = Not Detected Above Method Detection Limit.

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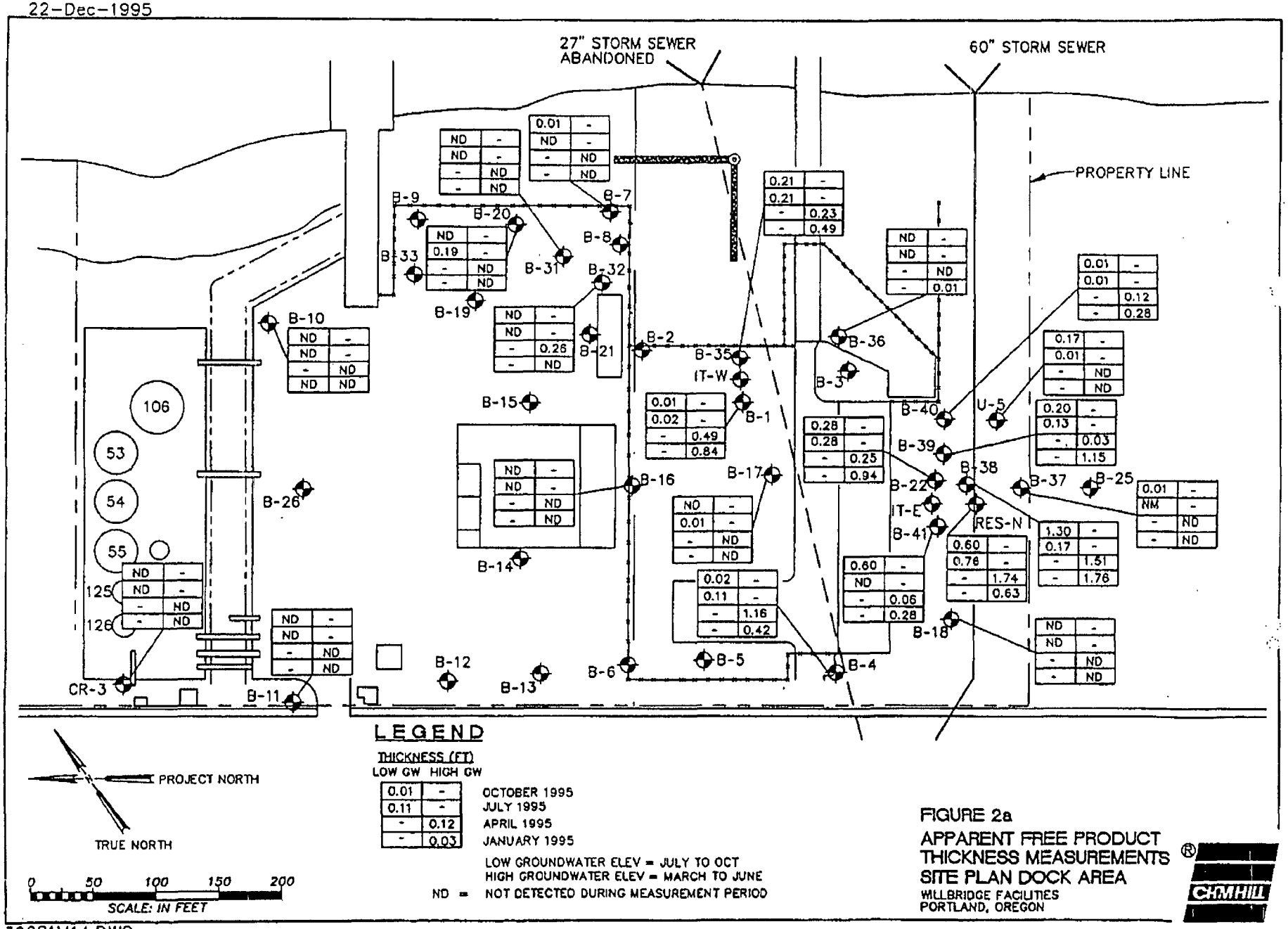


LEGEND

THICKNESS (FT)

LOW GW	HIGH GW	
0.01	-	OCTOBER 1995
0.11	-	JULY 1995
-	0.12	APRIL 1995
-	0.03	JANUARY 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

ND = NOT DETECTED DURING MEASUREMENT PERIOD

FIGURE 2a
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

39281M14.DWG

Table 5a
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Unocal

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene Q	Benzo(a)-anthracene Q	Benzo(b)-fluoranthene Q	Benzo(k)-fluoranthene Q	Chrysene Q	Dibenzo(a,h)-anthracene Q	Indeno-pyrene Q	Acenaph-thene Q	Anthra-cene Q	Fluor-anthene Q	Fluorene Q	Naph-thalene Q	Pyrene Q	Acenaph-thylene Q	Phenan-threne Q	Benzo(g,h,i) perylene Q
Recovery Trench Well Network																	
B-17	Jan-95	0.5 U	1.1	0.5 U	0.5 U	0.5 U	1 U	0.5 U	2.5 U	5.2	34	23	56	0.5 U	5 U	25	0.5 U
	Apr-95	1 U	1 U	1 U	1 U	1 U	2 U	2 U	10 U	2 U	5 U	11	10 U	2 U	30 U	13	1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	13	0.1 U
	Oct-95																
B-35	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																
B-36	Jan-95																
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
RES-New Well Network																	
B-4	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																
B-37	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1 U	0.1 U	0.5 U	0.2	1 U	0.13	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	0.5 U	1 U	0.2 U	3 U	0.2 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
General Groundwater Monitoring																	
U-2	Jan-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.1 U	0.5 U	0.05 U	0.1	0.1 U	3.6	0.1 U	1 U	0.1 U	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.23	1 U	0.2 U	0.5 U	0.5 U	9.8	0.2 U	3 U	1 U	1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
U-3	Jan-95	0.1 U	0.4	0.7	0.3	0.1 U	0.6	0.7	0.5 U	0.05 U	0.9	0.9	0.6	0.8	1 U	0.65	0.1 U
	Apr-95	1.6	1.1	1.4	0.71	1.1	0.4	2.3	2 U	0.4 U	1.8	1.8	2.2	1.7	6 U	0.99	1.4
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
U-4	Jan-95	1 U	1 U	1 U	2 U	2.3	2 U	1 U	7	5 U	72	24	5 U	1 U	10 U	44	1 U
	Apr-95	1 U	1 U	1 U	2 U	1 U	2 U	2 U	10 U	10 U	5 U	5 U	10 U	2 U	30 U	2 U	1 U
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																
U-5A	Jan-95	0.2 U	0.2 U	0.1 U	0.2 U	0.2 U	0.4 U	0.2 U	1.8	0.63	2.7	8	1.1	0.5	2 U	2.6	0.2 U
	Apr-95	1 U	1 U	0.1 U	1 U	1 U	2 U	2 U	10 U	2 U	5 U	17	10 U	2 U	30 U	2 U	1 U
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																
U-5	Jan-95	0.1 U	0.1 U	0.5 U	0.5 U	0.1 U	0.2 U	0.5 U	0.5 U	0.16	0.4	1	2.5	0.1 U	1 U	0.13	0.1 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	1.6	1 U	0.2 U	3 U	0.4 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
B-18	Jan-95	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	2.5 U	0.88	7	2.3	2.5 U	0.5 U	5 U	3.6	0.5 U
	Apr-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	1 U	0.2 U	0.5 U	2	1 U	0.2 U	3 U	5 U	0.1 U
	Jul-95	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5 U	5 U	0.1 U	5 U	5 U	0.5 U	5 U	5 U	0.1 U
	Oct-95																
B-22	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																
B-27	Jan-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Apr-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Jul-95	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	Oct-95																

F- Sample was not obtained because of the presence of free (floating) product.

COPPOR0000624B

Table 5b
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Chevron

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
Recovery Trench Well Network																																	
B-7	Jan-95	0.7		0.5		0.5	U	0.5	U	1.2		1	U	0.5	U	3.4		4.1		59		23		2.4	U	0.5	U	4.8	U	28		0.5	U
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	15		10	U	2	U	30	U	2	U	1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	17		5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
B-9	Jan-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	2.4	U	0.65		3.3		4.3		2.4	U	0.5	U	4.8	U	0.48		0.5	U
	Apr-95	0.1	U	0.1	U	0.16		0.1	U	0.37		0.2	U	0.24		1	U	0.2	U	0.5	U	8.1		1	U	0.2	U	3	U	0.2	U	0.26	
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	10		5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
General Groundwater Monitoring																																	
B-10	Jan-95	0.2		0.1		0.1		0.1	U	0.3		0.2	U	0.2		1.2		2		15		7.6		13		0.1	U	1	U	9.4		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	3.9		1	U	0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.11		0.1	U	0.26		0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5.1		5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
B-11	Jan-95	0.9		0.2		0.5		0.3		0.3		0.2	U	0.5		0.5	U	0.3		2.1		1.4		0.9		0.6		1	U	1.4		0.3	
	Apr-95	0.11		0.1	U	0.14		0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	1.8		1	U	0.2	U	3	U	1.3		0.1	U
	Jul-95	0.15		0.1	U	0.28		0.11		0.24		0.1	U	0.25		5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.22	
	Oct-95																																
B-14	Jan-95	0.1	U	0.3		0.1	U	0.1	U	0.7		0.2	U	0.1	U	0.6		0.27		2.2		2		12		0.5		1	U	2.7		0.1	U
	Apr-95	0.15		0.24		0.12		0.1	U	0.2		0.2	U	0.2	U	12		0.2	U	0.5	U	2.3		12		0.2	U	3	U	2.2		0.1	U
	Jul-95	0.1	U	0.16		0.1	U	0.1	U	0.13		0.1	U	0.1	U	5	U	5	U	0.74		5	U	9.8		0.5	U	5	U	5	U	0.1	U
	Oct-95																																
B-28	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1	U	0.1	U	2		0.1	U	1	U	0.05	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	13		0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.11		0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	12		0.5	U	5	U	5	U	0.11	
	Oct-95																																
B-30	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.05	U	0.1	U	0.1	U	0.5	U	0.1	U	1	U	0.05	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	1	U	0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
CR-8	Jan-95	9.2		1.9		3.4		1.9		2.2		0.4		5.3		0.5	U	0.41		3		0.9		0.5	U	3.8		1	U	1.4		2.6	
	Apr-95	0.32		0.18		0.19		0.1	U	0.21		0.2	U	0.24		1	U	0.2	U	0.73		0.5	U	1	U	1.1		3	U	0.2	U	0.38	
	Jul-95	6.8		4.4		6.9		3.2		5.7		0.5	U	9.2		25	U	25	U	8.6		25	U	25	U	12		25	U	25	U	11	
	Oct-95																																
CR-11	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.6		0.7		0.6		2		0.5	U	0.1	U	1	U	1.3		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	1.7		1	U	0.2	U	3	U	0.2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																

Notes

COPPOR00006249

Table 5c
Water Quality Analysis Results
Polycyclic Aromatic Hydrocarbons by SW8310
Shell/GATX

Sample Location	Sample Date	Concentration (ug/l) Benzo(a)-pyrene	Q	Benzo(a)-anthracene	Q	Benzo(b)-fluoranthene	Q	Benzo(k)-fluoranthene	Q	Chrysene	Q	Dibenzo(a,h)-anthracene	Q	Indeno-pyrene	Q	Acenaph-thene	Q	Anthra-cene	Q	Fluor-anthene	Q	Fluorene	Q	Naph-thalene	Q	Pyrene	Q	Acenaph-thylene	Q	Phenan-threne	Q	Benzo(g,h,i) perylene	Q
General Groundwater Monitoring																																	
MW-7	Jan-95	1.9		1.0	U	1.0	U	1.0	U	1.0	U	0.2	U	1.0	U	5	U	5.1		37		16		5	U	8.1		10	U	19		1.0	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	56		20	U	4	U	60	U	83		2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	26		25	U	2.5	U	25	U	76		0.5	U
	Oct-95																																
MW-11	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	<0.1	U	2.8		0.14		0.2		0.1	U	190		0.1	U	29		0.05	U	0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	500		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	420		0.5	U	5	U	5	U	0.1	U
	Oct-95																																
MW-22	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.5	U	0.07		0.2		0.3		0.5	U	0.1	U	1	U	0.34		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	10	U	0.2	U	0.5	U	5	U	290		0.2	U	30	U	2	U	0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	100	U	5	U	0.1	U	100	U	440		0.5	U	100	U	100	U	0.1	U
	Oct-95																																
MW-23	Jan-95	0.6		0.5	U	0.5		0.5	U	0.9		1	U	0.5	U	2.5	U	2.6		11		11		8.5		2.7		48		11		0.5	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	0.5	U	12		0.2	U	3	U	4	U	0.1	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	33		2.5	U	25	U	25	U	0.5	U
	Oct-95																																
MW-24	Jan-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Apr-95	ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns		ns	
	Jul-95	5	U	5	U	5	U	5	U	5	U	5	U	5	U	50	U	50	U	1	U	58		50	U	25	U	50	U	72		5	U
	Oct-95																																
MW-26	Jan-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	3.4		0.26		1.1		1.3		6.4		0.3		1	U	2.3		0.1	U
	Apr-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	1	U	0.2	U	0.5	U	3.4		10		0.2	U	3	U	2.3		0.1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
MW-28	Jan-95	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.4	U	0.2	U	2.9		0.94		1.8		0.2	U	1	U	8.6		6.1		1.2		0.2	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	12		20	U	4	U	60	U	4	U	2	U
	Jul-95	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	25	U	25	U	0.5	U	25	U	25	U	2.5	U	25	U	25	U	0.5	U
	Oct-95																																
MW-31	Jan-95	1	U	1	U	1	U	1	U	1	U	2	U	1	U	5	U	15		56		32		5	U	1	U	10	U	46		1	U
	Apr-95	1	U	1	U	1	U	1	U	1	U	2	U	2	U	10	U	2	U	5	U	17		10	U	2	U	30	U	25	U	1	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	5	U	5	U	0.1	U	5	U	5	U	0.5	U	5	U	5	U	0.1	U
	Oct-95																																
MW-37	Jan-95	0.2		0.2		0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	2.2		0.32		3.7		4.9		0.5	U	0.1	U	1	U	3.2		0.1	U
	Apr-95	2	U	2	U	2	U	2	U	2	U	4	U	4	U	20	U	4	U	10	U	10	U	20	U	4	U	60	U	4	U	2	U
	Jul-95	0.1	U	0.1	U	0.1	U	0.14		0.1	U	0.1	U	0.2		5	U	5	U	0.1	U	20		5	U	0.5	U	5	U	7.8		0.36	
	Oct-95																																

Notes: U = Not Detected Above Method Detection Limit.
ns = Not Sampled.

COPPOR0006250

Table 6
Free Product Recovered
Interim Action Plan
Willbridge Facilities

Week Ending	PRODUCT REMOVED (gal) Unocal	Chevron	Shell/GATX	Holbrook Recovery Trench	COMMENTS
5/26/95	---	---	1.50	off	SHELL/GATX installed Phase I recovery systems MW-6 and MW-24
6/2/95	---	---	0.41	off	
6/9/95	---	---	nc	off	
6/16/95	---	---	0.63	off	
6/23/95	---	---	0.25	off	
6/30/95	0.50	---	0.06	off	UNOCAL installed Phase I recovery systems U-5A and B-41(auto-bailer)
7/7/95	0.00	---	0.00	off	
7/14/95	0.00	---	nc	?	
7/21/95	0.55	0.00	0.37	?	SHELL/GATX installed Phase II recovery systems MW-7, MW-19, and MW-28 (removed from MW-6 and 24)
				?	CHEVRON installed Phase I recovery systems B-24, CR-6, CR-7, and CR-10 (petro-belt)
7/28/95	0.00	0.04	0.00	?	
8/4/95	nc	0.13	nc	?	
8/11/95	nc	0.03	nc	?	
8/18/95	3	0.005	0.78	?	UNOCAL removed product from U-4 with a Vac-truck
8/25/95	2.21	0.40	nc	?	UNOCAL - 2 day trial of auto-bailer on U-4
9/1/95	nc	0.01	0.50	?	
Product Recovered	6.26	0.62	5.00	?	
			Total Recovered	11.88	

Symbols:
--- = no product recovery systems installed.
nc = product recovery systems not checked that week.

COPPOR0006251

PROJECT NORTH

TRUE NORTH

0 100 200 300 400

SCALE: IN FEET

LEGEND

MW-16 21.12 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION

FLOW LINE

30 — GROUNDWATER ELEVATION CONTOURS

EXTRAPOLATED GW CONTOUR LINES

SEE FIGURE 1a FOR GROUNDWATER ELEVATION DETAILS IN THE DOCK AREA

FIGURE 1
GROUNDWATER ELEVATION CONTOUR MAP JULY 1995
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2M HILL

COPPOR0000252

18-Sep-1995

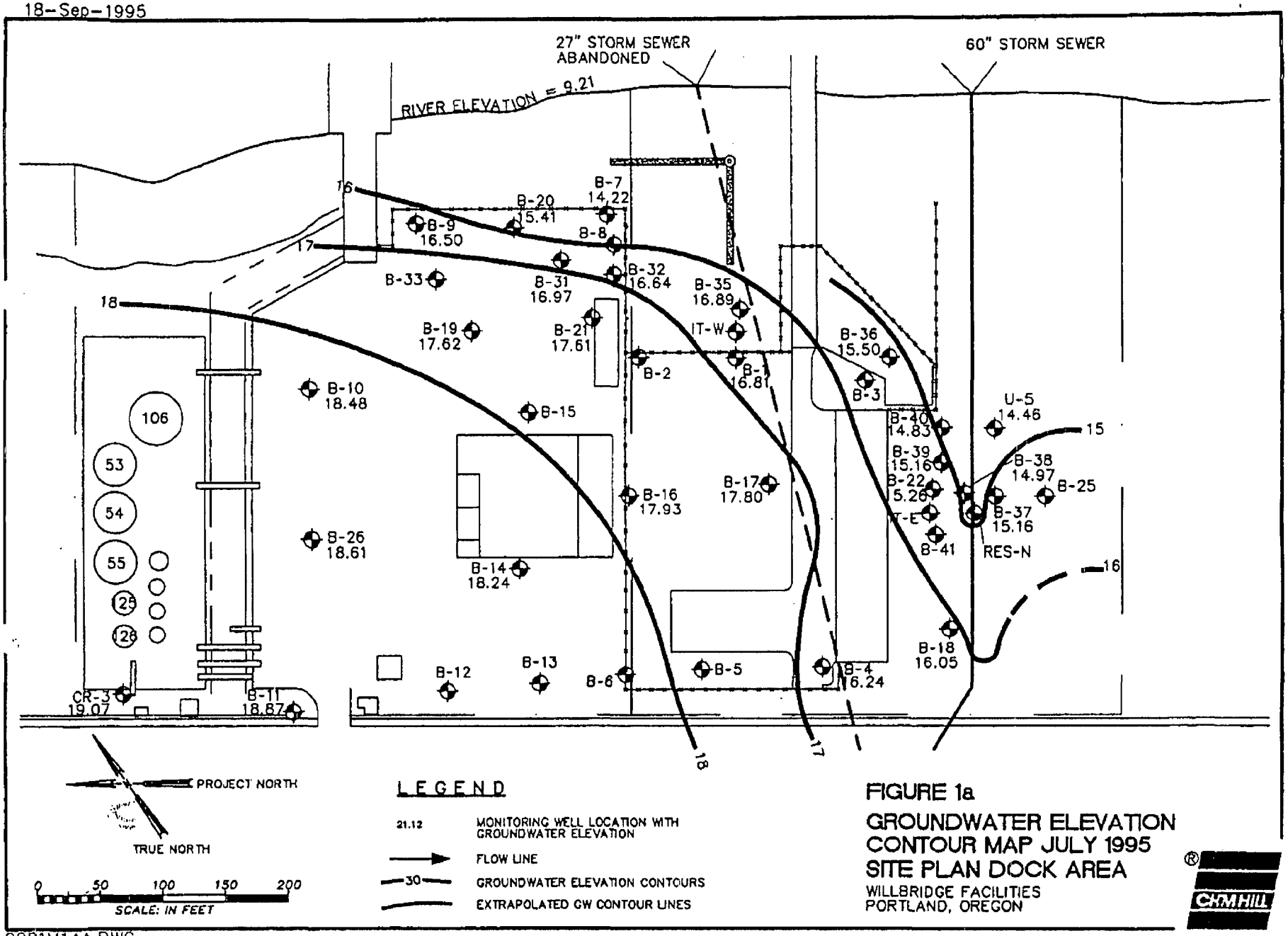


FIGURE 1a
GROUNDWATER ELEVATION CONTOUR MAP JULY 1995
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2M HILL

9281M14A.DWG

COPPOR0006253

PROJECT NORTH

TRUE NORTH

0 100 200 300 400

SCALE: IN FEET

27" STORM SEWER ABANDONED

60" STORM SEWER

SEE FIGURE 2a FOR FREE PRODUCT THICKNESS DETAILS IN THE DOCK AREA

0.15	-
-	ND
-	ND
0.13	ND

ND	-
-	ND
-	0.03
0.46	ND

0.24	-
-	0.94
-	0.88
0.7	0.46

0.01	-
-	0.54
-	0.50
0.4	0.25

ND	-
-	ND
-	ND

ND	-
-	0.69
-	ND
0.23	0.15

ND	-
-	ND
-	ND

ND	-
-	ND
-	0.02
0.13	ND

ND	-
-	ND
-	ND

ND	-
-	ND
-	0.04
0.04	0.01

ND	-
-	ND
-	ND
0.06	0.04

0.04	0.03
-	0.03
-	0.03
0.06	0.35

-	0.02
-	0.03

1.14	-
-	0.31
-	0.63
1.45	NM

4.17	-
-	6.17
-	5.00
4.31	NM

0.01	-
-	0.01
-	0.04
0.1	0.24

ND	-
-	ND
-	ND

ND	-
-	0.08
-	0.10
1.79	1.62

0.01	-
-	0.57
-	0.16
0.1	0.13

0.37	-
-	0.39
-	0.57
0.3	NM

LEGEND

THICKNESS (FT)

LOW GW	HIGH GW	
0.11	-	JULY 1995
—	0.12	APRIL 1995
—	0.03	JANUARY 1995
0.13	ND	1994

0.11	-
-	ND
-	ND

JULY 1995
APRIL 1995
JANUARY 1995

LOW GROUNDWATER ELEV = JULY TO OCT
HIGH GROUNDWATER ELEV = MARCH TO JUNE

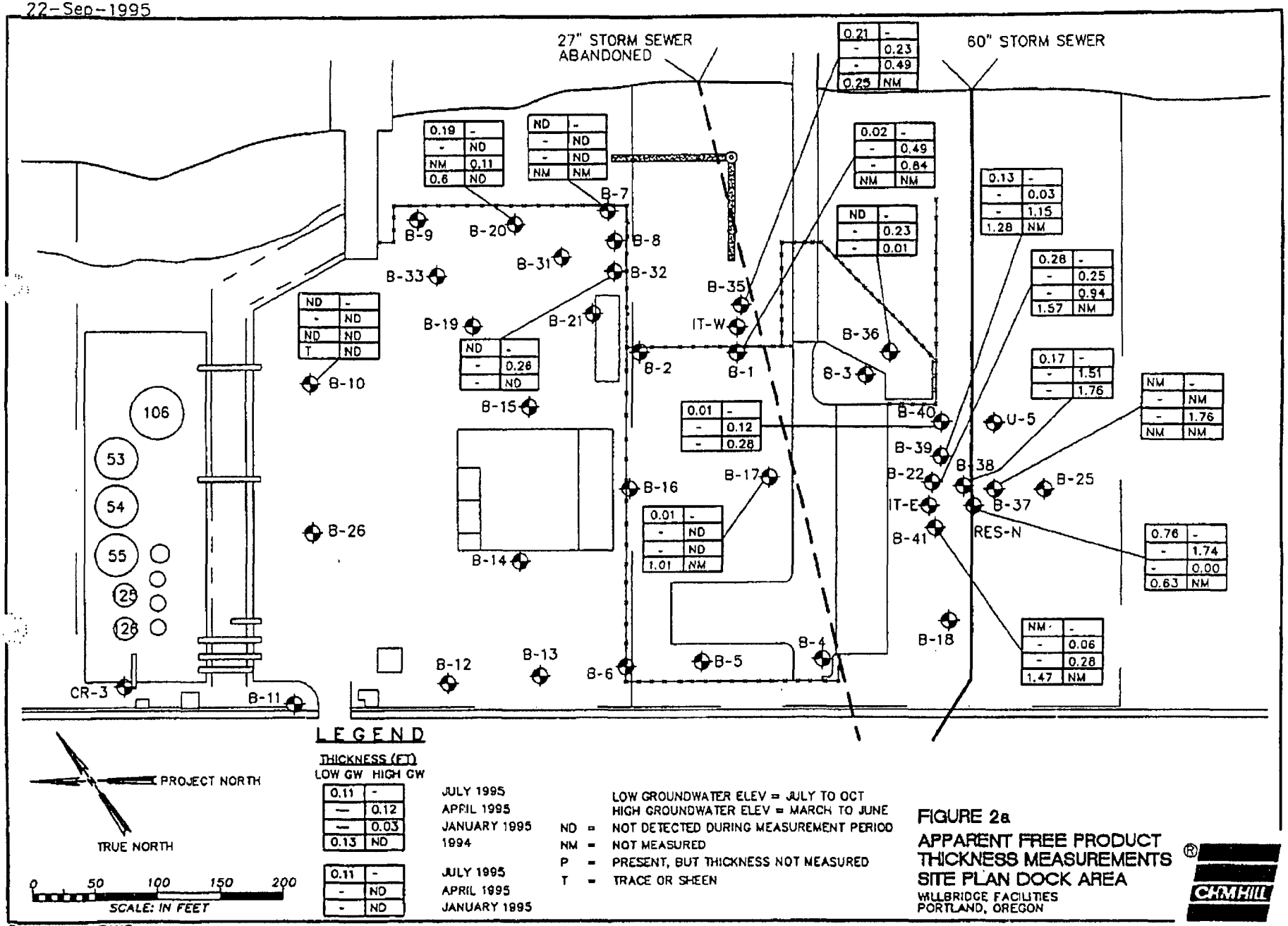
ND = NOT DETECTED DURING MEASUREMENT PERIOD
NM = NOT MEASURED
P = PRESENT, BUT THICKNESS NOT MEASURED
T = TRACE OR SHEEN

FIGURE 2
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS 1994 TO JULY 1995
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR00006254

22-Sep-1995



39281M14.DWG

FIGURE 2a
APPARENT FREE PRODUCT THICKNESS MEASUREMENTS
SITE PLAN DOCK AREA
WILLBRIDGE FACILITIES
PORTLAND, OREGON

CH2MHILL

COPPOR0006255

SITE RESPONSE SECTION

PROJECT STATUS AND ISSUE REPORT

REPORTING PERIOD: April - June 1995

PROJECT: Shell Oil Co. - Willbridge Plant
5880 NW St. Helens RD
Portland 97210

PROJECT MANAGER: Jill Kiernan

BACKGROUND

FACILITIES

Shell Oil Co. Willbridge Plant
Petroleum tank farm. Years of operation: since 1914

HAZARDOUS SUBSTANCES/WASTE TYPES
DDT, chlorinated solvents, petroleum tank bottoms, VOCs, lead

MANNER AND TIME OF RELEASE
Spills/past practices/onsite disposal. Time of release: Unknown

CONTAMINATION
Releases through several 'spills' and past practice waste management.

PATHWAY INFORMATION
They have an early warning groundwater detection system. Soil contamination as well as possible surface & groundwater contamination.

ENVIRONMENTAL/HEALTH THREATS
Soil and groundwater contamination and possibly surface water contamination.

STATUS OF REMEDIAL ACTION

PROJECT STATUS SUMMARY
Most spills were cleaned up. (3/24/93 KAM/SRS) Further action recommended; high priority. Site has been referred to the Voluntary Cleanup Program.

Exposure to contaminated soils. Site is vacant and fenced. So exposure would occur only to site trespassers. Impacts to groundwater are confirmed but are not above health based levels. Groundwater will be monitored as part of the remedial action for Units A & C.

STATUS OF REMEDIAL ACTION

PROJECT STATUS SUMMARY

(4/94 BPM/SRS) RI/FS & Remedial Action selected for Unit C. Phase I of the remedial action was completed during late summer 1994. The completion report was approved in Jan. 1995. Phase I involved the removal of the on site near surface soils that exceed the remdial action levels. Remedial action levels were established for lead, PCBs and PAHs. The Phase I action resulted in 3000 cubic yards of soil removed from the site as hazardous waste and/or debris. Phase II will involve protective capping of the site that incoporates the features from site development that function as a cap. Unit B. Unit B was issued a no further action based on a review of conditions at this parcel. Unit A. Unit A Record of Decision was signed by the DEQ Director in April, 1995. The remedy consists of removal of surface and near surface soils that exceed remedial action levels, and long-term management of H2S gas.

PROJECT ISSUE SUMMARY

Long term issue is performance of the maintenace and monitoring plans that will be in place after Units A & C remedies are implemented. Shorter term issue relates to remedial action implementation.

SITE RESPONSE SECTION

PROJECT STATUS AND ISSUE REPORT

REPORTING PERIOD: April - June 1995

PROJECT: Unocal - Willbridge Terminal
5528 NW Doane AVE
Portland 97210

PROJECT MANAGER: Jill Kiernan

BACKGROUND

FACILITIES

Unocal - Willbridge Terminal
Petroleum transfer terminal. Years of operation: 1920s to present

HAZARDOUS SUBSTANCES/WASTE TYPES
diesel, gasoline, heavy oils and constituents

MANNER AND TIME OF RELEASE
Past practices (spills). Time of release: unknown

CONTAMINATION
The US Coast Guard discovered oil seeping from the shoreline on 1/28/82. The site is between Union Oil and the Chevron Terminal. The site is on Union property but both Union and Chevron agreed to conduct groundwater contamination studies. The program was modified in 1986 and is continuing. (11/12/91 RP/NWR) There are currently 4 oil/water separators on site that treat wastewater from surface runoff and groundwater treatment. However, they are designed to remove free product and not dissolved contamination. The extent of petroleum contamination of soil and groundwater, especially dissolved contamination has not been determined. At least 4 separate releases have been identified, based on work done by Reidel (diesel, gasoline, and heavy oil). Groundwater contamination continues to bypass the recovery systems as witnessed by ongoing seepage into the Willamette River (most recently on 10/28/91 by Andree Pollock DEQ/NWR). While NPDES permits have been in compliance, they only address a portion of the site contamination.

PATHWAY INFORMATION
Surface water, soil; recovery system and 4 oil/water separators for removal of free product from goundwater maintained by Reidel Environmental Services.

ENVIRONMENTAL/HEALTH THREATS
Seepage of contaminated groundwater into the Willamette River.

levels.

ENVIRONMENTAL/HEALTH THREATS
Groundwater contamination confirmed; soil in need of further testing; property is adjacent to Johnson Creek.

STATUS OF REMEDIAL ACTION

PROJECT STATUS SUMMARY
Further soil analysis needed; at present, it is uncertain if and how the soil is contaminated. (3/25/93 MK/SRS) Confirmed groundwater contamination; extent requires further investigation. (9/23/93 MK/SRS) Three copies of Interagency agreement sent for signature. (7/10/95 MDK/HW-SRS) RI/FS activities ongoing per DEQ-approved RI/FS workplan. RI work has included installation of monitor wells downgradient of site, groundwater sampling and monitoring, stream water and sediment sampling. FS work has included conduct of biotreatability study.

WRF/QSR

SITE RESPONSE SECTION

PROJECT STATUS AND ISSUE REPORT

REPORTING PERIOD: April - June 1995

PROJECT: Willbridge Bulk Fuel Area
Portland

PROJECT MANAGER: Jill Kiernan

PROJECT TYPE: State Lead/PRP Funded

BACKGROUND

FACILITIES

Willbridge Bulk Fuel Area

HAZARDOUS SUBSTANCES/WASTE TYPES
Petroleum hydrocarbons, benzene, toluene, ethlybenzene, xylene, polynuclear aromatic hydrocarbons (PAHs), heavy metals, DDT.

MANNER AND TIME OF RELEASE
Leaks and spills from product tanks and pipelines.

CONTAMINATION
Remedial investigations have been conducted at the Shell Oil, Chevron, and Unocal facilities since the 1970s. A fairly extensive network of wells provide groundwater contamination data on all three facilities. There is free product and dissolved-phase contamination from petroleum products beneath all three facilities. There are high levels of heavy metals in groundwater beneath the three facilities. In addition, there is groundwater contamination of DDT at the Shell Oil facility.

PATHWAY INFORMATION
The Willamette River is adjacent to all three sites, which is in direct hydraulic connection with the contaminated groundwater. The river is used for fishing and recreational purposes. Seepage of contaminants in groundwater into the river is on-going.

ENVIRONMENTAL/HEALTH THREATS
Contaminant concentrations in groundwater may present current and future threats to human health and the environment due to discharge of groundwater in this area to the Willamette River. Volatile emissions from the free product in groundwater may present current and future threats to the health and safety of utility/service line workers.

STATUS OF REMEDIAL ACTION

PROJECT STATUS SUMMARY

Chevron, Shell, and Unocal signed a Consent Order with DEQ on March 30, 1994, for the conductance of a remedial investigation, feasibility study, and interim remedial measures. A Work Plan for Interim Actions was submitted in September 1994 and approved by DEQ in June 1995. An Interim Action Design Plan was also submitted in April 1995 and approved by DEQ in June 1995. Interim actions were initiated in May 1995 to address free-product in groundwater and contaminant seepage into the Willamette River and include: (1) free-product removal from existing monitoring wells via recovery canisters, auto-bailers, and/or petro-belts; (2) continued operation of a subsurface cutoff trench; and (3) placement of containment booms around seepage areas in the Willamette River. As the focus of site efforts is on interim actions to control seepage of free product into the Willamette River, the schedule for submittal of an RI/FS Work Plan has been deferred until the latter part of 1995.

PROJECT ISSUE SUMMARY

No issues have been identified.

FINAL UPLAND REMEDIAL INVESTIGATION REPORT

WILLBRIDGE FACILITY
PORTLAND, OREGON

PREPARED FOR

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ FILE WMCSR-NWR-94-06

AUGUST 1, 2003

REVIEWED AND EDITED BY

KHM ENVIRONMENTAL MANAGEMENT, INC.
7150 S.W. HAMPTON STREET, SUITE 220
TIGARD, OREGON 97233

PROJECT B17-01G

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1.0 INTRODUCTION

1.1 BACKGROUND

Chevron Products Company (Chevron), Unocal Oil Company (Unocal) and Shell Oil Products Company (Shell) were required by the Oregon Department of Environmental Quality (DEQ) to perform a Remedial Investigation (RI) and Feasibility Study (FS) for the Willbridge Bulk Fuels Area (referred to hereafter as the "Willbridge Facility" or "the site") as part of Order on Consent (referred to as the "Consent Order" or "CO") WMCSR-NWR-94-06. The Consent Order was signed by DEQ and Chevron, Unocal and Shell (referred to hereafter as the "Responsible Parties" or "RPs") on April 6, 1994.

When the CO was signed the Willbridge Facility was composed of the Chevron Willbridge Light Products Terminal, the Unocal Portland Terminal and the Shell Willbridge Plant. Following signing of the Consent Order, control of the Shell Willbridge Plant was transferred to GATX Terminals Corporation (GATX) by sale agreement on November 23, 1994, with Shell retaining a portion of the environmental responsibility for the terminal. On March 1, 2003, the GATX terminal was sold to Kinder Morgan Liquid Terminals LLC. (KMLT). Control of the Unocal Portland Terminal was transferred to Tosco Refining Company (Tosco) by sale agreement on March 31, 1997, with Tosco assuming remedial responsibility for the terminal and Unocal retaining environmental liability. Subsequently, the Tosco facility was purchased by Phillips Petroleum Company on September 18, 2001. Phillips Petroleum Company and Conoco Petroleum Company subsequently merged on September 1, 2002 forming ConocoPhillips, which is now responsible for the remediation of the former Unocal terminal.

The Chevron terminal began petroleum-processing operations in 1911, distributing and blending a variety of refined petroleum products, including gasoline, diesel, Bunker C oil, stove oil, turbine oil, transmission fluid, and lubrication oils. The ConocoPhillips terminal began petroleum-processing operations in 1908 and manages a variety of petroleum products, including gasoline, diesel, fuel oils and lubrication oils. The KMLT terminal began petroleum-processing operations in 1914, managing a range of petroleum products, including diesel, gasoline, fuel oils, motor oil, greases and lubrication oils.

The RPs began evaluating potential hazards at the site in the early 1970's, when separate-phase petroleum hydrocarbons (SPH) were observed seeping from the site into the Willamette River. Unocal and Chevron conducted a comprehensive joint investigation of the waterfront area in response to renewed petroleum hydrocarbon seepage in 1982. The DEQ performed an initial site investigation at the Chevron terminal in 1984. DEQ performed a second site investigation in preparation of conducting a Preliminary Assessment (PA) in 1990. The DEQ notified

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Chevron and Unocal in 1992 of the DEQ's intent to perform a PA at the terminals. Chevron and Unocal performed and submitted PAs for their respective terminals in 1993.

The Shell terminal was proposed by the U.S. Environmental Protection Agency (EPA) for inclusion into the National Priority List (NPL) as a Superfund Site in 1988. The EPA contracted with Ecology & Environment (E&E) to perform a PA and Site Inspection (SI) in 1988 and 1989, respectively. Based on the results of the PA and SI, the site was not placed on the NPL, but was referred to DEQ. The DEQ requested that Shell perform a PA for the site in 1992. Shell performed and submitted the PA in 1993.

The DEQ and the RPs entered into CO negotiations in late 1993 and the final CO was signed on April 6, 1994. The CO required performance of a RI/FS, satisfying Oregon Administrative Rules (OAR) 340-122-180 and 340-122-080, the terms and schedules outlined in the Scope of Work (SOW) attached to the CO. The RPs selected a common consultant and field consultants to begin the RI process. Groundwater monitoring and interim action (IA) planning began at the site in 1995.

The initial RI fieldwork was completed by May 1999 and supplemental RI field work and various other RI activities have been on-going to date. Groundwater sampling at the facility continues to be conducted on a semiannual basis with quarterly depth to water gauging events. The results of the RI activities are discussed in this report.

1.2 OBJECTIVES OF RI

Per OAR 340-122-080, the goal of this report is to present information collected during the RI fieldwork and determine the need for remedial action. This report includes the information needed to interpret subsurface conditions, evaluate the potential human health and ecological risk associated with these conditions, and to evaluate characteristics relevant to identifying potential hot spots of contamination.

1.3 REGULATORY FRAMEWORK

The Consent Order and RI field activities were completed prior to the Portland Harbor being listed as a Comprehensive Environmental Resource and Compensation Liability Act (CERCLA) cleanup site (Portland Harbor Superfund Site) in December 2000. The Portland Harbor is an approximate six-mile section of the lower Willamette River that includes the river section adjacent to the Willbridge Facility. The current management approach for the Portland Harbor delegates the United States Environmental Protection Agency (EPA) as the lead agency for all in-water assessment and remediation efforts and the DEQ as the lead agency for upland source control measures. Consistent with other upland cleanup sites along the Portland Harbor; in-water issues will be evaluated during future CERCLA activities associated with the Portland Harbor Superfund Site. For the purposes of this report and consistent with other sites on inland

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waterways, the mean (or ordinary) high water mark is being used to delineate upland and in-water portions of the Site. The combination of the RI/FS Report focusing on upland issues, a separate source control evaluation focusing on the riverfront, and the CERCLA activities focusing on in-water issues provides an effective structure to address the various aspects of environmental work at the Willbridge Terminals.

The *Preliminary Source Control Evaluation* was prepared by KHM and submitted to DEQ on April 24, 2003. Oregon Administrative Rules (OAR) 340-122-040(2) states that remedial actions must be adequate to achieve the standards for "protectiveness" and the standard acceptable risk levels as defined in OAR 340-122-115. As presented in KHM's letter addressed to the DEQ dated February 25, 2003, the source control evaluation is intended to assess potential environmental impacts from upland contamination to aquatic receptors for the purpose of evaluating, designing and implementing source control measures. The source control evaluation is focused on groundwater discharges, SPH seeps, and overland transport such as stormwater discharges or bank erosion. The Preliminary Source Control Evaluation also provided a framework for the identification of potential data needs associated with the source control evaluation.

2.0 SITE DESCRIPTION

2.1 SITE SETTING/PHYSIOGRAPHY

The Willbridge Facility is situated on the west bank of the Willamette River, in Portland, Oregon and is comprised of the Chevron Willbridge Light Products Terminal at 5531 Northwest Doane Avenue, the ConocoPhillips Portland Terminal at 5528 Northwest Doane Avenue and the KMLT Willbridge Terminal at 5880 Northwest St. Helens Road. The site is located in Sections 18 and 19 of Range 1E, Township 1N, as well as Section 13 of Range 1W, Township 1N. A site location map is presented as Figure 1. A site plan is presented in Figure 2.

2.1.1 PHYSIOGRAPHY

The site is located in the Doane Lake Area. The area was once containing several small lakes, including Kittridge and Doane Lakes, as well as sloughs. Figure 3 shows the former location of these lakes and the Holbrook Slough that connected Kittridge Lake to the Willamette River. Much of the site is located on historic Kittridge Lake. These lakes and sloughs were filled with dredge materials from the Willamette River. The pre-fill topography is important to current groundwater migration pathways. In the area near the Willamette River, groundwater levels are affected by changes in the Willamette River stage. The Tualatin Mountains adjoin the Doane Lake area to the southwest. A portion of the Tualatin Mountains has been designated as a City of Portland park called Forest Park. Forest Park is the largest urban park in the country and has a significant area of wildlife habitat. The Tualatin Mountains reach heights of 1,100 feet above mean sea level are dominated by second growth forest. Runoff from the Tualatin Mountains is the main source of recharge for site groundwater. Saltzman Creek collects water from the Tualatin Mountains and discharges to the Willamette River. Saltzman Creek crosses the KMLT Terminal in a concrete-lined channel.

2.1.2 SITE LOCALITY

The locality of the facility is defined as " ...any point where a human or an ecological receptor contacts or is reasonably likely to come into contact, with facility-related hazardous substances "Section 7.1 of this report provides the detailed description of how the locality of the Willbridge Facilities was determined. The locality of the facility is depicted on Figure 2 and is described as follows:

- Along Front Avenue, east of the ConocoPhillips Terminal across from McCall Oil Company;
- The southern and eastern property boundary between the ConocoPhillips facility and the Chevron Asphalt facility;

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- The CertainTeed Roofing facility across from KMLT;
- Along the shoreline of the Willamette River. As per Consent Order WMCSR-NWR-94-06 the site boundaries extend into the river 50 feet from the ordinary high water line of the river and 100 feet from ordinary high water line at the 60-inch storm sewer outfall and the confluence of Saltzman Creek and the Willamette River.

2.2 CLIMATOLOGY

Portland is located in the floodplain of the Willamette River. Portland has a moderate marine climate. The January monthly mean temperature is 38.1 degrees Fahrenheit, while the July mean temperature is 67.1 degrees Fahrenheit. The average annual precipitation is approximately 38 inches, which is experienced predominantly between December and February. The one-year, 24-hour average rainfall for the area is 2.4 inches. The Portland area averages approximately seven inches of snowfall per year.

Wind data are not readily available for this area of Portland. The closest weather station with published data is located at Portland International Airport. In the Portland vicinity, prevailing winds generally are from the north-northwest throughout the year. During the summer months, winds occasionally prevail from the east and south.

2.3 DEMOGRAPHY AND LAND USE

The population within ½-mile of the site is estimated to be about 105 (41 residences multiplied by a per household average population of 2.56). The population within 4 miles of the site is estimated at 101,525. The nearest single-family residence is located approximately 700 feet from the site boundary. Forest Park, a park designated as a "primitive area", is located 800 feet west of the site, in the Tualatin Mountains. The park is approximately 7.5 miles long by two miles wide, the park trends southeast to northwest.

2.3.1 ZONING

The site is located in Portland's Northwest Industrial District (District). The District is generally zoned by the City of Portland as heavy industrial (IH) with some sections included in the river heavy industrial overlay (IHi). Figure 4 presents a zoning map of the immediate area around the site. Figure 5 presents the current land use of the adjacent properties. Per the City of Portland Zoning Code 33.140.030(F), the heavy industry zoning "...Provides areas where all kinds of industries may locate including those not desirable in appearance. The development standards are the minimum necessary to assure safe, functional efficient and environmentally sound development." Furthermore, the region east of St. Helens Road is designated as an Industrial Sanctuary. City of Portland Policy 10.4(21) defines the industrial sanctuary classification as "...intended for areas where city policy is to reserve land for existing and future

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industrial development. A full range of industrial uses are permitted and encouraged. Non-industrial uses are limited to prevent land use conflicts and to preserve land for industry."

The entire site is zoned IH with an "i" designation, River Industrial Greenway Overlay (City of Portland, 1999). The IH zoning allows a variety of industrial activities, including the current use of the site. The "i" designation is for river dependent or river related uses that "strengthen the economic vitality of Portland as a marine shipping and industrial harbor, while preserving and enhancing the riparian habitat and providing public access where practical" (City of Portland, 1987).

2.3.2 HISTORICAL AND CURRENT LAND USE AT THE SITE

While ownership has changed, the original three oil facilities (Union Oil, Standard Oil, and Shell Oil) included in this RI are still operational and have been in operation since the early 1900s. Detailed descriptions of the current and historical operations conducted at the three facilities that make up the investigation site are included in Section 3.0.

Based on reviews from available early maps and aerial photos taken in 1906, 1924, 1934 1940, 1956, 1975, and 1996, the general sequence of development at the Willbridge Facility is described below.

1906 — As observed in the map titled Portland and Seattle Railway Willamette River Bridge at Portland, (Figure 6), dated February 19th, 1906, the Northern Pacific Railway and Saint Helens Road were the only development in the immediate area before 1906. A rail bridge, as proposed in this figure, was constructed to the north of the site by Spokane Portland and Seattle Rail Company sometime during this period. Doane Lake and Kittridge Lake (where the Willbridge Facility is presently located) appear to have remained in a relatively natural state prior to 1906.

1924-1934 — In an aerial photograph dated 1924 (Figure 7), the Willbridge Facility is visible in the background with numerous above ground storage tanks (ASTs). Piers are visible on the waterfront with outbuildings on the Willamette River. The Spokane Portland and Seattle rail bridge is visible spanning the Willamette River. As observed in the aerial photograph dated 1934 (Figure 8), the Willbridge Facility is shown to have numerous ASTs of various capacities, some warehouses, and four marine docks, which appear to have replaced the piers observed in Figure 7. Standard Oil and Shell Oil companies are the most predominant facilities visible in Figure 8.

The following historical narrative describes the chronological operations and land use by individual facility as observed from the aerial photographs dated 1940, 1956, 1975, and 1996.

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UNION OIL COMPANY (CONOCOPHILLIPS)

1940 Based on the aerial photograph dated 1940 (Figure 9), the Union Oil Company of California terminal had ten above-ground storage tanks (ASTs) present in Tank Yard #1, and no ASTs in Tank Yard #2. Tank Yard #3 is not visible in this aerial photograph. One maintenance building is visible adjacent to Tank Yard #3. The dock yard is vacant except for one warehouse. Above-ground pipelines running to the dock are visible north of the tank yards along Doane Street, running below ground under Front Avenue, and surfacing again south of the dock yard warehouse. One large Union Oil marine dock is situated as the southernmost dock on the Willamette River waterfront along with three other Willbridge Terminal marine docks.

1956 As observed from the aerial photograph dated 1956 (Figure 10), 17 ASTs are visible in Union Oil Company's Tank Yard #1, eleven ASTs visible in Tank Yard #2, and eight ASTs visible in Tank Yard #3. Approximately twenty-nine small ASTs are present in the lube cell west of Yard #1. Two warehouses, two loading racks, and expansion to the maintenance building are visible. The above-ground pipelines are no longer visible north of the tank yards and south of the dock yard warehouse, surfacing just south of the Union Oil marine dock. It is assumed these pipelines were buried beneath the ground. The dock yard is still generally vacant.

1975 Based on the aerial photograph dated 1975 (Figure 11), the Union Oil Company removed 2 ASTs in Yard #1, added 1 AST in Yard #2, and added 20 ASTs to Yard #3. The lube cell warehouse was reconstructed. Eleven ASTs were added to the lube cells, and 2 ASTs were removed south of the lube cell warehouse. Two truck-loading racks are present between Yard #1 and Yard #3.

1996 In the most recent aerial photograph dated 1996 (Figure 12), the Union Oil Company removed another eight ASTs from Yard #1, and removed the western-most truck-loading rack north of Yard #1. One outbuilding was added west of Yard #1. Yards #2 and #3 remained relatively unchanged. One outbuilding east of the dock yard warehouse was added, and one boat moorage was added on the south side of the marine dock. Booms are visible on the Willamette waterfront south of the Union Oil marine dock.

STANDARD OIL COMPANY (CHEVRON)

1940 As observed on Figure 9, the Standard Oil Company (Chevron) terminal had a total of approximately twelve ASTs in the Main Yard and twelve ASTs in the

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loading rack is located between the North and South Yard. One AST and one outbuilding are present east of Front Avenue. Product pipelines surface east of Front Avenue to join the Shell Oil marine dock. Saltzman Creek appears channeled in concrete between the North and South Yards, and visible in a natural channel east of Front Avenue to its confluence with the Willamette River.

1975 Based on the 1975 aerial photograph (Figure 11), the Shell Oil Company of California added approximately thirteen ASTs in the South Yard, seven ASTs in the North Yard, six ASTs in the lube cell. The lube cell warehouse, a building west of the North Yard, and the loading rack west of the North Yard were expanded. One additional overhead pipeline was constructed joining the North and South Yards. Saltzman Creek is overlain by a parking lot east of Front Avenue and appears to surface approximately 375 feet further east towards the Willamette River.

1996 On the most recent aerial photograph dated 1996 (Figure 12), the Shell Oil Company of California removed nine ASTs from the South Yard, and two outbuildings between the North Yard and western-most loading racks along Front Avenue. An overhead pipeline between the lube warehouse and Chevron's Main Yard is present. A boat moorage is present north of the Shell Oil marine dock. The Saltzman Creek confluence joins the Willamette River further to the west.

2.3.3 Historical and Current Land Use in the Vicinity

Current and historical land uses in the District have been summarized in a document prepared by Woodward-Clyde (Woodward-Clyde, 1997). These uses include:

- Manufactured gas production;
- Coal tar pitch and wood treating chemicals storage;
- Silicon chip production;
- Battery recycling and secondary lead smelting;
- Landfilling (foundry water);
- Chemical production;
- Liquified gas production;
- Bulk oil storage;
- Truck repair;

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- Retail petroleum sales;
- Steel warehousing, cutting, and distribution; and,
- Railroad corridor.

Not all of these uses have occurred within the "locality of the facility". Areas to the west of the site are hydraulically upgradient and are not considered to be part of the locality of the facility. The locality of the facility is discussed in Section 7 of this report.

The site is surrounded by seven major industrial sites and eight commercial sites (Figure 13). A description of the current and historical surrounding land uses is presented below:

GOULD INCORPORATED

A secondary lead smelting facility was constructed on the current Gould property and commenced operations in 1949 under the ownership of Morris P. Kirk and Sons (Kirk). Facility operations consisted of lead-acid battery recycling, lead smelting and refining, zinc alloying and casting, cable sweating (removal of lead sheathing from copper cable) and lead oxide production. Wastes (slag, matte, spent battery acid and battery casings) were disposed on and near the Kirk property and adjacent properties including those now owned by Rhone-Poulenc and ESCO. Due to the threat posed to human health and the environment by the off-site migration of lead, the Gould site was proposed for inclusion to the National Priorities List (NPL) in 1983.

RHONE-POULENC FACILITY

Rhone-Poulenc AG Company (RPAC) is located southeast of the Wacker Siltronics property at the junction of NW St. Helens Road and the Burlington Northern Santa Fe Railroad line. The plant was known as Chipman Chemical/Rhodia Agricultural Division until 1978 when it was named after its parent company, Rhone-Poulenc.

The Chipman Chemical plant began operation in 1948 as a liquid formulation plant and insecticide distribution warehouse. In 1956, a 2,4-D herbicide production plant began operation at Chipman, and operated until 1982. During operation, the plant manufactured and packaged a variety of herbicides and insecticides, and most recently produced only bromoxynil octanoate. The Rhone-Poulenc facility ceased operations in the fall of 1990.

ESCO SITE

The ESCO site contains a capped landfill, which was used for the disposal of clay-bonded sands, demolition debris, and sand bonded with foundry resins containing phenol-formaldehyde. Arc furnace dust containing chromium was disposed on-site between 1971 and 1975. Zircon sands with naturally occurring radioactivity were also placed in the on-site landfill until 1976.

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In 1957, ESCO began disposing foundry sand and slag into the east Doane Lake Remnant. Landfill operations at the ESCO site continued to fill in the west Doane Lake Remnant until 1979.

ELF ATOCHEM CORPORATION

The Pennsylvania Salt Manufacturing Company (Pennwalt) first began operations at this location in 1949. The Pennwalt plant produced chlorine, caustic soda, sodium and potassium chlorate, hydrochloric acid and ammonia. The basic raw material used by the plant was salt, obtained from Baja California.

Five surface impoundments existed on the site during operation of the Pennwalt plant. These surface impoundments contain asbestos from old electrolytic cell casings, chlor-alkali production and waste from the sodium orthosilicate process. All surface impoundments on the Pennwalt site are unlined and have no surface outlets. Elf Atochem purchased the site from the Pennwalt Company in 1990.

TRANS INDUSTRIES METRO CENTRAL TRANSFER STATION

This transfer station site currently is owned and operated by Trans Industries/Metro and was formerly owned by American Steel. The facility collects refuse and garbage from the greater Portland area. The refuse is then separated and transferred to appropriate landfills throughout Oregon.

CERTAINTEED ROOFING PRODUCTS

The CertainTeed Roofing Products facility is located at 6350 NW Front Avenue. CertainTeed (formerly GenStar/GS Roofing) Roofing is a manufacturer of residential and commercial building asphalt roofing products. Asphalt shingles have been produced for approximately 40 years at this present location. The facility is situated on approximately three acres which is partly occupied by three major buildings, including the plant, warehouse and office. Approximately 50 percent of the facility land is developed, and the remaining portions are bare ground, paved ground, or asphalt storage.

MCCALL OIL/QUADRA CHEMICAL

In the mid-1920s the Port of Portland purchased the property now occupied by McCall and Quadra Chemical, a subsidiary of McCall Oil. In 1946, Pioneer Flintkote Company (Flintkote) purchased two parcels from the Port of Portland. Quadra Chemical and the McCall Asphalt plant currently occupy these two parcels.

Flintkote manufactured asphalt roofing shingles and tiles on the property from 1947 to 1982. A factory, warehouse for roofing material, silos, boilers, aboveground and underground storage

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tanks (ASTs and USTs) and retorts were present. By 1960, Douglas Oil Company (Douglas) occupied this address and operated an asphalt facility.

During the early 1960s, the Port of Portland used dredge spoils from the Willamette River channel to create new land along the Willamette River next to the Flintkote and Douglas Oil facilities. In the mid-1970s, McCall constructed the marine terminal on the filled land. In 1985, McCall operated a lube oil distribution facility on part of its asphalt plant site. The lube oil operations were discontinued in 1991.

Current operations on the McCall site include the marine terminal and asphalt plant. The facility stores, blends and distributes petroleum products including asphalt, bunker fuel and diesel fuel. Bulk petroleum products are stored in ASTs at the marine terminal tank farm and at the asphalt plant.

CHEVRON ASPHALT

The Chevron Asphalt facility consists of asphalt refining emulsions, manufacturing and asphalt blending. The facility occupies 38 acres. The facility layout includes 91 product storage tanks with a containment capacity of 1,642,600 barrels, eight tank-truck loading racks and one tank car loading rack. The facility has a 15,000-bbl-per-day crude oil vacuum distillation unit, a continuous and batch air still refining process, an emulsions manufacturing process, an asphalt blending process, a boiler plant and hot oil heating system, bulk storage and tank car, tank truck and pipeline shipping and receiving operations. Crude oil and charge stocks for the refining process are received by tanker shipments at the Chevron Willbridge Distribution Center dock. Compounding stocks and additives are received in bulk by tank cars or transport trucks. Asphalt vacuum gas oils, fuel oil and naphtha are received by barge and tanker over the Willbridge Distribution Center dock, in addition to tank car, pipeline and tank truck deliveries. The facility typically handles an average of approximately 200,000 barrels per month. The facility has been in continuous operation since 1947.

2.3.4 REASONABLY LIKELY FUTURE LAND USE

Given the nature of the facility (three bulk petroleum terminals with pipeline and marine access) and their location (within a major metropolitan area), the current zoning in the region (heavy industrial/heavy industrial with a river industrial overlay), the current use of the facility (heavy industry) is also the reasonably likely future use in the locality of the facility. As demonstrated by the sale of the Shell terminal to GATX and then subsequent sale of the GATX terminal to KMLT and the Unocal terminal to Tosco, Phillips Petroleum, and then ConocoPhillips, the likely future uses of the land space will probably continue to be bulk fuel handling and related activities. This is supported by the results of DEQ's community survey (Woodward-Clyde, 1997). The responses to the survey suggest that there are no driving forces to change the existing land uses and zoning within the locality of the facility.

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3.0 SOURCE DESCRIPTION

The source areas addressed in the RI include the Chevron Willbridge Light Products Terminal, the KMLT Willbridge Terminal, and the ConocoPhillips Portland Terminal. These three facilities are referred to as the site in the following sections. All three facilities have historical records of releases of petroleum and other products to the environment.

The following sections describe the potential sources of environmental contaminants at each of the three facilities, the characteristics of the products released to the environment, and the characteristics of the compounds of concern in those products.

3.1 SOURCE AREAS

The aforementioned three terminals that make up the Willbridge Facility (site) have been operating at their present location since 1911, 1914, and 1908, respectively. The following sections describe the history of uses, waste treatment practices, product storage practices, and previously reported releases. The results of previous site environmental investigations at these areas are also summarized.

3.1.1 CHEVRON WILLBRIDGE LIGHT PRODUCTS TERMINAL

The Chevron terminal distributes and blends a variety of refined petroleum products, including gasoline, diesel, Bunker C oil, stove oil, turbine oil, transmission fluid and lubrication oils. The Chevron terminal began petroleum-processing operations in 1911. Naphtha solvents were received, stored and distributed on-site until 1992. Waste oils generated from drum reconditioning activities were stored on-site, until the practice was discontinued in 1993. There is no record of chlorinated solvents or antifreeze being handled on-site. The terminal operates 179 tanks with an aggregate capacity of approximately 63 million gallons.

Since 1992, tank bottom sludges have been sent to the Chevron Asphalt Plant (Asphalt) to be recycled through the asphalt production process. Sludges, which are not suitable for asphalt production, are stored in drums and subsequently incinerated off-site. During the mid 1970s to 1992, tank bottom sludges were shipped to an off-site treatment terminal. Prior to the mid-1970s, sludges were disposed of according to industry standards, which might have included on-site disposal.

3.1.1.1 Waste Treatment Practices, Disposal Practices and Areas

At the terminal, waste can be subdivided into several categories that include in-line filters, tank bottom sludges, stormwater runoff, treated process water, drum reconditioning waste, as well as separator sediments and skimmings.

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3.1.3 CONOCOPHILLIPS PORTLAND TERMINAL

3.1.3.1 Operating Activities and Practices

The ConocoPhillips terminal manages a variety of petroleum products, including gasoline, diesel, fuel oils and lubrication oils. Petroleum-handling operations at the ConocoPhillips terminal began in 1908. The terminal produced asphalt from 1968 to 1975. There is no record of chlorinated solvents being handled on-site. The terminal contains 119 storage tanks with an aggregate capacity of approximately 36 million gallons.

Oil recovered from the terminal oil/water separators, tank cleaning operations, and other operational and maintenance related activities is either stored temporarily in on-site tankage or shipped off-site for recycling or disposal. Recovered oils, also known as slop oils, primarily consist of oil skimmed from the process separator and, to a lessor extent, the storm water separators or recovered from tank cleaning and other maintenance activities. Slop oil stored on-site is either blended into marine or industrial fuel oils handled at the terminal or sold to an outside vendor for fuel blending. Sludges/tank bottoms are drummed or removed by vacuum truck and transported to an approved recycling or disposal facility. Prior to the mid-1960s, sludges/tank bottoms were disposed according to industry standards, which may have included on-site disposal. The oil/water separator systems at the site have been in place since 1930.

3.1.3.2 Waste Treatment Practices, Disposal Practices and Areas

At the ConocoPhillips terminal waste can be subdivided into several categories that include in-line filters, tank bottom sludges, stormwater runoff, treated process water, slop oils and separator sediments.

In line filters are drained and deposited in a dumpster for off-site disposal. If the filters are considered hazardous, they are disposed of at the Chem-Waste facility in Arlington, Oregon.

Slop oil, which meet flash and specific gravity specifications, is sold to an outside vendor for use in intermediate products or blended into marine or industrial fuel oils handled at the facility. These are generally stored in Tank 36. Slop oil, which does not meet specifications, are stored in Tank 4223 and later disposed of or recycled at licensed off-site hazardous waste facilities. In total, approximately 2,000 gallons of slop oil are produced annually.

Storm water runoff is sent through three gravity flow oil/water separators known as #001, #002 and #004. Recovered oils from #001 and #002 are skimmed off and sent to Tank 36 for fuel oil blending or sale to an outside vendor. Recovered oils from #004 are often considered hazardous due to the tanks in the associated tank farm containing primarily gasoline and sent to Tank 4223 pending off-site recycling or disposal. "Clean" water from the storm water separators is discharged to the Willamette River via the municipal storm sewer system. Process water is directed to separator #003. Effluent from the gravity fed oil/water separator

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is pumped through a hydrocleaner for further treatment. The hydrocleaner effluent water is discharged to the City of Portland sanitary sewer system for final treatment at the POTW.

3.1.3.3 Raw Material and Finished Product Storage Areas

There are six tank yards at the ConocoPhillips terminal. The different tank yards generally store different products which are as follows: 1) primarily diesel and industrial fuel oils, 2) primarily gasoline, 3) primarily industrial fuel oils and lube products, 4) strictly lube products, and 5) primarily lube product additives. The main terminal warehouse is used for storage of packaged lube products for distribution as well as blending of bulk lube products.

There are several truck racks and product transfer areas located at the terminal. The main truck rack is used for gasoline and diesel (light products) loading and is situated at the front of the terminal along Doane Avenue. A light products and ethanol truck unloading station is also located along Doane Avenue east of the maintenance building. The lube oil truck loading rack is located just south of tank yard #1 with the industrial fuel oil rack located just south of the lube oil rack. The industrial fuel oil truck unloading area is situated just north of tank yard #3 and the lube additive unloading area is located just east of tank yard #6. The rail car loading/unloading racks are located just to the west of tank yard #6. Light products, lube oil, and industrial fuel oils are transferred between the dock and terminal through an interconnecting pipeline network.

3.1.3.4 Time and Volume of Known Releases

Spill data for the ConocoPhillips terminal dates back to January 1979. Documented spills number 38 at the ConocoPhillips terminal. Reported spills range in volume from 11,700 to one gallon. The volume of known spills totals approximately 35,421 gallons. Documented spills are summarized in Table 2-6.

3.1.3.5 Previous Investigations

Following a January 1982 release, 13 groundwater monitoring wells and one groundwater extraction well were installed to investigate the subsurface soils and groundwater around the dock area. These investigations concluded that the backfill around the Doane Avenue sewer alignment were a conduit for petroleum hydrocarbon migration. Beginning in 1984, Riedel installed 8 monitoring wells and two extraction wells and researched additional information regarding the physiogeographic history of the area. In 1988, a clay barrier was constructed by Riedel to aid in SPH recovery around the Doane Avenue storm drain.

In March 1993, Delta performed groundwater monitoring and analyzed samples from 10 out of 27 wells for BTEX.

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In June 1993, Secor prepared a PA for the site. The PA was designed to investigate current and former chemical and waste handling practices and to evaluate potential exposure pathways.

In August 1997, five USTs were decommissioned at the terminal. Three of the USTs were excavated and removed from the ground. The remaining two USTs were decommissioned in place by filling with an inert substance. The three USTs that were excavated and removed included one 550-gallon diesel UST, one 550-gallon gasoline UST and one 1,000-gallon diesel UST. The two 550-gallon tanks were located in the same tank pit positioned end to end. Three soil samples were collected from this tank pit, one soil sample from each end and one soil sample from between the tanks. Each of the three soil samples contained detectable levels of petroleum hydrocarbons. Sample 1, collected from the end of the tank where the gasoline fill pipe was located, contained only gasoline range hydrocarbons at a concentration of 4,130 mg/kg. Sample 2 was collected from between the two tanks and contained a gasoline concentration of 2,520 mg/kg and TPH (diesel and oil range hydrocarbons) by USEPA Method TPH-418.1 was detected at a concentration of 10,600 mg/kg. Sample 3, taken from beneath the diesel tank fill pipe also had detectable levels of gasoline range hydrocarbons of 655 mg/kg and TPH by USEPA Method TPH-418.1 at a concentration of 3,730 mg/kg. The 1,000-gallon diesel UST that was excavated and removed was located in a separate tank pit. Soil samples were collected from below each end of this tank. Both samples were analyzed by Oregon Method TPH-HCID for hydrocarbon identification. Neither sample had detectable levels by this method.

The two tanks that were abandoned in place were a 500-gallon diesel additive UST and a 600-gallon used oil UST. Soil samples were collected from beneath these tanks by drilling holes in the bottom of each tank and boring 12 to 24 inches below the USTs. Each of the four soil samples collected had detectable levels of petroleum hydrocarbons by Oregon Method TPH-HCID. Detectable gasoline concentrations ranged from 48 mg/kg to 2,500 mg/kg. TPH by USEPA Method TPH-418.1 was detected at concentrations ranging from 1,080 mg/kg to 16,300 mg/kg. Two samples were analyzed for cadmium, chromium and lead using toxic characteristic leaching procedure (TCLP). The only metal detected was cadmium, it was detected in each sample. In addition, one sample was analyzed for volatile organic compounds (VOCs) by USEPA Method 8240. The only compounds detected were ethylbenzene (72 ppb), styrene (25,755 ppb) and total xylenes (127 ppb).

3.2 Characteristics and Behavior of Contaminants of Potential Concern

The primary products used at the facilities and potentially released to the environment include:

- Gasoline;
- Diesel Fuel (including heating oil);

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- Bunker C oil (including industrial/marine fuel oils);
- Jet Fuel (including kerosene);
- Lube Oil;
- Pesticides; and,
- Solvents.

The general characteristics of these products and their behavior in the environment are discussed below.

Gasoline – Gasoline is produced from the light distillates during petroleum fractionation. The major components are primarily parrafins, olefins, naphthenes, and aromatics. It is relatively insoluble in water, has a low boiling point (39°C), a specific gravity of approximately 0.75, and volatilizes easily at ambient temperatures. The common COIs in gasoline are the aromatic compounds (benzene, toluene, ethylbenzene, and xylenes). Some gasoline formulated prior to approximately 1995 included tetraethyl-lead as an additive. Other gasoline additives have included up to 10 percent ethanol and possibly methyl-tert-butyl ether (MTBE).

Diesel – Diesel fuel and heating oil are produced from the middle distillates in petroleum fractionation. Various grades are available depending on engine requirements or use, with most being synonymous with fuel oil no. 2 (diesel) or fuel oil no.1 (heating oil). The major components are predominantly aliphatic, olefinic, cycloparaffinic, and aromatic hydrocarbons. These fuels are generally yellow, slightly viscous liquids, relatively insoluble in water. Diesel has a boiling point range of 177-400°C, and a specific gravity of approximately 0.85.

Bunker C oil - Bunker C oil and industrial/marine fuel oils are produced from the residual distillate in the petroleum fractionation process. These oils are highly viscous, dark liquid practically insoluble in water, with a flash point between 54 and 66°C and a specific gravity slightly less than 1. The toxic effects of these oil range petroleum hydrocarbons may be similar to that of diesel except to a lesser degree since it doesn't volatilize as readily.

Jet Fuel - Jet Fuel comes in a variety of grade designations. The jet fuels are composed of hydrocarbons from the middle distillate fraction in the kerosene range, with some components from the light distillates. Jet-A is a narrow cut kerosene product. This is a standard commercial and general aviation grade available in the United States. It usually contains no additives with the exception of anti-icing chemicals. It is a mixture of petroleum hydrocarbons, primarily paraffins with 10 to 16 carbon atoms per molecule. Kerosene is the best choice to compare with Jet-A, since they are very similar chemically. Kerosene is relatively insoluble, with a boiling point range of 175-325°C, and a specific gravity ranging from approximately 0.775 to 0.840.

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Lube oil - lubricating oils are manufactured from the medium lube distillate and include several fractional categories. The lubricating oils include motor and aviation oils, tractor oil, turbine oils, and specially prepared insulating and hydraulic oils. The lube oils are composed of aliphatic, olefinic, naphthenic, and aromatic hydrocarbons, as well as additives depending on their special use. The lube oils contain primarily paraffinic hydrocarbons with 20 or more carbon atoms per molecule. The boiling point range for lube oils ranges from 200 to 400°C, specific gravities are slightly less to slightly greater than 1, and the lube oils are insoluble.

Pesticides - (DDT) (dichlorodiphenyltrichloroethane) is practically insoluble in water, and is resistant to destruction by light and oxidation. DDT was banned in the United States in 1973 due to its persistant characteristics. Gastrointestinal, and probably dermal, absorption of organochlorines is enhanced by fat and fat solvents. While most of the solid organochlorines are not highly volatile, pesticide-laden aerosol or dust particles trapped in respiratory mucous and subsequently swallowed may be vehicles leading to significant gastrointestinal absorption. DDT exhibits varying degrees of solubility in organic solvents.

Solvents (Chlorinated) - Organic solvents constitute a chemically diverse group of liquids characterized by their ability to dissolve oils, fats, resins, rubber, and plastics. Solvents may be divided into a number of categories based on their chemical structures. Most solvents produce irritant effects on the mucous membranes of the eyes, nose, and throat. In general aromatic solvents are more potent irritants than aliphatic solvents. Heavy exposures are commonly associated with cough, chest tightness, and feeling of breathlessness. At very high exposures, a number of common solvents, such as toluene, xylene, and methylene chloride, can induce pulmonary edema or chemical pneumonitis. Short-term high exposures to organic solvents produce narcotic effects.

Solubility of ranges from miscible for acetone and methanol in water, to insoluble for solvents such as methylene chloride, tetrachloroethene, and trichloroethene. Density of solvents also ranges form less than 1 to greater than 1.

As described above, the primary products contain certain contaminants of interest that were defined for the site based upon the known composition of the products and the results of previous sampling and analysis conducted at the sites. Based upon the results of the RI sampling and analytical program, this list was developed to include only those contaminants that were positively identified in soil, groundwater, surface water or sediments within the boundary of the facility. These constituents are defined to be the site Contaminants of Potential Concern (COPCs). The COPCs for the site are:

- Aromatic volatile organics (e.g. BTEX) related to gasoline product releases;
- Polynuclear aromatic hydrocarbon compounds related to diesel/heavy oil product releases;

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- Metals (defined as arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver and zinc) in soil and groundwater; and
- Organo-pesticides, primarily DDT, in soils and groundwater at the GATX terminal related to historic DDT storage in Shell Tank 4.

This listing of COPCs will be further refined to a final listing of contaminants of concern (COCs) based upon the results of the HHRA and ERA.

3.3 SPH Occurrence

At the time of the RI sampling of the monitoring wells (October 1997), SPH were present in the subsurface at all three of the Willbridge bulk petroleum terminals. During the RI sampling activity no SPH was observed in the Chevron wells gauged. SPH were observed in four wells (MW-11, MW-23, MW-26, & MW-28) on the KMLT terminal during the RI sampling event and in three wells (B-4, B-22, & RES-N) on the ConocoPhillips. Table 5 presents the RI gauging data and Figure 17 shows the SPH occurrences during the RI sampling. In addition, a map showing the historic extent of SPH across the Site is presented as Figure 18.

Since the completion of the RI field activities, the wells at the Site have been gauged on a quarterly basis with corresponding monthly SPH recovery efforts performed on wells that exhibit SPH during the quarterly events. Gauging data from June 1999 through September 2002 is presented in Appendix A. In general, apparent SPH thicknesses have decreased significantly since record keeping was started.

3.3.1 Chevron Willbridge Terminal

Since March 1995, 20 of the 51 groundwater monitoring wells at the Chevron facility have been recorded as containing SPH equal to or greater than 0.01 feet in thickness (Appendix A). Measured thickness ranged from 0.01 feet to 3.21 feet.

Wells with measurable SPH are located near the marine dock, the truck loading racks along NW Doane Avenue and at the west side of the tank yard near the rail loading racks. Current SPH thickness measurements collected from these wells range from 0.01 feet (well B-7) to 2.09 feet (well CR-10).

3.3.2 KMLT Willbridge Terminal

Forty groundwater monitoring wells have been installed at the KMLT Terminal; 13 of these wells have documented occurrences of SPH. Three wells have had maximum thickness measurements of 0.01 foot (MW-9, MW-11 and MW-22). Two wells (MW-18 & MW-37) had one occurrence of SPH measured at 0.02 feet. The other eight wells (MW-6, MW-7, MW-19, MW-23, MW-24, MW-26, MW-28 and MW-31) have had recorded SPH thickness

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measurements of 0.01 to 1.03 feet. Currently, only wells MW-7, MW-22, and MW-24 consistently show measurable amounts of SPH.

3.3.3 ConocoPhillips Willbridge Terminal

Sixteen of the 34 wells at the ConocoPhillips terminal have had documented occurrences of SPH (Appendix A). Six wells have historic highs between 0.01 and 0.09 feet (B-17, B-27, B-35, B-37, U-4 and U-5A). The remaining ten wells (B-2, B-4, B-22, B-38, B-40, B-41, EX-39, U-3, U-4, and U-5) have historic maximum thickness of SPH from 0.25 feet to 1.74 feet.

SPH has historically occurred primarily at the intersection of Front and Doane Avenues and along the former and current Doane Avenue storm sewers although currently very little SPH remains in wells at the intersection. A few wells in the sand lot area in the southeast corner of the facility contain SPH and one well in the west tank yard (U-5A) occasionally contains SPH.

3.4 Interim Remedial Actions

Historic remedial activities at the Willbridge Facility include the following:

- Between 1975 and the early 1980's, Chevron pumped accumulated petroleum product from a depression in the old Doane Avenue storm sewer where piping dipped under NW Front Avenue. Unocal pumped accumulated hydrocarbon from a boomed containment area installed at the old sewer outfall formerly situated between the Chevron and Tosco/Unocal (ConocoPhillips) docks. The pumping was continued until 1982 when the new Doane Avenue storm sewer was completed and the old storm sewer was filled with concrete. DEQ records report that approximately 9,000 gallons of petroleum product were recovered from the boom containment between 1974 and 1978.

- In 1978, Shell Oil installed a 12-inch diameter SPH recovery well in the rail-loading area between its two yards. SPH recovery operations reportedly continued until 1980.

- In 1982, two 10-inch recovery wells were installed near the old storm sewer line. The wells were initially referred to as B-31and B-33. Well B-33 was later referred to as the "Chevron Well" or EX-1. Two additional extraction wells were installed in 1984. The three extraction wells formed a line parallel to the Willamette River and were designed to stop SPH seepage to the Willamette River. The middle of the three extraction wells was referred to as "Union 76 Middle Well" or "Union 76 Western Well" and later as the "TT-W" well. The eastern most well was referred to as the "Union 76 East Well" and later as the "TT-E" well.

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- In June 1985, a 12-inch diameter well was installed at the intersection of NW Doane Avenue and NW Front Street ("Old RES Recovery Well" or RES-o). The well was reportedly initially effective in recovering SPH. Several hundred gallons of petroleum product were recovered. SPH recovery operations continued until April 1986.

- SPH recovery was shifted from the Old RES Recovery Well to nearby observation well U-4 in January 1987 due to slow product recharge to the 12-inch diameter well.

- In September 1987, a clay barrier along the new 60-inch storm sewer on the Unocal property near the dock was installed to aid in the recovery of SPH from the water table and to reduce seepage to the Willamette River. A 12-inch recovery well was installed immediately adjacent to the storm sewer pipe at the barrier wall (referred to as New RES Recovery Well, RES-n, or Outfall Recovery Well). SPH recovery was initiated in November 1987. During the first three months of operation, approximately 1,000 gallons of petroleum product was recovered. In 1988, approximately 2,000 gallons of petroleum product were recovered from the well adjacent to the new 60-inch storm sewer clay barrier. Approximately 500 gallons of petroleum product were recovered in 1989.

- A groundwater interception trench (Holbrook Trench) was constructed in the fall of 1988 along the beach line between the Chevron and Unocal docks. The trench was constructed to prevent petroleum product seepage into the Willamette River. During 1988, approximately 2,000 gallons of petroleum product were recovered from a recovery well at the apex of the trench. The Holbrook Trench was operated until 1993. In the fall of 2002, the recovery system was operated to determine groundwater inflow. The system was operated for approximately one month. The water level in the trench could be maintained at a discharge rate of approximately 3 gallons per minute. The system was shut down when the elevation of the river flooded the trench system. During operation, less than one gallon of SPH was recovered.

- Monthly manual removal of product was initiated in February of 1997. From February 1997 to September 2002, an estimated 683 gallons of SPH have been recovered from wells at the facility by manual bailing, pumping or absorption. Prior to the initiation of hand bailing in February 1997, approximately 15,000 gallons of SPH had been recovered by a variety of methods.

- On September 11, 2000, KHM hand-dug two exploratory excavations, one on either side of storm sewer near the outfall to determine if SPH was present in the backfill. The excavations were dug to approximately two feet in depth and approximately four feet behind the outfall. SPH was observed in both excavations and a sheen was noticed on the river the following day.

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- On September 12, 2000, Cowlitz Clean Sweep (CCS) of Longview, Washington deepened the excavations by hand and placed 6-inch diameter, machine-slotted PVC well screens on either side of the storm sewer outfall. These wells were installed to provide extraction points for the removal of groundwater and SPH. CCS constructed a basic groundwater and SPH recovery system using air-diaphragm pumps to extract groundwater and product from the newly installed wells. The pumps discharged to a 6,500-gallon storage tank, that was being used as a temporary oil/water separator, situated at the top of the riverbank near the end of the Tosco Asphalt Shed. Oil was collected in the storage tank and water was pumped through the Tosco process water treatment system prior to discharging to the City of Portland sanitary sewer.

- On September 21 and 22, 2000, KHM supervised the excavation of six test pits. The pits were excavated to a maximum depth of approximately 7.5 feet below grade. Soil samples were collected from the test pits and from near the Willamette River low water line at the sand/silt interface. While the test pits were open, two, six-inch and four, four-inch diameter machine-slotted PVC extraction points (N-1, N-2, N-3, S-1, S-2, and S-3) were installed to enhance the dewatering of the backfill material and subsequent SPH recovery in an attempt to further inhibit SPH seepage to the river.

- In early October 2000, pressure-grouting of the storm sewer backfill was performed in a further attempt to stop SPH from seeping into the Willamette River through the sewer backfill. Approximately 1,500 gallons of grout were injected into the storm sewer backfill. The grouting activities appeared to have sealed off some areas but not others and, consequently, reduced but did not eliminate the seepage of water and SPH from under the storm sewer. This was likely due to the void space in the backfill and bedding being too extensive to be filled. Therefore, it was concluded that grouting of the storm sewer backfill to mitigate subsequent SPH seepage to the river could not be effectively accomplished.

- On November 22, 2000, KHM supervised the installation of two recovery trenches (RT-1 and RT-2) and a barrier beneath the storm sewer outfall. This barrier was composed of bentonite powder and pellets and was installed in an attempt to seal off the backfill around the sewer and minimize further SPH seepage. Recovery trenches (RT-1 and RT-2) were installed immediately upgradient of the outfall and the bentonite barrier on either side of, and perpendicular to, the storm sewer pipe where it was exposed near the outfall. In accordance with a request by Tosco, each recovery trench was comprised of a horizontal four-inch diameter perforated pipe attached to the bottom of a six-inch diameter extraction well surrounded by gravel. The trenches, wells, and perforated pipes were intended to enhance the recovery of SPH from the sewer pipe backfill. Two of the four previously installed four-inch diameter wells were removed during the excavation for the installation of RT-1 and RT-2.

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- On October 6, 2000, one recovery well (RW-1) was installed near the ordinary high water line of the Willamette River along the 60-inch storm sewer. This location was selected based on observation of the greatest amount of SPH in this area during the push-probe investigation.

- On February 15 and 16, 2001, KHM supervised the installation of five additional recovery wells. Two of the recovery wells (RT-3 and RT-4) were installed near the outfall to enhance the extraction rate of groundwater and SPH from the trench backfill near the outfall. Two additional wells were installed along the storm sewer, one in the sand lot (RW-3) and one just riverside of the McCall black oil line (RW-2). The last recovery well (RW-4) was installed near Well B-40, which frequently contains SPH. Well RW-4 was installed to facilitate product recovery in this area using a PetroBelt or other active recovery system.

- In April 2001, an interception trench was excavated by CCS perpendicular to the storm sewer just a few feet upgradient from the outfall. The trench extended fully beneath the sewer and approximately five feet out from each side. Oil entering the trench was recovered, along with some water, with floating weir type skimmers (one on each side of the storm sewer). This trench system was very successful in its intended purpose of collecting and recovering SPH migrating along the sewer pipe backfill and preventing it from reaching the river. The use of Wells RT-1 through RT-4 was discontinued due to the effectiveness of the interception trench.

- In early July 2001, the original interception trench was removed and replaced by CCS with a slightly larger interception trench in the same location. This was necessitated by the declining river, and associated water table levels, resulting in water and SPH contained in the trench draining through preferential pathways to the river prior to recovery by the skimmers. The replacement trench was deeper, wider, and longer with the downgradient side sealed with an impermeable liner, to the extent practical, to prevent SPH draining from the trench into the river.

- During November 2001 and January 2002, KHM supervised the construction of cutoff wall across the 60-inch storm sewer. The cutoff wall was installed to intercept separate-phase hydrocarbons (SPH) along the dominant groundwater flow path of the storm sewer trench backfill. The cutoff wall is generally "U" shaped to encompass the storm sewer trench backfill. The upgradient extent of the cutoff wall, or the ends of the "U"-shaped wall, are keyed into the natural silt soil ridge that was identified during previous investigations. The downgradient extent of the cutoff wall, or base of the "U"-shaped wall, is approximately centered at the point where the storm sewer trench daylights at surface, at the bank of the Willamette River (outfall). The cutoff wall extends through the sand fill layer, and is keyed into the underlying native silt along its

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entire alignment. The top of the cutoff wall has an elevation of 16.1 feet City of Portland Datum, which is the approximate ordinary high water elevation for the Willamette River. A concrete collar was installed at the point where the 60-inch storm sewer pipe penetrates the cutoff wall. The concrete collar was installed to provide a water-tight seal to prevent the migration of SPH beyond the cutoff wall. As of September 2002, a total of approximately 3,525 gallons of SPH have been removed from the backfill of the 60-inch storm sewer since 2000.

- In 2002, a soil vapor extraction system (SVE) was installed in the area of Tank 60 at the Chevron terminal. The purpose of the SVE system is to mitigate methane generated during the degradation of ethanol. The SVE system is operated under the Chevron terminal's existing air quality discharge permit. The system has operated continuously since December 2002.

- Since 1998, more than 2,000 tons of soil generated during construction activities at the Chevron terminal have been disposed as petroleum contaminated soil (PCS) under permit at TPST Technologies, Inc. in Portland, Oregon or Hillsboro Landfill in Hillsboro, Oregon.

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6.0 INVESTIGATION RESULTS

6.1 VALIDATION OF SITE DATA

The former site consultant, IT Corporation (IT), reviewed the existing data from the facility and determined that the data was of sufficient quality to use in the development of the RI work plan. The cumulative gauging data from the site since 1995 is acceptable for any use and is included in Appendix A. Pre-RI historical chemistry data has not been included or reported herein as it was of insufficient quality for use in the RI.

The data collected for this RI report has been validated according to the USEPA Functional Guidelines for Data Validation. All of the data has been determined to be acceptable for its intended use.

6.2 GEOLOGY

6.2.1 REGIONAL GEOLOGY

The Willamette Valley is located centrally in a structural downwarp between the Cascade Range and the Coast Range. The base of the Tualatin Mountains lies about 1,000 feet southwest of the site. The Tualatin Mountains trend to the northwest and reach an elevation of approximately 1,100 feet.

The Willamette River region is underlain by Holocene terrace, flood plain and fluvial sand and silt. The Holocene sediments are underlain by late Pleistocene fluvio-lacustrine sand and gravel. The alluvium ranges up to several thousand feet thick. The alluvium is underlain by early Pliocene conglomerates of the Troutdale Formation, early Pliocene siltstone of the Sandy River Formation, Miocene to Pliocene Columbia River Basalt and Tertiary marine sediments of the Scappoose Formation.

Alluvium deposited by the Willamette River underlies the floodplain. The alluvium consists of channel and bar sands and silty sands, levee silt and sandy silt and various over-bank lacustrine silts and clays. Isolated local lenses and stringers of volcanic ash, mudflow and sandy gravel are usually present in the alluvium, as are lenses of organic silt, peat and woody detritus. Prior to development, the site was occupied by Doane Lake and Kittridge Lake, which comprised part of an abandoned prehistoric channel of the Willamette River (Dames and Moore 1987). The locations of historic lakes and channels are shown in Figure 3. The information depicted in Figure 3 was taken from a map from the Oregon Historical Society dated September 1908.

Throughout most of the area, elevations below about 350 feet are mantled with sand, silt and gravel of late-Pleistocene age. These sediments were transported to the Portland area and deposited as a large delta by catastrophic floods of glacial melt water that coursed down the

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Columbia River about 10,000 to 13,000 years ago. The glacial-fluvial flood deposits have largely been removed from the site by erosion (Dames and Moore 1987).

In the Portland area, the late-Pleistocene Alluvium overlies the Troutdale Formation. The Troutdale Formation consists of sandstone and conglomerate of Pliocene age. Most of the Troutdale Formation in the site area has been removed by erosion; only a few thin remnants are known along the Tualatin Mountains. Local remnants of the Troutdale Formation may underlie the alluvium at the site area, but none has been encountered during drilling and none have been reported in nearby wells (Dames and Moore 1987).

In the Portland area, the Columbia River Basalt consists of 12 to 14 flows of hard basalt. The flows, which date from the Miocene age, are jointed and usually have rubbly or vesicular tops which contain most of the groundwater. Often they are separated by a few inches or feet of sedimentary deposits (siltstone and sandstone). Some of the flows are weathered to a depth of a few feet. The basalt is estimated to be in excess of 500 feet thick beneath the site. The basalt underlies the anticlinal Tualatin Mountains, immediately west and south of the site. The Columbia River Basalt dips to the northeast from the Tualatin Mountain anticline into the Portland Basin. Basalt outcrops are found in many areas along the flanks of the hills. Basalt outcrops at the base of the hills to the southwest of the site at about 35 feet. In off-site drilling, the basalt has been encountered at depths of 75 to 250 feet below grade.

The Columbia River Basalt has been described during investigations to the northwest. The Basalt encountered is thought to be of the Frenchman Springs Member of the Columbia River Basalt Group. The basalt is medium-grained (crystals 1 to 2 millimeters across) and has a porphyritic texture. Fine to course basalt gravel locally overlay the basalt. These gravels, which are occasionally vesicular, are subrounded to subangular. The upper section of the basalt is thought to be fractured and jointed (Dames and Moore 1987).

The Scappoose Formation underlies the Columbia River Basalts. The Scappoose Formation consists of tuffaceous sandstone, siltstone and mudstone with local occurrences of coal and volcanic ash. Regionally, the Scappoose Formation varies from a few feet in thickness to nearly 800 feet. The Scappoose Formation crops out several miles northwest of the site near the town of Scappoose. Near the Willbridge Facility, it lies at a depth of about 500 to 700 feet below grade (Dames and Moore 1987).

6.2.2 SITE GEOLOGY

The site lies on the northeastern flank of the northeast dipping Tualatin Mountain anticline. Fill material of gravel, silt and sand has been deposited over most of the site, covering the Holocene alluvial deposits of clay, silt and sand. The alluvium overlies the Columbia River Basalts.

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There have been more than 95 soil borings installed at the site. These include the B-series (1 through 41) installed at the Chevron and ConocoPhillips terminals, the CR-series (1 through 11) at the Chevron terminal, the MW-series (1 through 40) installed at the KMLT terminal, RES-N, RES-O, IT-E, IT-W and the U-series (1 through 4) installed at the ConocoPhillips terminal. Most borings were completed as monitoring wells. These soil borings have helped define the interface between the fill material and the underlying alluvium and have allowed for evaluation of groundwater depth and quality. The boring logs for the holes drilled during the 1998 and 1999 RI field activities are presented in Appendix B.

The site soil profile is typified by a layer of fill covering alluvium. The source of the fill is primarily Willamette River dredging. The fill is very loose to medium dense and fine to medium grained sand and silty sand. The thickness of the fill material ranges from nonexistent to greater than 30 feet. There is relatively little fill in the KMLT terminal's south tank yard, while there are significant fill areas on the rest of the site.

In general, the alluvium is very soft to medium stiff clayey silt with sand and organics. The alluvium is often inter-bedded with silty clays and clays. The alluvium may be initially encountered at ground level to depths of 50 feet below grade at the site. The thickness of this unit has been explored on-site within the Chevron tank farm. In two geotechnical borings, the alluvium extended to a depth of approximately 50 feet below grade.

Based on these two geotechnical borings in the Chevron Tank yard, Columbia River Basalts are present at approximately 50 feet below grade. The flows, which date from the Miocene age, are jointed and usually have rubble or vesicular tops which contain most of the groundwater.

6.3 HYDROLOGY

6.3.1 REGIONAL CLIMATE AND HYDROLOGY

Portland lies about 60 miles east of the Pacific Ocean. The city has a moderate marine climate with January monthly mean temperatures of 38.1 degrees Fahrenheit and July mean temperatures of 67.1 degrees Fahrenheit. The average annual precipitation is approximately 38 inches. The majority of the annual precipitation occurs as rainfall between the months of December and February. The one-year, 24-hour average rainfall for the area is 2.4 inches. The Portland area averages approximately seven inches of snowfall per year.

The Portland area is near the confluence of the Willamette River and Columbia River in the floodplain of the Willamette River. The Willamette River flows to the northwest, while the Columbia River flows to the west. The confluence of the rivers is approximately seven miles to the northwest of the site. The average annual stream flow of the Willamette and the Columbia Rivers are 33,000 cubic feet per second (cfs) and 184,179 cfs, respectively. The Willamette

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River is subject to non-saline tidal effects, which are transmitted from the Pacific Ocean through the Columbia River.

6.3.2 SITE HYDROLOGY

Currently, there are 77 groundwater monitoring wells in the monitoring well network for the site (Figure 2). The groundwater gradient, based on the groundwater-monitoring data collected during the RI sampling in October and November 1997, is east towards the Willamette River at a magnitude of approximately 0.017 foot/foot (ft/ft). The depth-to-water ranged from approximately 3 to 20 feet below grade during the RI sampling activities. This is generally consistent with monitoring events since the 1997 event.

The site lies outside the Willamette River 500-year floodplain. The Saltzman Creek watershed is the primary means of groundwater recharge for the area. The creek drains approximately 840 acres in the Tualatin Mountains, which lie to the southwest of the site and is channeled in a flume near the center of the KMLT terminal. The average stream flow for Saltzman Creek is estimated at 3 to 4 cubic feet per second (cfs) and varies seasonally. Facility runoff flows through the Doane Avenue storm drain and is not directed through the Saltzman Creek flume.

The topography of the Willbridge Facility is relatively flat with a gradual downward slope towards the Willamette River. The facility elevation is between 30 and 40 feet above the national geodetic vertical datum of 1929. The Willamette River ranges in elevation from a high tide elevation of approximately 16 feet above MSL to a low tide elevation of approximately 5 feet above MSL. The average daily tidal influence brings a fluctuation of two to three feet to the Willamette River. Percolation principally occurs at the site in the graveled tank yards, unpaved rail areas and other unpaved areas.

6.3.3 POTENTIAL SURFACE WATER MIGRATION PATHWAYS

The Saltzman Creek drainage is the only surface water migration pathway to the Willamette River at the site. Saltzman Creek flows in an east-west direction and is located on the KMLT terminal property. No other direct surface water migration pathways exist at the site although some, non-process areas such as parking lots, alleys, roof drains, etc. drain directly to the municipal storm sewer system and then to the Willamette River.

6.4 HYDROGEOLOGY

6.4.1 REGIONAL HYDROGEOLOGY

Four units which act as aquifers are present within the Portland area. These are the Columbia River Basalt, the Troutdale formation, late Pleistocene glacial flood deposits and Holocene alluvium. The Columbia River Basalts and underlying units, have been downwarped to form

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the Willamette Lowland. The Tualatin Mountains form a structural high separating the eastern (Portland Basin) and western (Tualatin Valley) parts of the Willamette Lowland. The basin was filled with deposits of the Sandy River Mudstone, Troutdale formation and Pleistocene flood deposits. These deposits were subsequently incised by the Willamette River and Columbia River. When sea levels rose at the end of the Pleistocene, these canyons were backfilled with sand, gravel, silt and clay filled silt.

The Columbia River Basalts form the main regional aquifer. Recharge for the aquifer comes from the uplands adjacent to the Portland Basin. The basalt outcrops in these uplands, exposing the edges of the individual flows. Since the basalt is overlain by the low permeability Sandy River Mudstone, water in the basalt aquifer is confined to the central part of the basin. Discharge from this aquifer is largely from water wells, slow leakage to the Sandy River Mudstone and river alluvium where the rivers have incised to the basalt.

The Troutdale formation most likely does not occur beneath the site, although the formation may occur to the east, beneath the Willamette River. The Troutdale formation receives its recharge from the adjacent uplands, where it outcrops and strata are exposed. Local artesian conditions may occur within the Troutdale, where there are discontinuous lower permeability lenses. The majority of discharge is to the Columbia River and water wells.

Pleistocene flood deposits are not present at or near the site. Discussion of these deposits is not significant to this investigation.

The Holocene alluvial deposits are internally complex and consist of many individual aquifers and aquitards. Hydrologic conditions within the alluvium are localized and seasonal. These deposits line the Willamette River and are recharged largely through precipitation, bank storage and discharge from the underlying units. Discharge from this unit is largely to the Willamette River, water wells and leakage to underlying units.

6.4.2 Site Hydrogeology

6.4.2.1 Hydrostratigraphy

Fill

The fill and the alluvium are hydraulically connected. The units discharge to the Willamette River. The fill may be locally perched on the alluvial unit. The direction of groundwater flow, inferred from the elevation contours, is generally toward the river at approximately 0.017 ft/ft. There is a localized groundwater mound in the KMLT south tank farm and apparent elongated groundwater depressions (troughs) in the vicinity of Doane Avenue and the Saltzman Creek flume. The fill layer is the primary zone for travel of petroleum hydrocarbon contamination. Groundwater flows through the intergranular pore space of the fill. A layer of

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alluvium underlies the fill. The alluvium is, in some locations, less permeable and may provide an aquitard.

Groundwater may still preferentially flow along the historic surface topography of the site and surrounding area. The current groundwater surface mimics the historic topography of the site. The groundwater mound in the KMLT terminal's south tank yard is located in the vicinity of a rise in the historic topography. This area received little fill material when the area was filled and leveled for development. The groundwater trough near the Saltzman Creek flume corresponds to the historic pathway of Saltzman Creek. The groundwater depression near Doane Avenue may be influenced by backfill lining the trench for the Doane Street storm sewer conduit but may also correspond with the location of the historic Kittridge Lake (Figure 3).

Water levels beneath the site are influenced by annual precipitation cycles and by river stage fluctuations. The effect of river stage fluctuations is most pronounced on water levels in wells along the riverfront. The depths to water typically range from 3 feet to 22 feet below grade. Groundwater elevation ranges from about 15 to 35 feet MSL. The direction of shallow groundwater flow is generally to the east, toward the Willamette River, at an average gradient of 0.017 ft/ft (Figure 16).

Alluvium

The alluvium contains disconnected bedding and inter-fingering lenses of clayey material that affect the hydraulic conductivity of the unit. The units are thought to be generally unconfined, although due to the lenses and bedding, there may be locally confined areas within the aquifers. The alluvium discharges into the Willamette River.

Basalt

In off-site investigations, groundwater has been found in the underlying basalts. Basalt jointing influences both vertical and horizontal permeability. It is likely that the basalt is hydraulically connected to the fill and alluvium units. The groundwater of the basalt unit may be confined by the fill and alluvial units providing an upward gradient beneath the site.

6.4.2.2 Potential Groundwater Migration Pathways

Groundwater contamination has the potential to preferentially travel along historic topographic channels. Backfill lining the trench for the Doane Street (60-inch diameter) storm sewer outfall is a potential route for groundwater migration as is the historic Holbrook Slough, the historic Kittridge Lake connection to the river, and Saltzman Creek. Groundwater also has the potential to enter the Willamette River directly through a seep from the banks of the Willamette River on the border of the Chevron and ConocoPhillips properties.

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6.5 GROUNDWATER INVESTIGATION RESULTS

Water samples were collected from existing groundwater monitoring wells and from hydropunch drilling locations. The well and hydropunch locations are shown on Figures 19 through 31. Hydropunch sample locations are identified with the HP or RF prefix.

Analytical results of groundwater samples collected from monitoring wells are considered to accurately represent the groundwater quality conditions beneath the locality of the facility. The hydropunch water samples are considered to be semi-quantitative measures of contaminant levels in groundwater. The hydropunch organic analytical results above the detection limits are semi-quantitative because they can be biased high due to stripping of adsorbed organics from the soil to groundwater during drilling activities. They can also be biased high by the typical presence of suspended soil particles that may contain elevated concentrations of contaminants that are included in the analytical results but not actually dissolved in the groundwater. Similarly, the hydropunch inorganic unfiltered analytical results are also semi-quantitative because they can be biased high due to the suspension of soil particles and subsequent dissolution of the particles in acidified samples. Due to the high bias, hydropunch samples results that are reported as not detected (ND) at or above laboratory method reporting limits (MRLs) are considered to be quantitative in the sense that they are an accurate test of the absence of the analyzed compound in groundwater at the reported detection limit.

6.5.1 GROUNDWATER MONITORING WELL SAMPLE RESULTS

A total of 77 groundwater-monitoring wells were gauged and sampled during the RI activities in October and November 1997. These wells (referred to as the "RI wells") and the analytical methods for the groundwater samples collected from the wells are identified in Table 4. Selected wells also were resampled in November and December 1998 for additional analytes, including volatile organics compounds (VOCs), semivolatile organic compounds (SVOCs) and total and dissolved copper and zinc. The resampling activity was conducted at the request of DEQ. Tables 6 through 11 summarize the analytical results from the October/November 1997 and November/December 1998 sampling of these groundwater monitoring wells. Sample locations and results are shown on Figures 19 through 27. The analytical results are discussed below.

A number of the facility wells have been gauged and sampled on a quarterly or periodic basis for a number of years prior to the RI field activities. Only the gauging data related to the RI fieldwork was judged to be of sufficient quality to be used for the RI. The quarterly gauging and sampling results after 1997 are also of sufficient quality to be used in the RI. Selected tables of cumulative gauging from 1995 to the present for the RI wells are included in Appendix A along with quarterly analytical results from 2000 through September 2002. The certified analytical reports from NCA are presented in Appendix C (This appendix consists of nine volumes.).

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6.5.1.1 Gauging Data

Table 5 summarizes the cumulative gauging data from the October 1997 gauging and sampling effort. These results also summarize the free product removal effort that was conducted at the facility during that quarter.

The groundwater elevation (GWE) in the RI wells at the Chevron site ranged from 15.00 to 31.59 feet (ft) MSL. At the KMLT terminal, the range was from 21.6 to 32.57 ft MSL. For the ConocoPhillips site, the range was from 13.30 to 21.02 ft MSL. The general direction of groundwater flow at the facility during the October 1997 gauging effort was to the northeast and east at a gradient of 0.01 ft/ft (Figure 16).

Historically, the groundwater elevation within the locality of the facility has ranged from 11 to 35 feet MSL (Appendix A, Table A-1). Groundwater flow has generally been to the east and northeast toward the Willamette River over that time period.

Product thickness measurements in the RI wells during October 1997 ranged from 'no product' (NP) to a maximum thickness of 0.07 feet in KMLT well MW-23. In all, four KMLT and three ConocoPhillips wells contained measurable product in October 1997. No Chevron RI wells contained product (Table 5). The distribution of free product at the facility during October 1997 is shown on Figure 17.

Historically, the product thickness in the RI wells has ranged from a trace (several wells) to 2.26 feet (B-22) during the period from 1995 to the present (Appendix A, Table A-1). The maximum product thickness recorded in all site wells (including data extending back to 1988) is summarized in Appendix A, Table A-2. Four wells had recorded thickness measurements of SPH of greater than nine feet in 1987; however, SPH has not been measured with this great of thickness since that time.

Total product recovered from the RI wells from 1995 through May 1999 is 106 gallons (Appendix A, Table A-1). Total product recovered from all site wells (including wells not sampled for the RI), as of May 1999, is 568 gallons (IT Corp. 1999b). Of this total, 207 gallons were recovered from the ConocoPhillips property, 290 gallons from the KMLT property, and 71 gallons from the Chevron property.

6.5.1.2 BTEX

Analytical results for BTEX in the RI wells are presented in Table 6 and Figures 19, 20 and 21. These results indicate that the BTEX compounds are present in many of the facility wells. The maximum benzene concentration at the Chevron site was 1650 µg/l (ppb) at well B-14. The maximum ethylbenzene, toluene, and xylene concentrations at the Chevron site were 520 ppb, 91 ppb, and 109 ppb, respectively. The maximum ETX results were also from well B-14. For the KMLT site, the maximum benzene concentration was 2,090 ppb. The maximum

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ethylbenzene, toluene, and xylene concentrations at the KMLT site are 4880 ppb, 2820 ppb, and 14,900 ppb, respectively. These maximum concentrations were all from well MW-22. At the Tosco site, the maximum benzene concentration was 712 ppb at Well B-17. The maximum ethylbenzene, toluene, and xylene concentrations at the Tosco site are 1990 ppb (Well B-6), 17.5 ppb (Well B-17), and 237 ppb (Well B-6), respectively.

6.5.1.3 PAH

Analytical results for PAH in the RI wells are presented in Table 7 and Figures 22, 23 and 24. These results indicate that fifteen of the sixteen PAH compounds in the target analyte list were detected above the laboratory MRLs at the facility. The one PAH not detected was dibenzo(a,h)anthracene. The remaining PAH detections ranged from 0.0505 ppb to 479 ppb. PAH compounds were detected in nearly all wells sampled.

6.5.1.4 SVOCs

Selected wells from the RI well list were resampled in November and December 1998. These samples were submitted for SVOC analysis and are listed in Table 4. Analytical results for SVOCs in the RI wells are presented in Table 8 and Figures 22, 23 and 24.

Of the 60 SVOC target analytes, ten were detected above the laboratory MRLs. Of the detected SVOCs, six were PAHs (acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene). These compounds were also detected in the wells during the 1997 sampling effort (see Section 5.5.1.3 and Table 7).

In addition to the PAHs, 2,4-Dimethylphenol and 4-Methylphenol were detected above the laboratory MRLs in KMLT Well MW-11 only. The concentrations of 2,4-Dimethylphenol and 4-Methylphenol were 40.6 ppb and 16.5 ppb, respectively.

The other two SVOC compounds detected in the wells were 2-methylnaphthalene and bis(2-ethylhexyl)phthalate (BEHP). The BEHP detection was in KMLT Well MW-11 at a concentration of 15.6 ppb.

BEHP is a common laboratory contaminant. Based upon the frequency of detection at the site and concentration level, it is unlikely that BEHP is a compound of concern at the Willbridge Terminal.

Like naphthalene, the compound 2-methylnaphthalene is a common constituent of diesel and heavy oils. Based upon the analytical results, 2-methylnaphthalene appears to be associated with naphthalene in most cases. As such, it is likely that the source of 2-methylnaphthalene at the facility is historic fuel spills.

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6.5.1.5 VOCs

As described above, selected wells from the RI well list were re-sampled in November and December 1998 at the request of DEQ. These samples (identified in Table 4) were submitted for VOC analysis. The VOC results are summarized in Table 9 and on Figures 19, 20 and 21.

Of the 50 VOC target analytes, fourteen were detected above the laboratory MRLs. These VOCs are: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, sec-butylbenzene, isopropylbenzene, n-butylbenzene, n-propylbenzene, p-isopropyltoluene, naphthalene, chloroform, and the BETX compounds (benzene, ethylbenzene, toluene, m,p-xylenes, and o-xylenes).

The VOCs are all trace constituents of typical heavy fuels, except chloroform. Concentrations of 1,2,4-trimethylbenzene were present in five wells with a maximum concentration of 1,360 ppb (KMLT Well MW-11). The remaining four wells had concentrations of 64 ppb or less, with one result less than 10 ppb (Table 9). The compound 1,3,5-trimethylbenzene was present in five wells at concentrations with a maximum concentration of 327 ppb (KMLT Well MW-11). The remaining four wells had concentrations of 13.8 ppb or less (Table 9).

For the –butylbenzenes and –propylbenzenes compounds, with few exceptions, the concentrations detected were less than 61 ppb. The exceptions are as follows:

- isopropylbenzene - 65 ppb in Chevron Well B-14, 80 ppb in ConocoPhillips Well B-6;
- n-propylbenzene – 112 ppb in Chevron Well B-14, 163 ppb in KMLT Well MW-11, and 250 ppb in ConocoPhillips Well B-6.

The maximum concentration of p-isopropyltoluene detected was 16.6 ppb in ConocoPhillips Well B-6.

Chloroform was detected in one well (KMLT Well MW-32) at a concentration of 6.79 ppb. Chloroform is a common laboratory cross contaminant. It should not be retained as a COC based upon this one detection.

Naphthalene is a common constituent in diesel, fuel oils, and heavy oils. It was detected in five wells, with a maximum concentration of 548 ppb in KMLT Well MW-11. The remaining four detections were 16 ppb (KMLT Well MW-8), 19.5 ppb (Chevron Well B-14), 42 ppb (Chevron Well B-28), and 72 ppb (ConocoPhillips Well B-6).

The BTEX compounds were detected in KMLT Wells B-14 and B-24. BTEX results for all the site wells are summarized fully in Section 6.5.1.2 (Table 6). The maximum benzene concentration from the VOC analyses detected was 211 ppb (Well B-24).

6.5.1.6 Pesticides

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Twenty-four KMLT wells were sampled and analyzed for pesticides during October 1997. These wells are listed in Table 4. The results of the analyses are presented in Table 10. Three pesticide compounds were detected above the laboratory MRLs. These compounds are a-BHC, g-BHC, and 4,4'-DDD.

The a-BHC and g-BHC compounds were both detected in KMLT Well MW-13. The concentrations of a-BHC and g-BHC in this well were 0.131 ppb and 9.43 ppb respectively.

The 4,4'-DDD detection was in KMLT Well MW-22. The concentration in this well was 0.415 ppb. This compound should not be retained as a COC due to its low concentration and low frequency of detection.

DDT, the primary pesticide of concern at the facility, was not detected in any of the wells sampled and, therefore, should not be retained as a groundwater COC.

6.5.1.7 Metals

Groundwater samples were collected from the RI wells and sampled for total and dissolved metals by USEPA 6000/7000 Series Methods during October 1997 and November/December 1998. During 1998 sampling, copper and zinc were added to the previous analyte list from the October 1997 sampling event. The list from the October 1997 sampling event consisted of arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The metals analytical results are summarized in Tables 11a (total) and 11b (dissolved) and shown on Figures 25, 26 and 27. A copy of the laboratory analytical report and chain-of-custody document are included as Appendix C.

As expected from the groundwater samples, the total metals concentrations are generally higher than the dissolved metals concentrations.

Dissolved and Total Arsenic

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) arsenic laboratory analysis. The groundwater concentrations of arsenic ranged from below laboratory method reporting limits (MRLs) to 423 ppb at ConocoPhillips Well W-10. Dissolved arsenic was detected in 90% of the submitted groundwater samples, and total arsenic was detected in 95% of the submitted groundwater samples. The relatively high frequency of detection may indicate that arsenic is naturally occurring in the soils and fill at the site. Levels of naturally occurring arsenic are known to be present in the area. In general, the concentrations of total arsenic are approximately 50% higher than the concentrations of dissolved arsenic.

Dissolved and Total Barium

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The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) barium laboratory analysis. The concentrations of barium over the site ranged from 6.8 ppb to 1,330 ppb at Chevron Well B-19. Dissolved and total barium was detected in 100% of the submitted groundwater samples. Concentrations of barium in groundwater appear to be relatively ubiquitous in the groundwater at the site, which may be attributed to naturally occurring barium in the existing fill at the site.

Dissolved and Total Cadmium

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) cadmium laboratory analysis. The concentrations of cadmium over the site ranged from below laboratory method reporting limits (MRLs) to 34.9 ppb at Chevron Well B-26. Dissolved cadmium was detected in 9% of the submitted groundwater samples, and total cadmium was detected in 36% of the submitted groundwater samples. In one of the three groundwater samples collected, the duplicate sample had concentrations of dissolved cadmium below the laboratory MRLs, and in four of the 40 groundwater samples, the duplicate sample had concentrations of total cadmium below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 5% for dissolved cadmium and 32% for total cadmium. The distribution of cadmium (dissolved and total) concentrations above laboratory MRLs appear to generally be localized in the northeastern (down gradient) and southwestern (up gradient) portions of the Willbridge Terminal. This distribution (up gradient and down gradient) may indicate that the concentrations are likely background concentrations at the site.

Dissolved and Total Chromium

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) chromium (unspeciated) laboratory analysis. The concentrations of chromium over the site ranged from below laboratory MRLs to 317 ppb at ConocoPhillips Well B-18. Dissolved chromium was detected in 15% of the submitted groundwater samples, and total chromium was detected in 74% of the submitted groundwater samples. However, in four of the six groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of dissolved chromium below the laboratory MRLs, and in six of the 29 groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of total chromium below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 5% for dissolved chromium and 21% for total chromium. The distribution of chromium (dissolved and total) concentrations appears to generally be elevated in the northeastern portion of the site.

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Dissolved and Total Copper

The groundwater samples collected during the RI activities were submitted for dissolved (16 samples) and total (51 samples) copper quantitative analysis. The concentrations of copper over the site ranged from below laboratory MRLs to 242 ppb at Chevron Well B-28. To further evaluate the analytical results, the frequency of detection was assessed. Dissolved copper was detected in 6% of the submitted groundwater samples, and total copper was detected in 72% of the submitted groundwater samples. The dissolved copper concentrations are below the laboratory MRLs except for one sample location, B-37; however, the concentration detected, 2.10 ppb, is just above the laboratory MRL of 2 ppb. The distribution of copper (dissolved and total) concentrations appears to generally be elevated in the northeastern portion of the site.

Dissolved and Total Lead

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) lead laboratory analysis. The concentrations of lead over the site ranged from below laboratory MRLs to 132 ppb in Chevron Well B-26 (Note: KMLT Well MW-10 had a reported dissolved lead concentration of 161 ppb [Table 11b]; however, the duplicate of this sample was reported as 4.9 ppb). Dissolved lead was detected in 23% of the submitted groundwater samples, and total lead was detected in 79% of the submitted groundwater samples. However, in five of the nine groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of dissolved lead below the laboratory MRLs, and in 13 of the 88 groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of total lead below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 10% for dissolved lead and 68% for total lead.

Dissolved and Total Mercury

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) mercury laboratory analysis. The concentrations of mercury over the site ranged from below laboratory MRLs to 1.8 ppb in the former Chevron Well B-31. Dissolved mercury was detected in 38% of the submitted groundwater samples, and total mercury was detected in 44% of the submitted groundwater samples. However, in three of the 15 groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of dissolved mercury below the laboratory MRLs, and in seven of the 49 groundwater samples, the recent groundwater sampling in December 1998 and/or the duplicate sample had concentrations of total mercury below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 31% for dissolved mercury and 38% for total mercury. The distribution of mercury (dissolved and total) concentrations appears to generally be elevated in the northeastern portion of the site.

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Historically, the presence of SPH at the Site was prevalent in the northeastern portion of the site. The presence of free product can create a reducing environment (i.e., low D.O., low eh, etc.) which may lead to mobilization of some metals.

Dissolved and Total Selenium

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) selenium laboratory analysis. The concentrations of selenium over the site ranged from below laboratory MRLs to 2.30 ppb in the Chevron Well B-30. The groundwater sample at well B-30 from the groundwater-sampling event in December 1998 had concentrations below the laboratory MRLs. Dissolved selenium was detected in 5% of the submitted groundwater samples, and total selenium was detected in 20% of the submitted groundwater samples. The dissolved selenium concentrations are below the laboratory MRLs except for two sample locations, MW-21 and U-3; however, the concentrations detected, 1.3 ppb and 1 ppb, respectively, is just above the laboratory MRL of 1 ppb. However, in 5 of the 22 groundwater samples collected, the groundwater sampling in December 1998 and/or the duplicate sample had concentrations of total selenium below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 15% for total selenium. The total selenium concentrations ranged from 1 ppb to 2.3 ppb and were detected above laboratory MRLs in up gradient and down gradient sampling locations, which may indicate that the background concentrations are relatively close to the laboratory MRLs. The distribution of selenium (dissolved and total) concentrations appears to generally be elevated in the northeastern portion of the site.

Dissolved and Total Silver

The groundwater samples collected during the RI activities were submitted for dissolved (39 samples) and total (111 samples) silver laboratory analysis. The concentrations of silver over the site ranged from below laboratory MRLs to 7.10 ppb in the KMLT Well MW-9. Dissolved silver was detected in 10% of the submitted groundwater samples, and total silver was detected in 14% of the submitted groundwater samples. However, in one of the two groundwater samples from the groundwater sampling in December 1998, concentrations of dissolved silver were below the laboratory MRLs. In seven of the 16 groundwater samples and/or the duplicate sample from the groundwater sampling in December 1998, detected concentrations of total silver were below the laboratory MRLs. Accordingly, the adjusted frequency of detection is 2% for dissolved silver and 8% for total silver. The one occurrence of dissolved silver can be assumed to be an isolated occurrence and not representative of the site or the data set. The KMLT Terminal did not have concentrations above the laboratory MRLs at the various sampling locations, except for two sampling locations: MW-9 and MW-15. The Chevron and ConocoPhillips Terminal did not have concentrations of dissolved or total silver above the laboratory MRLs in the northwestern and southwestern portions, and concentrations of dissolved silver were below the laboratory MRLs for all sampling locations at

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the Chevron and ConocoPhillips Terminal. The relatively low detection of frequency may indicate that the total silver concentrations are attributed to naturally occurring soils and fill at the site. The distribution of silver (dissolved and total) concentrations appears to generally be elevated in the northeastern portion of the site.

Dissolved and Total Zinc

The groundwater samples collected during the RI activities were submitted for dissolved (16 samples) and total (46 samples) zinc laboratory analysis. The concentrations of zinc over the site ranged from below laboratory MRLs to 1,950 ppb in the ConocoPhillips well U-5. Dissolved zinc was detected in 88% of the submitted groundwater samples, and total zinc was detected in 87% of the submitted groundwater samples. Zinc appears to be ubiquitous in the groundwater at the site (including upland sampling locations). The distribution of zinc (dissolved and total) concentrations appears to generally be elevated in the northern and northeastern portions of the site.

6.5.2 HYDROPUNCH WATER SAMPLE RESULTS

A total of 25 borings were sampled with a hydropunch during drilling for the RI activities during October/November 1998. These samples contain an HP or RF in the sample ID. In March/April 1999, an additional 10 borings were advanced in areas with underground utilities. These samples were identified with a UB in the sample ID, except for two samples designated G-HP 12 and G-HP 13. Borings GP-HP 12 and G-HP 13 were drilled to further delineate dissolved petroleum hydrocarbons near the KMLT Terminal. These hydropunch samples and the analytical methods used on the samples are identified in Table 4. The results for the utility borings are plotted on Figure 28. Tables 12 through 18 summarize the analytical results from the October/November 1998 hydropunch sampling. Sample locations and results are shown on Figures 29, 30 and 31. The analytical results are discussed below. It is important to note, however, that water samples collected via hydropunches often contain high levels of suspended solids. If the suspended solids contain contaminants, they will be extracted in the laboratory along with any dissolved contaminants and reported as dissolved contaminants. Therefore, the analytical results generally indicate much higher contaminant concentrations than are actually present in the groundwater samples collected from properly constructed monitoring wells.

6.5.2.1 BTEX

Table 12 summarizes the BTEX results from the hydropunch samples collected during the RI investigation. These results indicate that the BTEX compounds are present in the water from a number of the facility and utility boring locations. The maximum benzene concentration from a hydropunch sample at the facility was 249 ppb at KMLT boring G-HP 3. The maximum benzene concentration from a utility boring was 302 ppb in boring UB-7 also near KMLT.

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The maximum ethylbenzene and toluene concentrations at the facility were also at location G-HP 3 (82.8 ppb and 6.75 ppb, respectively). The maximum xylene result for the site was from ConocoPhillips boring T-HP 3 (63 ppb).

6.5.2.2 PAH

Table 13 summarizes the PAH results from the hydropunch samples. These results indicate that the non-carcinogenic PAHs, acenaphthene, fluorene, anthracene, fluoranthene, phenanthrene, benzo (g,h,i) perylene and pyrene, were detected in one or more of the hydropunch samples. The carcinogenic PAHs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and chrysene, were detected in samples C-HP 3, UB-3, UB-4, and UB-7. Naphthalene, a non-carcinogenic PAH, was detected in four samples.

The samples with non-carcinogenic PAH detections were Chevron samples C-HP-2, C-RF 1, and C-RF 3, KMLT samples G-HP 1, G-HP 3, G-HP 4, G-HP 9, G-HP 10, ConocoPhillips samples T-HP 1, T-HP2, T-HP 5, and T-HP 6, and utility boring samples G-HP 13, UB-2 through 5, and UB-7. The remaining seventeen samples did not contain any detectable PAH compounds. The detected concentrations range from 0.104 ppb (phenanthrene) in G-HP-13 to a maximum concentration of 29.6 ppb (phenanthrene) in UB-4. The majority of the PAH detections were in the 0.1 to 3.0 ppb range.

The samples with detectable concentrations of naphthalene were G-HP 3, G-HP 9, T-HP 6, and UB-7. The detected concentrations ranged from 0.135 ppb to 2.88 ppb.

The carcinogenic PAHs detected in samples C-HP 3, UB-3, UB-4, and UB-7 ranged in concentration from 0.105 (benzo(a)pyrene) to 2.92 ppb (chrysene).

6.5.2.3 SVOCs

Twenty-five selected hydropunch boring samples were submitted for a complete SVOC analysis. These samples are listed in Table 4. The SVOC results are summarized in Table 14. No SVOCs were detected in the utility borings.

Of the 60 SVOC target analytes, fourteen were detected. Of the detected SVOCs, eleven were PAHs (acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene). The samples with detectable concentrations of the listed PAHs were Chevron samples C-RF-1 and C-RF-2, KMLT samples G-HP 1D, G-HP2, G-HP 3, G-HP 4, and G-RF 2 DUP, and ConocoPhillips samples T-HP 1 and T-HP 2. The detected concentrations ranged from 0.100 ppb to 2,400 ppb. With the exception of anthracene, these compounds were also detected in the RI wells (Sections 6.5.1.3 and 6.5.1.4).

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In addition to the PAHs, three other SVOC compounds were detected. These were 2-methylnaphthalene, bis(2-ethylhexyl)phthalate (BEHP), and phenol. The BEHP detections were in samples C-RF 2 (70.8 ppb), C-RF 3 (3,530 ppb), G-RF 1 (16.1 ppb), T-RF 1 (17.5 ppb), UB-5 (18.4 ppb), UB-6 (21.1 ppb), UB-7 (22.0 ppb), and UB-8 (29.3 ppb). BEHP is, however, a common laboratory contaminant.

Like naphthalene, the compound 2-methylnaphthalene is a common constituent of diesel and heavy oils. Based upon the analytical results, 2-methylnaphthalene appears to be associated with naphthalene in most cases. As such, it is likely that the source(s) of 2-methylnaphthalene at the facility are historic fuel spills. Two 2-methylnaphthalene detections were reported. The maximum concentration of 2-methylnaphthalene at the site was 21.1 ppb in sample T-HP 1. The second detection was 10.8 ppb in sample T-HP 2.

Phenol was detected in one sample, G-HP 7 (12.2 ppb). Based upon these findings, it is recommended that phenol not be retained as a groundwater COC.

6.5.2.4 VOCs

Hydropunch samples from selected borings were analyzed for the full suite of VOC target analytes. These samples are identified in Table 4. The VOC results are summarized in Table 15.

Of the 63 VOC target analytes, thirteen were detected. The VOC analytes detected are: benzene, n-butylbenzene, sec-butylbenzene, tert-butylbenzene, ethylbenzene, isopropylbenzene, p-isopropyltoluene, n-propylbenzene, naphthalene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and m,p-xylene. These VOCs are all typical trace constituents of heavy fuels.

Benzene was detected in five samples at concentrations ranging from 8.20 ppb (KMLT G-HP-4) to 293 ppb (KMLT G-HP-3). See Section 6.5.2.1 for a more detailed summary of BTEX results.

N-butylbenzene was detected in three samples at concentrations ranging from 3.08 ppb (Chevron C-RF-1) to 6.26 ppb (UB-3). Sec-butylbenzene was detected in seven samples at concentrations ranging from 2.77 ppb (Chevron C-RF-1) to 18.9 ppb (KMLT G-HP-1 D). Tert-butylbenzene compounds were detected in one sample at a concentration of 1.44 (ConocoPhillips T-RF-2). Based upon these findings, it is recommended that tert-butylbenzene not be retained as a groundwater COC.

Ethylbenzene was detected in two samples at concentrations ranging from 5.70 ppb (UB-7) to 82.8 (KMLT G-HP 3).

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Isopropylbenzene was detected in eleven samples at concentrations ranging from 1.13 ppb (ConocoPhillips T-RF 2) to 36.87 ppb (ConocoPhillips T-HP 1). The only detection of p-isopropyltoluene was 6.55 ppb in a duplicate sample from KMLT sample G-HP 1; however was not detected in the first sample (G-HP 1) collected from this same location. N-propylbenzene was also detected in 11 samples at concentrations ranging from 1.65 ppb (ConocoPhillips T-RF 2) to 73.7 ppb (ConocoPhillips T-HP 3).

Naphthalene was detected in one sample at a concentration of 3.02 ppb (UB-7).

Toluene was detected in five samples at concentrations ranging from 1.92 ppb (KMLT G-HP 5) to 6.75 ppb (KMLT G-HP 3).

The 1,2,4-trimethylbenzene was present in the duplicate from one hydropunch location (G-HP 1 DUP) at a concentration of 21.0 ppb; however was not detected in the first sample (G-HP 1) collected from this same location. The compound 1,3,5-trimethylbenzene was present in hydropunch sample G-HP 2 at a concentration of 2.2 ppb. Based upon these findings, it is recommended that 1,3,5-trimethylbenzene not be retained as a groundwater COC.

M,p-Xylene was detected in three samples at concentrations ranging from 4.12 ppb (UB-7) to 44.5 ppb (KMLT G-HP 3).

6.5.2.5 Pesticides/PCBs

Groundwater from two Chevron borings, fourteen KMLT borings, one ConocoPhillips boring and three utility borings was collected and analyzed for pesticides during October/November 1998. One of the KMLT boring samples was also analyzed for PCBs. The hydropunch samples are listed in Table 4. The results of the pesticide analyses are presented in Table 16 and the PCB results are shown in Table 17.

Of the 22 pesticide analytes, only three were detected: gamma-BHC (lindane), dieldrin, and endrin ketone. Lindane was detected in two samples at concentrations ranging from 0.598 ppb (KMLT G-HP 7) to 4.85 ppb (KMLT G-HP 8). Dieldrin was detected in one sample at a concentration of 0.190 ppb (KMLT G-HP 9). Based upon these findings, it is recommended that dieldrin not be retained as a groundwater COC. Endrin ketone was detected in three samples at concentrations ranging from 0.110 ppb (KMLT G-HP 6) to 0.251 ppb (KMLT G-HP 8).

As shown in the tables, no PCB compounds were detected. Therefore, PCB compounds should not be retained as a COC.

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6.5.2.6 Metals

Selected boring locations were sampled and analyzed for total and dissolved metals. The metals analyte list for the hydropunch samples included arsenic, barium, cadmium, copper, chromium, lead, mercury, selenium, silver, and zinc. The results from the total metals analyses are summarized in Table 18a. Dissolved results are in Table 18b.

As expected from hydropunch samples, the total metals results are generally higher than the dissolved results. Detected total and dissolved arsenic concentrations over the site range from 2.30 ppb to 48.0 ppb. Elevated levels of naturally occurring arsenic are known to be present in the region.

The maximum total or dissolved barium result at the facility was 2,940 ppb at ConocoPhillips sample location T-RF 2. All other barium results are less than 1,340 ppb. Therefore barium is only a potential concern at this location. Based upon the groundwater monitoring wells results for barium, barium should not be retained as a groundwater COC.

None of the hydropunch samples contained detectable concentrations of total cadmium. Dissolved cadmium was detected in one sample (UB-5) at a concentration of 18.1 ppb.

The maximum total or dissolved chromium (unspeciated) result at the facility was 379 ppb (total) at ConocoPhillips sample location T-RF 2. The remaining detected chromium concentrations are less than 171 ppb.

The maximum total or dissolved copper result at the facility was 661 ppb at the ConocoPhillips sample location T-RF 2.

Total lead concentrations over the site ranged from not detected to 77.8 ppb (T-RF 2). Dissolved lead over the site ranged from not detected to 6.4 ppb in ConocoPhillips boring T-HP-1.

Total mercury concentrations over the site ranged from not detected to 1.02 ppb (T-RF 2). Dissolved mercury was detected in one sample (UB-8) at a concentration of 0.263 ppb.

Total selenium and silver was detected in one sample (T-RF-2) at concentrations of 2.00 ppb and 1.40 ppb, respectively. Dissolved selenium and silver was not detected in any of the samples.

The maximum detected total or dissolved zinc concentration at the facility was 980 ppb at ConocoPhillips sample location T-RF 2.

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6.6 River Sediment Investigation Results

A total of 13 river sediment locations were sampled during the RI field activities. These samples were collected during December of 1998. The river sediment samples were collected from points approximately 50 feet off shore from the ordinary high water mark (OHWL) or at 100 feet from the OHWL in the vicinity of the Saltzman Creek and Doane Avenue 60-inch Storm Sewer outfall. The samples were co-located with the surface water samples (Section 6.7, below). The surface water samples and the analytical methods used on the samples are identified in Table 4. Tables 19 through 23 and Figure 32 summarize the analytical results from the December 1998 sampling of these sediment sites. The analytical results are discussed below.

6.6.1 BTEX

Table 19 summarizes the BTEX results from the river sediment samples collected during the RI investigation. These results indicate that the BTEX compounds were not detected at the laboratory's method detection limit in all of the samples collected during December of 1998.

6.6.2 PAH

Table 20 summarizes the PAH results from the sediment samples. These results indicate that the non-carcinogenic PAHs anthracene, fluoranthene, phenanthrene, benzo (g,h,i) perylene and pyrene were detected in one or more of the sediment samples. The carcinogenic PAHs benzo (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene, chrysene, and indeno (1,2,3,c,d) pyrene were also detected in one or more of the samples.

The samples with non-carcinogenic PAH detections were KMLT samples G-SED 1, G-SED 2, and G-SED 4, and ConocoPhillips samples T-SED 2, T-SED 3, and T-SED 5. The detected concentrations range from 6.85 ppb (fluoranthene) in G-SED-4 to a maximum fluoranthene concentration of 629 ppb in T-SED 3.

The samples with carcinogenic PAH detections included KMLT samples G-SED 1, G-SED 2, G-SED 4, and ConocoPhillips samples T-SED 3 and T-SED 5. The detected concentrations range from 7.16 ppb (benzo(b)fluoranthene) in G-SED-2 DUP to a maximum chrysene concentration of 268 ppb in T-SED 3.

The three Chevron samples, KMLT sample G-SED 5 and ConocoPhillips samples T-SED 1 and T-SED 4 did not contain any detectable PAH compounds.

6.6.3 SVOCs

Nine river sediment samples were submitted for a complete SVOC analysis. These samples are listed in Table 4. The SVOC results are summarized in Table 21. Of the 65 SVOC target

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analytes, ten were detected and were PAHs. The PAHs detected include: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. The detected concentrations range from 7.16 ppb (benzo(b)fluoranthene) in G-SED-2 to a maximum fluoranthene concentration of 629 ppb in T-SED 3.

The three Chevron samples, KMLT sample G-SED 5 and ConocoPhillips sample T-SED 1 did not contain any detectable SVOC compounds.

6.6.4 Pesticides

Seven river sediment samples and two duplicates were analyzed for pesticides during December of 1998. The sediment samples are listed in Table 4. The results of the pesticide analyses are presented in Table 22. As shown in the tables, no pesticide compounds were detected with the exception of 4,4N - DDD (10.6 ppb) in sample G-SED 3.

6.6.5 Metals

Selected sediment samples were analyzed for total metals. The metals analyte list for the sediment samples included arsenic, barium, cadmium, copper, chromium, lead, mercury, selenium, silver, and zinc. The results from the total metals analyses are summarized in Table 23.

Total arsenic concentrations in the sediment samples ranged from 1,220 ppb (C-SED 2) to 6,530 ppb (T-SED 5).

The detected total barium concentrations ranged from 58,900 ppb (T-SED 5) to 180,000 ppb (C-SED 1).

Total cadmium concentrations ranged from 651 ppb (C-SED 2) to 5,790 ppb (T-SED 5).

The detected total chromium (unspeciated) concentrations detected in the sediment samples ranged from 13,300 ppb (T-SED 5) to 39,600 ppb (C-SED 1).

The detected total copper result was 11,300 ppb (C-SED 2) to 47,900 ppb (T-SED 3).

Total lead concentrations ranged from 10,000 ppb (C-SED 2) to 49,300 ppb (G-SED 2).

Total mercury, selenium and silver were not detected in any of the sediment samples collected.

Total zinc concentrations ranged from 17,300 ppb (T-SED 3) to 73,700 ppb (C-SED 1).

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6.7 Surface Water Investigation Results

A total of 13 surface water locations were sampled during the RI field activities. These samples were collected during December of 1998. The surface water samples were collected from points approximately 50 feet off shore from the ordinary high water mark (OHWL) or at 100 feet from the OHWL in the vicinity of the Saltzman Creek and Doane Avenue 60-inch Storm Sewer outfall. The surface water samples were co-located with sediment samples (Section 5.4, above). The surface water samples and the analytical methods used on the samples are identified in Table 4. Tables 24 to 26 and Figure 32 summarize the analytical results from the December 1998 sampling of these surface water sites. The analytical results are discussed below.

6.7.1 BTEX

Table 24 summarizes the BTEX results from the surface water samples collected during the RI investigation. These results indicate that the BTEX compounds are not present in any of the surface water samples collected.

6.7.2 PAH

Table 25 summarizes the PAH results from the surface water samples. These results indicate that the non-carcinogenic PAHs were not detected in any of the surface water samples collected. Naphthalene was the only carcinogenic PAH detected in the surface water samples collected. The naphthalene concentration in KMLT sample G-SW 4 was 0.243 ppb.

6.7.3 Metals

Selected surface water locations were sampled and analyzed for total and dissolved metals. The metals analyte list for the surface water samples included arsenic, barium, cadmium, copper, chromium, lead, mercury, selenium, silver, and zinc. The results from the total metals analyses are summarized in Table 26a. Dissolved metals results are in Table 26b.

As expected from river water samples, the total metals results are generally much higher than the dissolved results. Total and dissolved arsenic, cadmium, mercury, selenium and silver were not detected at the laboratory detection limit in any of the surface water samples collected.

The maximum total or dissolved barium result was 23.7 ppb at Chevron sample location C-SW 3.

The maximum total chromium (unspeciated) result was 2.40 ppb (total) in Chevron C-SW 3. The remaining total chromium concentrations are less than 2 ppb. Dissolved chromium was not detected in any of the surface water samples.

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The maximum total or dissolved copper result in the surface water samples collected was 3.90 ppb in KMLT G-SW 3.

Total lead concentrations ranged from not detected to 6.80 ppb (G-SW 3). Dissolved lead ranged from not detected to 3.10 ppb in Chevron C-SW 3.

The maximum total or dissolved zinc result in surface water at the facility was 42.6 ppb in ConocoPhillips sample location T-SW 5.

6.8 SEEP SAMPLING RESULTS

A total of three seep water samples (Seep 1, Seep 2 and Seep 27) were collected from two seep locations on the KMLT terminal (Seep 1 and Seep 2) and one near the ConocoPhillips/Chevron property line (Seep 27). Seep 1 was collected under the KMLT dock. Seep 2 was collected to the north of the KMLT dock in the beach area. These samples were collected during April of 2003. The seep sample from the ConocoPhillips/Chevron property line was collected near the location of the former 27-inch storm sewer outfall. This sample was collected on July 3, 2003. The analytical results are discussed below and are presented in Tables 34 through 38. Figure 32 shows the locations of these seep samples.

6.8.1 BTEX

These results indicate that the BTEX compounds are not present in any of the seep water samples collected from the two seeps on the KMLT property. The seep sample collected from near the ConocoPhillips/Chevron property line contained toluene at a concentration of 0.751 ppb and total xylenes at a concentration of 1.69 ppb.

6.8.2 PAH

The results indicate that there are no PAH compounds in the groundwater collected from the two seeps on the KMLT property. Two PAHs were detected in the seep sample collected near the ConocoPhillips/Chevron property boundary. Acenaphthene was detected at a concentration of 1.07 ppb and fluorene was detected at a concentration of 3.31 ppb.

6.8.3 METALS

The seep water samples were analyzed for total and dissolved mercury and zinc. Total mercury was detected at a concentration of 0.000683 ppm in one sample on the KMLT property. This sample was collected from the seep nearest the dock. Total and dissolved zinc was detected in both samples from the KMLT property. The detected concentrations ranged from 0.00803 ppm (dissolved zinc in Sample Seep-2) to 2.71 ppm (total zinc in Sample Seep 1). No mercury or zinc was detected in the sample from the ConocoPhillips property.

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6.8.4 TPH

All three samples were analyzed for TPH identification using Northwest Method NWTPH-HCID. TPH as diesel was detected in samples Seep-1 and Seep 27. In addition, TPH as oil was detected in sample Seep 1. These samples were further analyzed for TPH as diesel and oil using Northwest Method TPH-Dx with a silica gel cleanup procedure and without the silica gel cleanup procedure. Concentrations of TPH as diesel and oil were not detected by the analytical method when the silica gel cleanup procedure was used for sample Seep 1. However, TPH as diesel was detected in sample Seep 27 using the silica gel cleanup method at a concentration of 1.42 ppm. Silica gel cleanup is a laboratory procedure that removes non-petroleum compounds (organic material) from the sample material prior to the TPH extraction.

Sample Seep 27 was also analyzed for TPH as gasoline. A concentration of 326 ppb was detected in this sample.

6.9 Soil Investigation Results

Surface soils and subsurface soils were sampled during the RI field activities. Surface soils were identified with an SS in the sample ID (i.e., T-SS 1). Subsurface samples were identified with an HP (hydropunch), an HS (hot spot hydropunch), a RF (river front hydropunch), or a UB (utility boring) in the sample ID. A total of 54 surface soil samples were collected and analyzed. One hundred and ten subsurface soil samples were collected from the HP, RF, and UB sample locations. An additional 16 subsurface soil samples were collected from surrogate 'hot spot' locations on the KMLT and ConocoPhillips terminals (eight samples from four borings at each facility). These samples and the analytical methods used are summarized in Table 4. Note that the hot spot samples were only analyzed for BTEX and PAHs.

Tables 27 to 32 summarize the analytical results from the sampling of these sites. Surface soil sample locations and results are shown on Figures 33, 34, and 35. Vadose zone sample results are shown on Figures 36, 37, and 38. Capillary fringe results are shown on Figures 39, 40, and 41, and saturated zone results are shown on Figures 42, 43, and 44. The UB sample locations and results are shown on Figure 45. A utilities map with selected cross-sections is shown on Figure 45. The analytical results from the SS, HP, RF and UB samples are discussed below. The HS sample results are discussed separately in Section 5.10.

6.9.1 BTEX

Tables 27a, 27b, and 27c summarize the BTEX results from the soil samples collected during the RI field activities.

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These results indicate that the BTEX compounds were detected in seven of the 60 SS samples (Table 27a). The detected BTEX concentrations ranged from 77.9 ppb of toluene in sample G-SS 6 to 6,210 ppb of xylene in sample G-SS 22.

For the subsurface soils, thirteen BTEX detections were recorded in the 93 HP and RF samples and two detections were recorded in the 28 UB samples (Table 27b). The detected BTEX concentrations ranged from 54.5 ppb of ethylbenzene in sample G-HP 2 to 13,900 ppb of xylene in sample T-HP 3.

6.9.2 PAH

Tables 28a, 28b, and 28c summarize the BTEX results from the soil samples collected during the RI field activities.

Table 28a summarizes the PAH results from the 38 surface soil samples. These results indicate that low levels of PAHs are present in many areas of the site. These results indicate that the non-carcinogenic PAHs acenaphthene, acenaphthylene, anthracene, benzo (g,h,i) perylene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene were detected in one or more of the surface soil samples. The carcinogenic PAHs benzo (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene, chrysene, dibenzo(a,h)anthracene, and indeno (1,2,3,c,d) pyrene were also detected in one or more of the samples.

The samples with non-carcinogenic PAH detections were Chevron samples C-SS-3, C-SS-5, C-SS-6, C-SS-8, C-SS-9, C-SS-11, and C-SS-14, KMLT samples G-SS-2, G-SS-3, G-SS-4, G-SS-6, G-SS-8, G-SS-11, G-SS-13, G-SS-15, G-SS-17, and G-SS-20, ConocoPhillips samples T-SS-3, T-SS-3 DUP, T-SS-9, and T-SS-12. The detected concentrations range from 6,810 ppb (indeno (1,2,3-c,d) pyrene in C-SS-11 to a maximum phenanthrene concentration of 80,800 ppb in G-SS-6.

The samples with carcinogenic PAH detections included Chevron samples C-SS-3, C-SS-5, C-SS-8, C-SS-9, and C-SS-11, KMLT samples G-SS-2, G-SS-3, G-SS-4, G-SS-6, G-SS-8, G-SS-11, G-SS-13, G-SS-15, G-SS-18, and G-SS-20, ConocoPhillips samples T-SS-3, T-SS-3 DUP, T-SS-9, and T-SS-12. The detected concentrations range from 6,740 ppb (fluoranthene) in C-SS-8 to a maximum chrysene concentration of 25,000 ppb in G-SS-6.

For the subsurface soils, PAH detections were recorded in the 73 HP and RF samples and in the 29 UB samples (Table 28b). The detected non-carcinogenic PAH concentrations ranged from 6,760 (fluoranthene) in UB-8 to 14,200 ppb of phenanthrene in sample C-RF-1, and the detected carcinogenic PAH concentrations ranged from 6,700 ppb (benzo(a)anthracene) in UB-8 to 523 ppb of chrysene in sample G-RF-1.

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6.9.3 SVOCs

Twenty-three surface samples were submitted for a complete SVOC analysis. These samples are listed in Table 4. The SVOC results are summarized in Table 29a. Only one non-PAH SVOC (dibenzofuran) was detected in the samples. This analyte was present in sample C-SS 4 at a concentration of 40 ppb.

Twenty-two HP and RF subsurface soil samples and 10 UB samples were submitted for a complete SVOC analysis. These samples are listed in Table 4. The SVOC results are summarized in Table 29b. Only one non-PAH SVOC (bis[2-ethylhexyl]phthalate or BEHP) was detected in the samples. This analyte was present in samples G-HP-12, G-HP-13, UB-1, UB-2, UB-6, UB-7, UB-7 DUP, UB-8, and UB-8 DUP. All of these samples were collected from the bottom of Geoprobe borings within the utility trenches located on site. The BEHP concentrations ranged from 3,850 to 5,970 ppb.

6.9.4 VOCs

Twenty-three surface samples were submitted for a complete VOC analysis. These samples are listed in Table 4 and the VOC results are summarized in Table 30a. Of the twenty-three samples, two samples (C-SS-12 and G-SS-22) contained detectable VOC compounds. Sample C-SS-12 contained n-butylbenzene, sec-butylbenzene, ethylbenzene, isopropylbenzene, p-isopropyltoluene, naphthalene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and m,p-xylene. The detected concentrations range from 152 ppb (sec-butylbenzene) to a maximum 1,2,4-trimethylbenzene concentration of 5,280 ppb. Sample G-SS-22 contained n-butylbenzene, sec-butylbenzene, tert-butylbenzene, ethylbenzene, isopropylbenzene, p-isopropyltoluene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, o-xylene, and m,p-xylene. The detected concentrations range from 125 ppb (tert-butylbenzene) to a maximum p-isopropylbenzene concentration of 1,280 ppb.

Twenty-two HP and RF samples and 10 UB samples were submitted for a complete VOC analysis. These samples are listed in Table 4. The VOC results are summarized in Table 30b. Two samples (C-RF-1 and UB-4) contained detectable VOC compounds. Sample C-RF-1 contained n-butylbenzene, sec-butylbenzene, and n-propylbenzene. The detected concentrations range from 1,360 ppb (tert-butylbenzene) to a maximum n-butylbenzene concentration of 2,290 ppb. Sample UB-4 contained n-butylbenzene, sec-butylbenzene, isopropylbenzene, and n-propylbenzene. The detected concentrations range from 497 ppb (isopropylbenzene) to a maximum n-propylbenzene concentration of 2,430 ppb.

6.9.5 METALS

Fifteen selected surface soil samples, fourteen subsurface HP and RF samples, and ten UB samples were collected and analyzed for total metals. The metals analyte list for these samples

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included arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc. The results from the total metals analyses are summarized in Tables 31a and 31b.

Total arsenic concentrations over the site ranged from 1,360 ppb to 10,500 ppb in surface soils (Table 31a). There is no clear distinction in arsenic concentration between the Chevron, KMLT, and ConocoPhillips sites. Similar arsenic results are seen in the HP, RF, and UB samples, where the range of arsenic is from 1,200 ppb to 288,000 ppb (Table 31b). Arsenic is, however, known to occur naturally at elevated concentrations in the region.

The maximum total barium result at the facility was 249,000 ppb at KMLT surface sample location G-SS 21 (Table 31a). Barium was detected in all the surface and subsurface samples.

Total cadmium concentrations over the site ranged from not detected to 8,760 ppb (Table 31b). Five surface samples and fifteen subsurface samples had concentrations below the laboratory MRLs.

The maximum total chromium (unspeciated) result at the facility was 30,800 ppb (total) at KMLT subsurface soil sample location G-RF-4-(15) D at 15 feet below grade. Most of the remaining chromium concentrations are in the 10,000 to 20,000 ppb range (Tables 31a and b).

Total copper concentrations over the site ranged from 7,690 ppb to 134,000 ppb in surface soils (Table 31a). The subsurface samples had concentrations ranging from 4,260 ppb to 28,600 ppb (Table 31b).

The total lead concentrations ranged from 15,100 ppb to 142,000 ppb for the surface samples (Table 31a) and 2,720 ppb to 34,900 ppb for the subsurface samples (Table 31b).

Total mercury was only detected in three of fifteen surface samples (Table 31a) and two of twenty-four subsurface samples (Table 31b). The maximum mercury concentration detected was 253 ppb in sample T-SS 11.

Total selenium was detected in six of the fifteen surface samples (Table 31a) and one of the twenty-four subsurface samples (Table 31b). The maximum selenium concentration detected was 892 ppb in sample C-SS 8.

Total silver was not detected in the fifteen surface samples (Table 31a) or the twenty-four subsurface samples (Table 31b).

Total zinc concentrations in the samples ranged from 46,200 ppb to 387,000 ppb for the surface samples (Table 31a) and 39,900 ppb to 74,300 ppb for the subsurface samples (Table 31b).

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Given that arsenic is the only metal present in concentrations that exceeded the PRG, it would normally be the only one retained as a site soil COC. However, due to arsenic occurring naturally at elevated concentrations in the region, consideration should be given to removing it from the list of site soil COCs.

6.9.6 Pesticides

Seven surface soil samples, thirteen subsurface HP samples and eight utility boring samples were analyzed for pesticides during the RI field activities. The samples are listed in Table 4. The results of the pesticide analyses are presented in Table 32a (surface samples) and 32b (subsurface samples, including utility borings).

As shown in Table 32a, two surface samples (G-SS-2 and G-SS-18) contained detectable concentrations of the 22 pesticide analytes (4,4-DDD, 4,4-DDE, and 4,4-DDT). The maximum concentration detected was 2,090 ppb of 4,4'-DDT.

Only utility boring UB-4 at 12 feet below contained detectable pesticide compounds (Table 32b). The detected compound (4,4'-DDD) was present at a concentration of 57.7 ppb.

6.10 Ethanol Study

PNG Environmental and Chevron Research and Technology Company completed a study of the March 1999 release of 19,000 gallons of ethanol. The research project included the installation of "nested" wells to evaluate three different horizons in the groundwater table and the monitoring of existing wells over and 18-month period. These wells provide adequate delineation of the ethanol plume. The following text was copied from the Chevron Research paper: "Within six months after the release, ethanol was detected 250 feet (76 m) downgradient (CR-16), but shortly afterward the plume appeared to attenuate. Ethanol concentrations have significantly declined in two monitoring wells directly downgradient of the ethanol release (CR-12 and CR-13). December 2000 ethanol concentrations increased in these two wells, compared to earlier trends, suggesting some residual ethanol remains in the vadose zone.

The presence of ethanol has affected pre-existing petroleum hydrocarbon in both the NAPL and the dissolved phases. However, ethanol concentrations at UST release sites (10% ethanol in ethanol-gasoline mixtures) are not likely to have the same impact on a hydrocarbon plume. NAPL thickness in one near-source monitoring well (CR-19) has exceeded 2 feet (0.6 m) and is sustained during water table fluctuations. March 1999 data (pre-release) from the downgradient well, CR-7, coupled with increasing benzene concentrations in that well, suggest a possible cosolvent effect resulting from the presence of ethanol.

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The presence of ethanol has created a strongly anaerobic groundwater system, demonstrated by low or nondetectable DO, depleted sulfate and nitrate, and elevated methane concentrations. Declining ethanol concentrations in near-source monitoring wells, the lack of ethanol downgradient, and acetate detections in downgradient wells provide evidence for ethanol biodegradation" (Chevron Research, 2001).

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9.0 HOT SPOT DETERMINATION

This section was prepared to present an evaluation of potential hot spots at the site. The media evaluated were soil, sediment, groundwater, surface water, and SPH. This evaluation was completed following the DEQ guidance document titled "*Guidance For Identification of Hot Spots*", dated April 1998.

As part of the RI/FS process in Oregon, it is required to determine whether or not areas of the site meet the criteria of the hot spot definition. Assessment of potential hot spots is necessary because Oregon Revised Statute 465.315 requires the DEQ Director to select or approve a remedial action requiring treatment of hot spots to the extent treatment is feasible.

9.1 GROUNDWATER AND SURFACE WATER

This section presents the evaluation of hot spots in groundwater and surface water. OAR 340-122-115(31) (a) defines hot spots in groundwater and surface water as follows:

"For groundwater or surface water, hazardous substances having a significant adverse effect on beneficial uses of water or waters to which hazardous substances would be reasonable likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined by a feasibility study."

As described in Section 7.0, industrial water supply and groundwater recharge to the Willamette River were identified as current and reasonably likely future beneficial uses of groundwater in the locality of the site. The surface water in the Willamette River currently supports aquatic habitat and recreation, and is also used as a source of industrial water supply.

Heavy industrial use, specifically ongoing use as a bulk fuel terminal, was identified as the current and reasonably likely future land use for the site. The DEQ's *Guidance for Conducting Beneficial Water Use Determinations at Environmental Cleanup Sites* identifies non-contact water and water used as a solvent or as a raw material, including use in food and beverage processing, as potential industrial uses of water. The result of the land use determination indicates that industrial uses associated with food and beverage processing are not reasonably likely, and identifies non-contact uses as the current and reasonably likely future industrial uses of water. In consideration of the future uses of the site as a bulk petroleum terminal, the non-contact industrial uses of water are more specifically those non-contact uses associated with operation of bulk petroleum terminals.

Shallow groundwater at the site discharges into the Willamette River. Groundwater is currently being extracted from a deeper aquifer for use in the production of asphalt at the adjacent Chevron Asphalt facility. In consideration that there is currently no impairment to the beneficial use of this existing deeper industrial groundwater supply, and shallow site

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groundwater discharges to the river, no impairment of the identified industrial beneficial uses of groundwater associated with bulk petroleum terminals is expected in the future.

The current and reasonably likely future beneficial uses associated with surface water in the Willamette River are aquatic habitat, recreation, and industrial water supply. In addition, a beneficial use of site groundwater is recharge into the Willamette River. In consideration of groundwater discharge from the site into the Willamette River and the identified beneficial uses of surface water, the potential for significant adverse effects of these beneficial uses must be evaluated to assess if there are potential hot spots in groundwater and surface water.

The ecological risk assessment results support that there are currently no significant adverse effects to the beneficial surface water uses identified for the Willamette River. In consideration that the potential for ecological effects is relatively low, it is concluded there are no significant adverse effects to surface water for the identified non-contact industrial uses associated with operation of bulk petroleum terminals.

With regard to the potential for significant adverse effects to the beneficial uses of surface water in the future, the ecological risk assessment results indicate that groundwater samples from borings along the Willamette River contain concentrations of petroleum-related contaminants that may cause an unacceptable ecological risk in the event this contamination migrates to the river. DEQ guidance indicates that if any significant adverse effects are likely to exist in the future, it will be necessary to determine in a feasibility study if treatment is reasonably likely to restore or protect these beneficial uses within a reasonable period of time.

The results of the evaluation of hot spots in groundwater and surface water indicate there are no current significant adverse effects on the beneficial uses of water at the site, however, groundwater discharging to the Willamette River may represent a future hot spot. Whether treatment is reasonably likely to restore or protect beneficial uses within a reasonable period of time will be evaluated in the feasibility study.

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9.2 HOT SPOTS IN MEDIA OTHER THAN WATER

This section presents the evaluation of hot spots in soil, sediment, and as SPH. OAR 340-122-115(31) (b) defines hot spots in media other than water as follows:

"For media other than groundwater or surface water (e.g., contaminated soil, debris, sediments, and sludges; drummed waste; 'pools' of dense, non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level, the extent to which the hazardous substances:

(A) Are present in concentrations exceeding risk-based concentrations corresponding to:
(i) 100 times the acceptable risk level for human exposure to each individual carcinogen;
(ii) 10 times the acceptable risk level for human exposure to each individual non-carcinogen;
(iii) 10 times the acceptable risk level for individual ecological receptors or populations of ecological receptors to each individual hazardous substances;

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) {References OAR 340-122-115(31)(a)} or paragraphs (b)(A) or(b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study."

Assessing a site for hot spots in media other than water first requires an evaluation of the site's baseline risk. If the baseline risk at the site exceeds the acceptable risk level, it is necessary to determine if any areas of contamination at the site are hot spots resulting from contamination that is "highly concentrated", "highly mobile", or "not reliably containable".

The following sections discuss site conditions for evaluation of "highly concentrated" and "highly mobile" hot spots. The determination of whether contamination is "reliably containable" will be presented in a feasibility study.

Hart Crowser conducted a human health risk assessment (HHRA) to evaluate the potential adverse human health effects attributable to site-related contaminants at the Willbridge Facility in the absence of remedial actions (see Section 8.1). The objective of the HHRA was to determine the potential risks associated with reasonable maximum exposure and central tendency exposure conditions at the site. Only limited human health risks were identified.

The following sections evaluate the potential for hot spots in SPH, soil, or sediment present at the site.

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9.2.1 SEPARATE PHASE HYDROCARBONS

Separate phase hydrocarbons have been measured historically in 38 monitoring wells across the Willbridge Terminals. However, currently SPH is observed consistently in only 23 wells. These SPH-containing monitoring wells are located at the KMLT (MW-7, MW -19, MW -22, MW-24, and MW -28), ConocoPhillips (B-4, B-22A, B-27, B-38, EX-39A, B-40 B-41, U-4, and U-5), and Chevron (B-7, B-24, CR-6, CR-7, CR-10, CR-15, CR-19, CR-21A, and CR-25) facilities. The SPH are being removed from these monitoring wells by monthly bailing and use of absorbent socks along with pumping from extraction wells along the 60-inch storm sewer.

As discussed in the DEQ guidance, these locations are considered to be hot spots based on the "highly concentrated" and "highly mobile" characteristics of SPH.

9.2.2 SOILS

The baseline risk assessment identified a total excess lifetime cancer risk associated with the reasonable maximum estimate for an onsite outdoor worker for constituents in surface soil that exceeded DEQ's acceptable risk level of 1 x 10-6. These risk exceedances were related mainly to exposure to arsenic and benzo(a)pyrene. Review of the HHRA indicates that the risks values calculated for arsenic and benzo(a)pyrene do not exceed 100 times the acceptable risk level for human exposure to each individual carcinogen. (i.e., calculated risk < 1 x 10-4)

The arsenic and benzo(a)pyrene detected in surface soil were not present at concentrations indicative of "highly mobile" hot spots that would result in impairment to the identified beneficial uses of surface water in the Willamette River.

9.2.3 SEDIMENT

As previously discussed, it was concluded in the Ecological Risk Assessment (ERA) that evaluation of sediment data from the Willamette River indicates the potential for significant adverse ecological effects from site-related contamination is minimal. The HHRA did not identify sediments as having an unacceptable human health risk. The lack of human health and ecological risk associated with sediments indicates there are no hot spots in sediment at the Willbridge facility. It should be noted that a more complete ERA and HHRA will be conducted for the in-water zone as part of the on-going CERCLA activities for the Portland Harbor site.

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10.0 CONCLUSIONS

The Willbridge Terminals remedial investigation was conducted to comply with the requirements of Consent Order WMCSR-NWR-94-06. Moreover, the work was performed in accordance with OAR 340-122-080.

The remedial investigation activities identified petroleum hydrocarbon concentrations in surface soil, subsurface soil, groundwater, and sediments. Furthermore, SPH has been observed in several of the wells over the history of the site. However, SPH is currently consistently observed in 20 to 23 wells at the facility, depending on hydrologic conditions.

The remedial investigation also determined that the groundwater flow direction is generally towards the cove of the Willamette River where the docks for the terminals are located. There are three significant preferential groundwater migration pathways at the site, the Holbrook Slough, fill material at the former 27-inch storm sewer, and the backfill at the 60-inch storm sewer. None of these preferential pathways extend the boundaries of the locality of the facility. The locality of the facility is the boundary along the shoreline of the Willamette River for the purposes of this Upland RI. The extent of the locality of the facility into the Willamette River is undefined awaiting the completion of the CERCLA in-water investigation. Consistent with other upland cleanup sites along the Portland Harbor; in-water issues will be evaluated during future CERCLA activities associated with the Portland Harbor Superfund Site. For the purposes of this report and consistent with other sites on inland waterways, the mean (or ordinary) high water mark is being used to delineate upland and in-water portions of the Site. The combination of the RI/FS Report focusing on upland issues, a separate source control evaluation focusing on the riverfront, and the CERCLA activities focusing on in-water issues provides an effective structure to address the various aspects of environmental work at the Willbridge Terminals. The *Preliminary Source Control Evaluation* was prepared by KHM and submitted to DEQ on April 24, 2003.

Potential and hazards to site workers, trench workers, and landscape workers were evaluated at the KMLT OU. No unacceptable risks are predicted for landscape workers at the KMLT OU. The site worker theoretical risk estimate is driven by benzo(a)pyrene and arsenic. The arsenic risk estimates were calculated using the maximum detected surface soil concentration (10.5 mg/kg) and the average arsenic concentration in surface soil (5.8 mg/kg) at the KMLT OU. The average arsenic concentration is less than the State of Washington arsenic background level (7 mg/kg). The noncarcinogenic hazard estimates for the trench worker (HI = 2) are driven by VOC detections in MW-11, which was sampled in December 1998. The primary COPC (1,2,4-trimethylbenzene [HI =1]) was not detected in any other KMLT OU groundwater sample.

Potential and hazards to site workers, trench workers, and landscape workers were evaluated at the Chevron OU. Cumulative risk and hazard estimates for the three exposure scenarios were

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acceptable. Site worker carcinogenic theoretical risk estimates for arsenic and benzene are greater than 1×10^{-6} based on exposure to surface soil, while trench worker risk estimates for benzene and benzo(a)pyrene are greater than 1×10^{-6} based on exposure to groundwater during trenching activities. Theoretical carcinogenic risk estimates for both the site worker and trench worker are driven by high concentrations of benzene detected in groundwater at the Chevron Ethanol Area. No unacceptable risks are predicted for landscape workers at the Chevron OU.

The maximum detected arsenic concentration in surface soil (5.75 mg/kg) at the Chevron OU is less than the State of Washington arsenic background level (7 mg/kg). Carcinogenic risk estimates for site workers are acceptable at the Non-Chevron Ethanol area if arsenic is excluded from the risk calculations. Additionally, the individual carcinogenic risk estimate for site workers from benzene at the Chevron Ethanol Area (theoretical risk = 6×10^{-6}) is greater than the DEQ acceptable level for individual COPCs. Cumulative carcinogenic risks to trench workers are theoretically acceptable over the entire site and at the Non-Chevron Ethanol Area. The carcinogenic risk estimates from dermal contact with benzo(a)pyrene in groundwater are theoretically unacceptable at both subareas; however the Non-Chevron Ethanol benzo(a)pyrene groundwater EPC is the maximum detected concentration and likely overestimates risks to trench workers.

Potential and hazards to site workers and trench workers were evaluated at the ConocoPhillips OU. Cancer risk estimates and noncancer hazard indices are acceptable for the site and trench workers at the ConocoPhillips OU.

Cancer risk estimates and noncancer hazard indices are acceptable for the utility workers in the Utility Corridor. No unacceptable risks or hazards were identified to potential off-site workers. In addition, outdoor air risks and hazards were acceptable at each OU.

A Level I and Level II ERA was completed at the Willbridge Terminal to evaluate potential risk upland (terrestrial) ecological receptors. There was only one OU that was found to contain any potential exposure pathways to terrestrial ecological receptors and a Level II Screening ERA was conducted to evaluate potential ecological risks from exposure to appropriate upland areas identified in the KMLT OU. Assessment and measurement endpoints were selected and presented for the KMLT OU and a Level II Screening ERA was completed on the KMLT soils data. None of the PAHs that were detected in soil were found at concentrations exceeding the corresponding ecological SLV for any of the endpoints identified. The only CPECs that were identified were based on a lack of a SLV for that particular COI in soils. All detected concentrations of PAHs were several orders of magnitude less than the most conservative available SLV for PAHs in soils. Therefore, it is concluded, that the low level detections of PAHs in the soils at the KMLT OU that is available for terrestrial wildlife exposure does not present an unacceptable risk to these receptors. No additional ecological risk assessment activities are warranted for the upland portion of this facility based on exposures to terrestrial wildlife receptors.

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The arsenic and benzo(a)pyrene detected in surface soil were not present at concentrations indicative of "highly mobile" hot spots that would result in impairment to the identified beneficial uses of surface water in the Willamette River. The hot spot assessment concluded that petroleum hydrocarbons in the subsurface do not adversely affect the current or likely future beneficial used of surface water and groundwater. The hot spot assessment did identify the presence of SPH as a preliminary hot spot. Hot spots will be further evaluated during the FS process. Regular manual bailing and pumping of product continues to-date and the results from this SPH removal is reported with the semi-annual monitoring reports.

The RI objectives, as presented in the RI work plan, have been completed. The nature and extent of contaminants of interest have been adequately characterized to allow for the completion of the RI process for the site, and initiation of the FS phase. Based on these final RI results, the FS is anticipated to focus on SPH; benzo(a)pyrene and arsenic (KMLT OU); and benzene, arsenic, and benzo(a)pyrene (Chevron OU). The combination of the RI/FS, CERCLA activities, and source control measures provides a complete framework to address the various aspects of environmental work at the Willbridge Terminals.

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TABLE 3
SITE RELEASE HISTORY
ConocoPhillips Terminal
Portland, Oregon

	Date	Location	Estimated Volume	Product	Comment
1	01/21/79	Filter check valve	8,500	Leaded regular gasoline	Contained in separator system; 100 gal may have entered sanitary sewer
2	04/28/81	Tank 4254	100	Asphalt	Tank leak
3	09/10/81	Tank 2669	310	RR-40	Tank overfill
4	06/22/82	Underground flush tank	127	RRA-40	UST overfill
5	07/19/82	NA	800	NA	Product line cracked during annual pressure test
6	07/19/82	Union Oil Dock	1,000	Diesel	Line "Blow Out"
7	01/25/83	Tank 3761	20	Diesel	Tank leak
9	05/01/85	NA	15	NA	Tank overfill
10	05/30/85	Tank 4388	370	ATF	Tank overflow
11	06/11/85	Pipeline beneath Front Ave.	3,000	Fuel oil	Leak at broken flange gasket; 10 inch pipeline from Tank 3579
12	07/29/85	Tank car loading area	20	Oil	Flowed into sump drain
13	08/09/85	Tank 1289	40	Additive S-13	Tank overfill
14	03/14/86	Tank F-11	10	Additive	NA
15	03/14/86	Tank 4318	42	Asphalt (AR-400W)	Leaked from metering system
16	08/19/86	Heating vessel	200	Oil (450 Neutral)	Rupture of heating vessel
17	09/20/86	Electric steam pumps	84	Fuel Oil	Leaked from pump
18	01/26/87	Circulation pump	70	Additive R-12F	Leaked from pump
19	01/28/87	Dock	10	NA	Product spilled while disconnecting fuel hose from vessel
20	04/15/88	Loading rack	1,300	Diesel	Fully contained
21	NA/8/89	Tank 36	50	Fuel Oil	Drain overflowed
22	05/18/89	Fueling island	40	Diesel #2	Driver overfilled fueling tank (contained)
23	07/18/89	Tank car	300	Acryloid	Contained
24	11/24/89	Steam pump	210	Fuel oil	Spilled onto ground
25	12/17/89	Tank car	10	RR40	Steam coil leaked (contained)
26	04/26/90	Loading rack	72	Unleaded	Equipment malfunction (contained)
27	07/04/90	Dock	1	NA	Leaking gasket on abandoned asphalt line on dock
28	08/23/90	Lube loading rack	10	Gear Lube	Overflowed truck (contained)
29	09/13/90	Loading rack	10	Leaded regular	Spring Valve failed (contained)
30	05/06/91	Loading rack	50	Unleaded	Float failed (contained)
31	09/04/92	Flush tank	50	Flush oil	Overflowed (separator contained)
32	03/08/93	Ramar 20/40	2,900	Lube oil	Overflowed (separator contained)
33	11/02/95	Tank Farm	5,000	Block Oil	Malfunctioned pump
34	02/22/97	Tank 3411	11,700	Gasoline	Overfilled Tank 3411
35	12/19/97		2,500	Lube Oil	Equipment Failureat barrell filler, next to warehouse
37	06/15/00	Tank 2982, Tank Farm 2	6,540	Kerosene	Equipment malfunction (sampling valve vibrated open)
39	12/21/00	Tank 2669	55	Marine DieselOil	Pinhole in Tank
		Total	**45,516**		

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TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
CHEVRON									
Groundwater Samples									
B-7	10/22/1997	W	X	X			X		
B-7	11/24/1998	W					X		
B-9	10/22/1997	W	X	X			X	X	
B-9	12/11/1998	W			X	X	X	X	
B-9-D	10/22/1997	W	X	X			X	X	
B-10	10/21/1997	W	X	X			X		
B-10	11/24/1998	W					X		
B-11	10/21/1997	W	X	X			X		
B-11	11/23/1998	W			X	X	X		
B-14	10/22/1997	W	X	X			X	X	
B-14	11/25/1998	W			X	X	X	X	
B-14-D	10/22/1997	W	X	X	X	X	X	X	
B-15	10/22/1997	W	X	X			X		
B-24	10/23/1997	W	X	X			X	X	
B-24	11/23/1998	W			X	X			
B-26	10/21/1997	W	X	X			X		
B-28	10/23/1997	W	X	X			X		
B-28	11/24/1998	W			X		X		
B-29	10/22/1997	W	X	X			X		
B-30	10/23/1997	W	X	X			X	X	
B-30	11/24/1998	W			X	X	X	X	
B-31	10/23/1997	W	X	X			X		
B-32	10/22/1997	W	X	X			X		
CR-8	11/24/1998	W					X		
CR-9	10/23/1997	W	X	X			X		
CR-9	11/25/1998	W					X	X	
CR-11	10/23/1997	W	X	X			X		
EX-1	11/25/1998	W			X	X	X	X	

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TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
CHEVRON									
Surface Soil Samples									
CHEV-SS-1		S	X	X	X	X			
CHEV-SS-2		S	X	X					
CHEV-SS-3		S	X	X					
CHEV-SS-4		S	X	X	X	X	X		
CHEV-SS-5		S	X	X					
CHEV-SS-6		S	X	X					
CHEV-SS-7		S	X	X	X	X			
CHEV-SS-8		S	X	X			X		
CHEV-SS-9		S	X	X			X		
CHEV-SS-10		S	X	X	X	X			
CHEV-SS-11		S	X	X					
CHEV-SS-12		S	X	X	X	X			
CHEV-SS-13		S	X	X	X	X			
CHEV-SS-14		S	X	X			X		
CHEV-SS-15		S	X	X	X	X			
CHEV-SS-16		S	X	X	X	X			
Hydropunch Soil and Groundwater Samples									
CHEV-HP-1(4)		S	X	X					
CHEV-HP-1(12)		S	X	X					
CHEV-HP-1(20)		S	X	X					
CHEV-HP-1(W)		W	X	X					
CHEV-HP-2(4)		S	X	X					
CHEV-HP-2(12)		S	X	X					
CHEV-HP-2(W)		W	X	X					
CHEV-HP-3(8)		S	X	X					
CHEV-HP-3(11)		S	X	X					
CHEV-HP-3(W)		W	X	X					
River Front Hydropunch Soil and Groundwater samples									
CHEV-RF-1(4)		S	X	X					
CHEV-RF-1(10)		S	X	X					
CHEV-RF-1(16)		S	X	X	X	X	X		
CHEV-RF-1(W)		W	X		X	X	X	X	
CHEV-RF-2(8)		S	X	X					
CHEV-RF-2(W)		W	X		X	X			
CHEV-RF-3(4)		S	X	X					
CHEV-RF-3(8)		S	X	X					
CHEV-RF-3(12)		S	X	X	X	X			
CHEV-RF-3(W)		W	X		X	X			

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

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CHEVRON									
River Sediment Samples									
CHEV-SED-1		S	X	X	X		X		
CHEV-SED-2		S	X	X			X		X
CHEV-SED-3		S	X	X	X		X		X
Surface Water Samples									
CHEV-SW-1		W	X	X			X	X	
CHEV-SW-1		W	X	X					
CHEV-SW-1		W	X	X			X	X	
GATX									
Groundwater Samples									
MW-1	10/28/1997	W	X	X			X		X
MW-3	10/28/1997	W	X	X			X		X
MW-4	10/28/1997	W	X	X			X		X
MW-4	12/9/1998	W			X	X	X		
MW-6	10/28/1997	W	X	X			X		X
MW-8	10/30/1997	W	X	X			X		X
MW-8	12/10/1998	W			X	X	X		
MW-9	10/27/1997	W	X	X			X		
MW-10	10/27/1997	W	X	X			X	X	X
MW-10	12/9/1998	W					X	X	
MW-10-D	10/27/1997	W	X	X			X	X	X
MW-11	12/9/1998	W			X	X	X		
MW-12	10/28/1997	W	X	X			X		X
MW-13	10/27/1997	W	X	X			X	X	X
MW-13	12/9/1998	W			X	X	X	X	
MW-13-D	10/27/1997	W	X	X			X	X	X
MW-15	10/30/1997	W	X	X			X	X	X
MW-15	12/10/1998	W					X		
MW-17	10/30/1997	W	X	X			X		X
MW-18	10/30/1997	W	X	X			X		X
MW-20	10/28/1997	W	X	X			X	X	X
MW-21	10/29/1997	W	X	X			X	X	X
MW-21	11/4/1997	W	X	X					
MW-22	10/29/1997	W	X	X			X		X
MW-22	12/9/1998	W					X		
MW-23	12/9/1998	W					X		
MW-26	12/8/1998	W					X		
MW-27	10/29/1997	W	X	X			X		X
MW-29	10/29/1997	W	X	X			X		X

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
GATX									
MW-30	10/29/1997	W	X	X			X		X
MW-30	12/8/1998	W			X	X	X		
MW-31	10/29/1997	W	X	X			X		X
MW-31	12/8/1998	W					X		
MW-32	10/29/1997	W	X	X			X	X	X
MW-32	12/8/1998	W			X	X	X		
MW-33	10/31/1997	W	X	X			X	X	X
MW-33	12/11/1998	W	X	X	X	X	X	X	
MW-34	10/31/1997	W	X	X			X		X
MW-36	10/31/1997	W	X	X			X		X
MW-36	12/10/1998	W			X	X	X		
MW-37	10/31/1997	W	X	X			X	X	X
MW-37	12/10/1998	W			X	X	X	X	
MW-40	12/10/1998	W			X	X	X		
Surface Soil Samples									
GATX-SS-1		S	X	X	X	X			
GATX-SS-2		S	X	X			X		X
GATX-SS-3		S	X	X					X
GATX-SS-4		S	X	X					
GATX-SS-5		S	X	X			X		
GATX-SS-6		S	X	X					X
GATX-SS-7		S	X	X	X	X			X
GATX-SS-8		S	X	X			X		
GATX-SS-9		S	X	X					
GATX-SS-10		S	X	X					
GATX-SS-11		S	X	X					
GATX-SS-12		S	X	X			X		
GATX-SS-13		S	X	X					
GATX-SS-14		S	X	X					X
GATX-SS-15		S	X	X					
GATX-SS-16		S	X	X	X	X			
GATX-SS-17		S	X	X					
GATX-SS-18		S	X	X					X
GATX-SS-19		S	X	X					
GATX-SS-20		S	X	X					
GATX-SS-21		S	X	X	X	X	X		
GATX-SS-22		S	X	X	X	X			

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TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
GATX									
Hydropunch Soil and Groundwater Samples									
GATX-HP-1(8)		S	X	X					
GATX-HP-1(10)		S	X	X					
GATX-HP-1(14)		S	X	X	X	X	X		X
GATX-HP-1(W)		W	X	X	X	X	X	X	X
GATX-HP-2(4)		S	X	X					
GATX-HP-2(8)		S	X	X					
GATX-HP-2(10)		S	X	X	X	X			X
GATX-HP-2(20)		S	X	X	X	X			X
GATX-HP-2(W)		W	X	X	X	X			X
GATX-HP-3(8)		S	X	X					
GATX-HP-3(11)		S	X	X					
GATX-HP-3(14)		S	X	X	X	X	X		X
GATX-HP-3(W)		W	X	X	X	X	X	X	X
GATX-HP-4(8)		S	X	X					
GATX-HP-4(11)		S	X	X					
GATX-HP-4(22)		S	X	X	X	X			X
GATX-HP-4(W)		W	X	X	X	X			X
GATX-HP-5(7)		S	X	X					
GATX-HP-5(13)		S	X	X					
GATX-HP-5(22)		S	X	X	X	X			X
GATX-HP-5(W)		W	X	X	X	X			X
GATX-HP-6(4)		S	X	X					
GATX-HP-6(6)		S	X	X					
GATX-HP-6(12)		S	X	X	X	X			X
GATX-HP-6(W)		W	X	X	X	X			X
GATX-HP-7(6)		S	X	X					
GATX-HP-7(9)		S	X	X					
GATX-HP-7(18)		S	X	X	X	X			X
GATX-HP-7(W)		W	X	X	X	X			X
GATX-HP-8(6)		S	X	X					
GATX-HP-8(9)		S	X	X					
GATX-HP-8(14)		S	X	X					X
GATX-HP-8(W)		W	X	X					X
GATX-HP-9(8)		S	X	X			X		
GATX-HP-9(12)		S	X	X					
GATX-HP-9(24)		S	X	X					X
GATX-HP-9(W)		W	X	X					X

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
GATX									
GATX-HP-10(4)		S	X	X					
GATX-HP-10(10)		S	X	X					
GATX-HP-10(17)		S	X	X					X
GATX-HP-10(W)		W	X	X					X
GATX-HP-11(4)		S	X	X					
GATX-HP-11(8)		S	X	X					
GATX-HP-11(W)		W	X	X					
River Front Hydropunch Soil and Groundwater Samples									
GATX-RF-1(8)		S	X	X					
GATX-RF-1(W)		W	X	X	X	X			X
GATX-RF-2(1.5)		S	X	X					
GATX-RF-2(3.5)		S	X	X					
GATX-RF-2(11)		S	X	X	X	X	X		
GATX-RF-2(W)		W	X	X	X	X			X
GATX-RF-3(2)		S	X	X					
GATX-RF-3(9)		S	X	X					
GATX-RF-3(14)		S	X	X					
GATX-RF-3(W)		W	X	X			X	X	X
GATX-RF-4(2.5)		S	X	X					
GATX-RF-4(8.5)		S	X	X					
GATX-RF-4(15)		S	X	X	X	X	X		
GATX-RF-4(W)		W	X	X					X
Surrogate Hot Spot Samples									
GATX-HS-1(2.5)		S	X	X					
GATX-HS-1(5)		S	X	X					
GATX-HS-2(2)		S	X	X					
GATX-HS-2(4)		S	X	X					
GATX-HS-3(2)		S	X	X					
GATX-HS-3(4)		S	X	X					
GATX-HS-4(2)		S	X	X					
GATX-HS-4(4)		S	X	X					
GATX									
River Sediment Samples									
GATX-SED-1		S	X	X	X				X
GATX-SED-2		S	X	X	X		X		X
GATX-SED-3		S	X	X	X		X		X
GATX-SED-4		S	X	X			X		X
GATX-SED-5		S	X	X					X
Surface Water Samples									
GATX-SW-1		W	X	X			X	X	
GATX-SW-2		W	X	X					
GATX-SW-3		W	X	X			X	X	
GATX-SW-4		W	X	X					
GATX-SW-5		W	X	X			X	X	

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
TOSCO									
Monitoring Well Groundwater Samples									
B-2	10/27/1997	W	X	X			X	X	
B-6	10/27/1997	W	X	X			X	X	
B-6	11/18/1998	W			X	X	X		
B-16	10/27/1997	W	X	X			X		
B-17	10/24/1997	W	X	X			X	X	
B-17	11/4/1997	W	X	X					
B-18	10/24/1997	W	X	X			X		
B-18	11/19/1998	W					X		
B-22	11/19/1998	W			X	X	X		
B-25	11/19/1998	W			X	X	X		
B-35	10/24/1997	W	X	X			X		
B-35	11/20/1998	W					X		
B-36	10/24/1997	W	X	X			X		
B-36	11/18/1998	W			X	X	X		
B-37	10/24/1997	W	X	X			X	X	
B-37	11/19/1998	W					X		
B-37-D	10/24/1997	W	X	X			X	X	
B-40	10/24/1997	W	X	X			X		
B-41	10/24/1997	W	X	X			X		
P-1	11/20/1998	W			X	X	X		
RES-N	11/10/1997	W	X	X			X		
U-2	10/23/1997	W	X	X			X		
U-2	11/16/1998	W			X	X	X		
U-3	10/24/1997	W	X	X			X		
U-3	11/16/1998	W					X	X	
U-5	10/24/1997	W	X	X			X		
U-5	11/19/1998	W			X	X	X		
TOSCO									
Surface Soil Samples									
TOS-SS-1		S	X	X	X	X			
TOS-SS-2		S	X	X					
TOS-SS-3		S	X	X			X		
TOS-SS-4		S	X	X	X	X			
TOS-SS-5		S	X	X					
TOS-SS-6		S	X	X			X		
TOS-SS-7		S	X	X	X	X			
TOS-SS-8		S	X	X					
TOS-SS-9		S	X	X					
TOS-SS-10		S	X	X	X	X			
TOS-SS-11		S	X	X			X		
TOS-SS-12		S	X	X					
TOS-SS-13		S	X	X	X	X			
TOS-SS-14		S	X	X			X		
TOS-SS-15		S	X	X	X	X			
TOS-SS-16		S	X	X	X	X			

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
TOSCO									
Hydropunch Soil and Groundwater Samples									
TOS-HP-1(10)		S	X	X					
TOS-HP-1(20)		S	X	X					
TOS-HP-1(24)		S	X	X	X	X	X		
TOS-HP-1(W)		W	X	X	X	X	X	X	
TOS-HP-2(11)		S	X	X					
TOS-HP-2(20)		S	X	X					
TOS-HP-2(24)		S	X	X	X	X			
TOS-HP-2(W)		W	X	X	X	X			
TOS-HP-3(4)		S	X	X					
TOS-HP-3(20)		S	X	X					
TOS-HP-3(24)		S	X	X	X	X	X		
TOS-HP-3(W)		W	X	X	X	X	X	X	
TOS-HP-4(8)		S	X	X					
TOS-HP-4(20)		S	X	X					
TOS-HP-4(28)		S	X	X	X	X			
TOS-HP-4(W)		W	X	X	X	X			
TOS-HP-5(4)		S	X	X					
TOS-HP-5(10)		S	X	X					
TOS-HP-5(16)		S	X	X					
TOS-HP-5(W)		W	X	X					
TOS-HP-6(3.5)		S	X	X			X		
TOS-HP-6(12)		S	X	X					

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
TOSCO									
TOS-HP-6(28)		S	X	X					
TOS-HP-6(W)		W	X	X					
TOS-HP-7(4)		S	X	X					
TOS-HP-7(12)		S	X	X					
TOS-HP-7(16)		S	X	X					
TOS-HP-7(W)		W	X	X					
River Front Hydropunch Soil and Groundwater Samples									
TOS-RF-1(1.5)		S	X	X					
TOS-RF-1(8)		S	X	X					
TOS-RF-1(12)		S	X	X	X	X			
TOS-RF-1(W)		W	X	X	X	X			X
TOS-RF-2(8)		S	X	X					
TOS-RF-2(16)		S	X	X	X	X	X		
TOS-RF-2(W)		W	X	X	X	X	X	X	X
Surrogate Hot Spot Samples									
TOS-HS-1(8)		S	X	X					
TOS-HS-1(16)		S	X	X					
TOS-HS-2(8)		S	X	X					
TOS-HS-2(16)		S	X	X					
TOS-HS-3(12)		S	X	X					
TOS-HS-3(16)		S	X	X					
TOS-HS-4(12)		S	X	X					
TOS-HS-4(17)		S	X	X					
River Sediment Samples									
TOS-SED-1		S	X	X	X		X		
TOS-SED-2		S	X	X	X		X		
TOS-SED-3		S	X	X	X		X		
TOS-SED-4		S	X	X					
TOS-SED-5		S	X	X					
TOSCO									
Surface Water Samples									
TOS-SW-1		W	X	X			X	X	
TOS-SW-2		W	X	X					
TOS-SW-3		W	X	X			X	X	
TOS-SW-4		W	X	X					
TOS-SW-5		W	X	X			X	X	

TABLE 4
SAMPLE DESIGNATIONS AND ANALYSES
Willbridge Facility
Portland, Oregon

Sample Designation	Date Sampled	Sample Matrix	BTEX 8020A	PAH 8270M-SIM	SVOC 8270	VOC 8260	Total Metals [1] 6000/7000 Series	Dissolved Metals [1] 6000/7000 Series	Organo-Pesticides 8081A
OFF-SITE SAMPLING LOCATIONS									
Groundwater Samples									
A-1	11/3/1997	W	X	X			X		
A-5	11/3/1997	W	X	X			X		
W-6	11/3/1997	W	X	X			X		
W-10	11/3/1997	W	X	X			X		
W-15	11/3/1997	W	X	X			X		

Notes:
[1] Metal analysis on groundwater samples from October 1997 included: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Metal analysis for October 1998 samples will include: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc.
(X) = Vadose Zone, sample designation will include depth.
(Y) = Capillary Fringe Zone, same designation will include depth.
(Z) = Saturated Zone, sample designation will include depth.
(W) = Groundwater Sample

TABLE 19
SEDIMENT ANALYTICAL RESULTS - BTEX AND TOTAL ORGANIC CARBON
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS				
SAMPLE ID	T-SED 1	T-SED 2	T-SED 3	T-SED 4	T-SED 5
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SAMPLE DATE	12/17/1998	12/17/1998	12/17/1998	12/17/1998	12/18/1998
CONSTITUENT					
Benzene	0.0500 U	0.0500 U	0.120 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.120 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.120 U	0.0500 U	0.0500 U
Xylenes	0.0500 U	0.0500 U	0.120 U	0.0500 U	0.0500 U
Total Organic Carbon	**3780**	**758**	**15100**	**2360**	**554**

NOTES:
Benzene, toluene, ethylbenzene, and xylenes (BTEX) by USEPA Method 8020
Total Organic Carbon by EPA 9060 mod.
mg/kg = Milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
NA = Not analyzed
Bold Face Font = Analyte detected

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TABLE 20
SEDIMENT ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued		CONOCOPHILLIPS				
SAMPLE ID	G-SED 4	G-SED 5	T-SED 1	T-SED 2	T-SED 3	T-SED 4	T-SED 5
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	12/18/1998	12/18/1998	12/17/1998	12/17/1998	12/17/1998	12/17/1998	12/18/1998
CONSTITUENT							
Acenaphthene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Acenaphthylene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Anthracene	6.70 U	7.00 U	7.00 U	13.4 U	336 U	6.70 U	7.00 U
Benzo(a)anthracene	**7.60**	7.00 U	7.00 U	13.4 U	**189**	6.70 U	**9.72**
Benzo(a)pyrene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Benzo(b)fluoranthene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Benzo(ghi)perylene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Benzo(k)fluoranthene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Chrysene	**9.17**	7.00 U	7.00 U	13.4 U	**268**	6.70 U	**10.9**
Dibenzo(a,h)anthracene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Fluoranthene	**6.85**	7.00 U	7.00 U	**15.7**	**629**	6.70 U	**20.1**
Fluorene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Indeno(1,2,3-cd)pyrene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Naphthalene	6.70 U	7.00 U	7.00 U	13.4 U	168 U	6.70 U	7.00 U
Phenanthrene	6.70 U	7.00 U	7.00 U	13.4 U	**341**	6.70 U	7.00 U
Pyrene	**8.91**	7.00 U	7.00 U	**15.7**	**410**	6.70 U	**20.9**

NOTES:
Polynuclear Aromatic Compounds (PAHs) analyzed by USEPA Method 8270M-SIM
(µg/kg) = micrograms per kilogram
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

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TABLE 21
SEDIMENT ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	CHEVRON			KINDER MORGAN			CONOCOPHILLIPS		
SAMPLE ID	C-SED-1	C-SED-2	C-SED-3	G-SED-2	G-SED-2-DUP	G-SED-5	T-SED-1	T-SED-3	T-SED-5
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	12/17/98	12/17/98	12/17/98	12/18/98	12/18/98	12/18/98	12/17/98	12/17/98	12/18/98
CONSTITUENT									
Acenaphthene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Acenaphthylene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Anthracene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.336	0.00700 U
Benzo(a)anthracene	0.00700 U	0.00700 U	0.00700 U	**0.0135**	**0.00798**	0.00700 U	0.00700 U	**0.189**	**0.00972**
Benzo(a)pyrene	0.00700 U	0.00700 U	0.00700 U	**0.0129**	**0.00754**	0.00700 U	0.00700 U	0.168 U	0.00700 U
Benzo(b)fluoranthene	0.00700 U	0.00700 U	0.00700 U	**0.0116**	**0.00716**	0.00700 U	0.00700 U	0.168 U	0.00700 U
Benzo(ghi)perylene	0.00700 U	0.00700 U	0.00700 U	**0.0135**	**0.00765**	0.00700 U	0.00700 U	0.168 U	0.00700 U
Benzo(k)fluoranthene	0.00700 U	0.00700 U	0.00700 U	**0.00797**	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Benzoic acid	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Benzyl alcohol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Bromophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Butyl benzyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Chlorophenyl-3-methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Chloroaniline	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.80 U	2.00 U
Bis(2-chloroethoxy)methane	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Bis(2-chloroethyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Bis(2-chloroisopropyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2-Chloronaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2-Chlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Chlorophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Chrysene	0.00700 U	0.00700 U	0.00700 U	**0.0185**	**0.0105**	0.00700 U	0.00700 U	**0.268**	**0.0109**
Di-n-butyl phthalate	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Di-n-octyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Dibenzo(a,h) anthracene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Dibenzofuran	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
1,2-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
1,3-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
1,4-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U

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TABLE 21
SEDIMENT ANALYTICAL RESULTS - SVOCs
Willbridge Terminal
Portland, Oregon

	CHEVRON			KINDER MORGAN			CONOCOPHILLIPS		
SAMPLE ID	C-SED-1	C-SED-2	C-SED-3	G-SED-2	G-SED-2-DUP	G-SED-5	T-SED-1	T-SED-3	T-SED-5
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	12/17/98	12/17/98	12/17/98	12/18/98	12/18/98	12/18/98	12/17/98	12/17/98	12/18/98
CONSTITUENT									
3,3-Dichlorobenzidine	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
2,4-Dichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Diethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2,4-Dimethylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Dimethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4,6-Dinitro-2-methylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
2,4-Dinitrophenol	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.80 U	2.00 U
2,4-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2,6-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Bis(2-ethylhexyl)phthalate	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	4.80 U	2.00 U
Fluoranthene	0.00700 U	0.00700 U	0.00700 U	**0.0349**	**0.0216**	0.00700 U	0.00700 U	**0.629**	**0.0201**
Fluorene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Hexachlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Hexachlorobutadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Hexachlorocyclopentadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Hexachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Indeno(1,2,3-cd)pyrene	0.00700 U	0.00700 U	0.00700 U	**0.00984**	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
Isophorone	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2-Methylnaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Naphthalene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.168 U	0.00700 U
2-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
3-Nitroaniline	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
4-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Nitrobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2-Nitrophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
4-Nitrophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U

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TABLE 21
SEDIMENT ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	CHEVRON			KINDER MORGAN			CONOCOPHILLIPS		
SAMPLE ID	C-SED-1	C-SED-2	C-SED-3	G-SED-2	G-SED-2-DUP	G-SED-5	T-SED-1	T-SED-3	T-SED-5
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	12/17/98	12/17/98	12/17/98	12/18/98	12/18/98	12/18/98	12/17/98	12/17/98	12/18/98
CONSTITUENT									
N-Nitrosodi-n-propylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
N-Nitrosodiphenylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Pentachlorophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.40 U	1.00 U
Phenanthrene	0.00700 U	0.00700 U	0.00700 U	**0.0169**	**0.00955**	0.00700 U	0.00700 U	**0.341**	0.00700 U
Phenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
Pyrene	0.00700 U	0.00700 U	0.00700 U	**0.0307**	**0.0181**	0.00700 U	0.00700 U	**0.410**	**0.0209**
1,2,4-Trichlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2,4,5-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U
2,4,6-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	1.20 U	0.500 U

NOTES:
Semivolatile Organic Compounds (SVOCs) analyzed by USEPA Method 8270C
mg/kg = milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Faced Font = Analyte detected

COPPOR0006352

TABLE 23
SEDIMENT ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	CHEVRON			KINDER MORGAN				
SAMPLE ID	C-SED-1	C-SED-2	C-SED-3	G-SED-1	G-SED-1-DUP	G-SED-2	G-SED-2-DUP	G-SED-5
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SAMPLE DATE	12/17/1998	12/17/1998	12/17/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998
CONSTITUENT								
Arsenic	**1.25**	**1.22**	**2.42**	**2.82**	**2.51**	**2.68**	**2.90**	**2.52**
Barium	**180**	**100**	**139**	**70.2**	**89.4**	**88.0**	**86.9**	**137**
Cadmium	**1.21**	**0.651**	**1.07**	**4.47**	**3.88**	**5.45**	**5.07**	**5.05**
Chromium	**39.6**	**22.5**	**28.5**	**15.9**	**18.9**	**20.8**	**18.8**	**24.4**
Copper	**35.8**	**11.3**	**23.8**	**12.4**	**12.0**	**13.9**	**15.0**	**16.8**
Lead	**15.5**	**10.0**	**12.9**	**40.1**	**39.5**	**49.3**	**43.9**	**40.7**
Mercury	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Selenium	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Silver	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Zinc	**73.7**	**40.2**	**61.7**	**64.6**	**65.0**	**73.0**	**67.7**	**46.0**

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TABLE 23
SEDIMENT ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS		
SAMPLE ID	T-SED-1	T-SED-3	T-SED-5
UNITS	mg/kg	mg/kg	mg/kg
SAMPLE DATE	12/17/1998	12/17/1998	12/18/1998
CONSTITUENT			
Arsenic	**2.60**	**6.18**	**6.53**
Barium	**165**	**169**	**58.9**
Cadmium	**1.30**	**1.56**	**5.79**
Chromium	**32.4**	**30.7**	**13.3**
Copper	**35.1**	**47.9**	**19.3**
Lead	**13.7**	**42.0**	**35.5**
Mercury	0.0500 U	0.120 U	0.0500 U
Selenium	0.500 U	1.20 U	0.500 U
Silver	0.500 U	1.20 U	0.500 U
Zinc	**70.3**	**17.3**	**64.0**

NOTES:
Total Metals analyzed by USEPA 6000/7000 Series Methods
mg/kg = Milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0000354

TABLE 24
SURFACE WATER ANALYTICAL RESULTS - BTEX
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS					
SAMPLE ID	T-SW-1	T-SW-2	T-SW-3	T-SW-4	T-SW-5	T-SW-5-DUP
UNITS	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	12/22/1998	12/22/1998	12/22/1998	12/22/1998	12/22/1998	12/22/1998
CONSTITUENT						
Benzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Ethylbenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Toluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Xylenes	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

NOTES:
BTEX by EPA 8020 Method
(µg/l) = Micrograms per liter
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0000635

TABLE 25
SURFACE WATER ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CHEVRON			KINDER MORGAN			
SAMPLE ID	C-SW 1	C-SW 2	C-SW 3	G-SW 1	G-SW 2	G-SW 3	G-SW 3 DUP
UNITS	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	12/23/1998	12/23/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998
CONSTITUENT							
Acenaphthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Acenaphthylene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Anthracene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(a)anthracene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(a)pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(b)fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(ghi)perylene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(k)fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Chrysene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Dibenzo(a,h)anthracene	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Fluorene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Indeno(1,2,3-cd)pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Naphthalene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Phenanthrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U

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TABLE 25
SURFACE WATER ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued		CONOCOPHILLIPS					
SAMPLE ID	G-SW 4	G-SW 5	T-SW 1	T-SW 2	T-SW 3	T-SW 4	T-SW 5	T-SW 5 DUP
UNITS	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	12/18/1998	12/18/1998	12/22/1998	12/22/1998	12/22/1998	12/22/1998	12/22/1998	12/22/1998
CONSTITUENT								
Acenaphthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Acenaphthylene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Anthracene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(a)anthracene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(a)pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(b)fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(ghi)perylene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Benzo(k)fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Chrysene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Dibenzo(a,h)anthracene	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Fluoranthene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Fluorene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Indeno(1,2,3-cd)pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Naphthalene	**0.243**	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Phenanthrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Pyrene	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U

NOTES:
Polynuclear Aromatic Compounds (PAHs) analyzed by USEPA Method 8270M-SIM
(µg/l) = Micrograms per liter
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0000357

TABLE 26A
SURFACE WATER ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	CHEVRON		KINDER MORGAN				CONOCOPHILLIPS		
SAMPLE ID	C-SW-1	C-SW-3	G-SW-1	G-SW-3	G-SW-3 DUP	G-SW-5	T-SW-1	T-SW-3	T-SW-5
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SAMPLE DATE	12/23/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/22/1998	12/22/1998	12/22/1998
CONSTITUENT									
Arsenic	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Barium	**0.0128**	**0.0237**	**0.0126**	**0.0139**	**0.0134**	**0.0110**	**0.0139**	**0.00970**	**0.00950**
Cadmium	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Chromium	**0.00110**	**0.00240**	**0.00110**	**0.00100**	0.00100 U	0.00100 U	**0.00150**	0.00100 U	0.00100 U
Copper	**0.00240**	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	**0.00310**	0.00200 U	**0.00210**
Lead	0.00100 U	**0.00120**	**0.00150**	**0.00680**	**0.00230**	**0.00260**	**0.00200**	0.00100 U	**0.00150**
Mercury	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U
Selenium	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Silver	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Zinc	**0.0170**	**0.0330**	**0.0240**	**0.0220**	**0.0280**	0.0200 U	**0.0319**	**0.0266**	**0.0426**

NOTES:
Total Metals analyzed by USEPA 6000/7000 Series Methods
mg/l = Milligrams per liter
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006358

TABLE 26B
SURFACE WATER ANALYTICAL RESULTS - DISSOLVED METALS
Willbridge Terminal
Portland, Oregon

	CHEVRON		KINDER MORGAN				CONOCOPHILLIPS		
SAMPLE ID	C-SW-1	C-SW-3	G-SW-1	G-SW-3	G-SW-3 DUP	G-SW-5	T-SW-1	T-SW-3	T-SW-5
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SAMPLE DATE	12/23/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/18/1998	12/22/1998	12/22/1998	12/22/1998
CONSTITUENT									
Arsenic	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Barium	**0.00780**	**0.00770**	**0.00820**	**0.00960**	**0.00870**	**0.00760**	**0.00870**	**0.00710**	**0.00740**
Cadmium	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Chromium	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Copper	**0.00350**	0.0100 U	**0.00300**	**0.00390**	0.00200 U	**0.00340**	0.00200 U	0.00200 U	0.00200 U
Lead	0.00100 U	**0.00310**	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Mercury	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U
Selenium	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Silver	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Zinc	0.00500 U	0.0200 U	**0.00850**	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U

NOTES:
Dissolved Metals analyzed by USEPA 6000/7000 Series Methods
mg/l = Milligrams per liter
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006359

TABLE 27A
SURFACE SOIL ANALYTICAL RESULTS - BTEX
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS								
SAMPLE ID	T-SS-1	T-SS-2	T-SS-3	T-SS-3 DUP	T-SS-4	T-SS-5	T-SS-6	T-SS-7	T-SS-8
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/05/98	11/05/98	11/05/98	11/05/98	11/06/98	11/06/98	11/05/98	11/05/98	11/05/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT									
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**0.237**	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**0.317**	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**1.32**	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**1.79**	0.0500 U	0.0500 U

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TABLE 27A
SURFACE SOIL ANALYTICAL RESULTS - BTEX
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS Continued								
SAMPLE ID	T-SS-9	T-SS-10	T-SS-11	T-SS-12	T-SS-13	T-SS-13 DUP	T-SS-14	T-SS-15	T-SS-16
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/05/98	11/05/98	11/06/98	11/06/98	11/05/98	11/05/98	11/06/98	11/05/98	11/05/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT									
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	**0.0724**	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U

NOTES:
Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) analyzed by USEPA Method 8020
mg/kg = milligrams per kilogram
NA = Not Analyzed
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006361

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS								
SAMPLE ID	T-HP-1 (10)	T-HP-1 (20)	T-HP-1 (24)	T-HP-2 (11)	T-HP-2 (20)	T-HP-2 (24)	T-HP-3 (4)	T-HP-3 (20)	T-HP-3 (20)D
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/03/98	11/03/98	11/03/98	11/03/98	11/03/98	11/03/98	11/04/98	11/04/98	11/04/98
DEPTH (feet)	10	20	24	11	20	24	4	20	20
CONSTITUENT									
Benzene	0.0500 U	0.200 U	0.0500 U	0.0500 U	0.200 U	0.0500 U	0.0500 U	**1.16**	1.00 U
Ethylbenzene	0.0500 U	**1.49**	0.0500 U	0.0500 U	**0.691**	0.0500 U	0.0500 U	**6.62**	**4.34**
Toluene	0.0500 U	0.200 U	0.0500 U	0.0500 U	0.200 U	0.0500 U	0.0500 U	1.00 U	1.00 U
Xylene (total)	0.0500 U	**8.93**	0.0500 U	0.0500 U	**5.41**	0.0500 U	0.0500 U	**13.9**	**9.96**
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA

COPPOR0006362

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS Continued								
SAMPLE ID	T-HP-3 (24)	T-HP-4 (8)	T-HP-4 (20)	T-HP-4 (28)	T-HP-4 (28) D	T-HP-5 (4)	T-HP-5 (10)	T-HP-5 (16)	T-HP-6 (3.5)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/04/98	11/03/98	11/03/98	11/03/98	11/03/98	10/14/98	10/14/98	10/14/98	10/14/98
DEPTH (feet)	24	8	20	28	28	4	10	16	3.5
CONSTITUENT									
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA

COPPOR0006363

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS Continued							
SAMPLE ID	T-HP-6 (12)	T-HP-6 (28)	T-HP-7 (4)	T-HP-7 (12)	T-HP-7 (16)	T-RF-1 (1.5)	T-RF-1 (8)	T-RF-1 (12)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	10/12/98	10/12/98	10/12/98
DEPTH (feet)	12	28	4	12	16	1.5	8	12
CONSTITUENT								
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA

COPPOR0006364

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS Continued		UTILITY BORINGS					
SAMPLE ID	T-RF 2 (8)	T-RF 2 (16)	UB-1 (12)	UB-1 (16)	UB-2 (8)	UB-2 (16)	UB-2 (24)	UB-3 (4)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	10/13/98	10/13/98	03/31/99	03/31/99	03/31/99	03/31/99	03/31/99	03/31/99
DEPTH (feet)	8	16	12	16	8	16	24	4
CONSTITUENT								
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA

COPPOR0006365

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued								
SAMPLE ID	UB-3 (7)	UB-3 (11)	UB-4 (6)	UB-4 (9)	UB-4 (12)	UB-5 (5)	UB-5 (8)	UB-5 (12)	UB-6 (7)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	03/31/99	03/31/99	03/31/99	03/31/99	04/01/99	04/01/99	04/01/99	03/31/99
DEPTH (feet)	7	11	6	9	12	5	8	12	7
CONSTITUENT									
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**1.34**	0.0500 U	0.0500 U	**0.743**	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**1.27**	0.0500 U	0.0500 U	**0.201**	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**1.27**	0.0500 U	0.0500 U	**3.79**	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA

COPPOR0006366

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued					
SAMPLE ID	UB-6 (11)	UB-7 (7)	UB-7 (7)DUP	UB-7 (9)	UB-7 (9)DUP	UB-7 (16)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	7	7	9	9	16
CONSTITUENT						
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA

COPPOR0006367

TABLE 27B
SUBSURFACE SOIL ANALYTICAL RESULTS - BTEX/N AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS CONTINUED						
SAMPLE ID	UB-7 (16)DUP	UB-8 (8)	UB-8 (8)DUP	UB-8 (11)	UB-8 (11)DUP	UB-8 (16)	UB-8 (16)DUP
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	04/01/99	04/01/99	04/01/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	16	8	8	11	11	16	16
CONSTITUENT							
Benzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Ethylbenzene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Toluene	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Xylene (total)	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA

NOTES:

Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Naphthalene (N) analyzed by USEPA Method 8020

Gasoline range hydrocarbons analyzed by NW TPH-Gx Method

mg/kg = milligrams per kilogram

NA = Not Analyzed

J = Estimated Value

U = Analyte included in the analysis but not detected

Bold Face Font = Analyte detected

COPPOR0006368

TABLE 27C
HOT SPOT SOIL ANALYTICAL RESULTS - BTEX AND GASOLINE RANGE HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS									
SAMPLE ID	T-HS-1 (8)	T-HS-1 (16)	T-HS-1 (16) D	T-HS-2 (8)	T-HS-2 (16)	T-HS-3 (12)	T-HS-3 (16)	T-HS-3 (16) D	T-HS-4 (12)	T-HS-4 (17)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	10/27/98	10/27/98	10/27/98	10/27/98	10/27/98	10/27/98	10/27/98	10/27/98	11/05/98	11/05/98
DEPTH (feet)	8	16	16	8	16	12	16	16	12	17
CONSTITUENT										
Benzene	**0.0864**	**136**	**57.8**	**0.114**	**0.749**	**0.386**	**0.989**	**0.270**	0.100 U	2.00 U
Ethylbenzene	0.0500 U	**212**	**131**	**0.0742**	**0.181**	0.0500 U	0.200 U	0.0500 U	0.100 U	**13.1**
Toluene	**0.269**	**924**	**476**	**0.209**	**0.394**	**0.827**	**1.49**	**0.588**	0.100 U	2.00 U
Xylene (total)	**0.246**	**1220**	**780**	**0.378**	**1.11**	**0.592**	**1.78**	**0.415**	0.100 U	**94.5**
Naphthalene	0.0500 U	**69.2**	**45.3**	0.0500 U	**0.149**	0.0500 U	0.200 U	0.0500 U	0.100 U	**5.34**
Gasoline Range Hydrocarbons	2.00 U	**9240**	**7140**	**3.94**	**7.58**	**5.56**	**11.0**	**3.16**	4.00 U	**551**
Aviation Gas Range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Naphthalene (N) analyzed by USEPA Method 8020

Gasoline/Aviation range hydrocarbons analyzed by NW TPH-Gx Method

mg/kg = milligrams per kilogram

NA = Not Analyzed

J = Estimated Value

U = Analyte included in the analysis but not detected

Bold Face Font = Analyte detected

COPPOR00006369

TABLE 28A
SURFACE SOIL ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued			CONOCOPHILLIPS				
SAMPLE ID	G-SS-18	G-SS-19	G-SS-20	T-SS-2	T-SS-3	T-SS-3 DUP	T-SS-4	T-SS-5
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/03/98	11/03/98	11/03/98	11/05/98	11/05/98	11/05/98	11/06/98	11/06/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT								
Acenaphthene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Acenaphthylene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Anthracene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Benzo(a)anthracene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Benzo(a)pyrene	134 U	6.70 U	**8.62**	6.70 U	**37.4**	67.0 U	7.38 U	74.0 U
Benzo(b)fluoranthene	134 U	6.70 U	**7.68**	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Benzo(ghi)perylene	134 U	6.70 U	**9.63**	6.70 U	33.5 U	**122**	7.38 U	74.0 U
Benzo(k)fluoranthene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Chrysene	**220**	6.70 U	**7.11**	6.70 U	33.5 U	**83.3**	7.38 U	74.0 U
Dibenzo(a,h)anthracene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Fluoranthene	134 U	6.70 U	**8.15**	6.70 U	**49.3**	67.0 U	7.38 U	74.0 U
Fluorene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Indeno(1,2,3-cd)pyrene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	**86.9**	7.38 U	74.0 U
Naphthalene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Phenanthrene	134 U	6.70 U	6.70 U	6.70 U	33.5 U	67.0 U	7.38 U	74.0 U
Pyrene	134 U	6.70 U	**11.3**	6.70 U	**55.0**	67.0 U	7.38 U	74.0 U

COPPOR0006370

TABLE 28A
SURFACE SOIL ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS Continued						
SAMPLE ID	T-SS-6	T-SS-8	T-SS-9	T-SS-11	T-SS-12	T-SS-14	T-SS-14 (RR)
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/05/98	11/05/98	11/05/98	11/06/98	11/06/98	11/06/98	11/06/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT							
Acenaphthene	67.0 U	6.70 U	6.70 U	80.8 U	7.40 U	7.38 U	7.38 U
Acenaphthylene	67.0 U	6.70 U	6.70 U	80.8 U	7.40 U	7.38 U	7.38 U
Anthracene	67.0 U	6.70 U	6.70 U	80.8 U	7.40 U	7.38 U	7.38 U
Benzo(a)anthracene	67.0 U	6.70 U	**8.40**	80.8 U	**51.2**	7.38 U	7.38 U
Benzo(a)pyrene	67.0 U	6.70 U	**12.8**	80.8 U	**80.3**	7.38 U	7.38 U
Benzo(b)fluoranthene	67.0 U	6.70 U	**8.75**	80.8 U	**66.7**	7.38 U	7.38 U
Benzo(ghi)perylene	67.0 U	6.70 U	**14.6**	80.8 U	**58.9**	7.38 U	7.38 U
Benzo(k)fluoranthene	67.0 U	6.70 U	**7.81**	80.8 U	**37.9**	7.38 U	7.38 U
Chrysene	67.0 U	6.70 U	**9.57**	80.8 U	**57.8**	7.38 U	7.38 U
Dibenzo(a,h)anthracene	67.0 U	6.70 U	6.70 U	80.8 U	**12.6**	7.38 U	7.38 U
Fluoranthene	67.0 U	6.70 U	**12.3**	80.8 U	**68.1**	7.38 U	7.38 U
Fluorene	67.0 U	6.70 U	6.70 U	80.8 U	7.40 U	7.38 U	7.38 U
Indeno(1,2,3-cd)pyrene	67.0 U	6.70 U	**9.50**	80.8 U	**45.3**	7.38 U	7.38 U
Naphthalene	67.0 U	6.70 U	6.70 U	80.8 U	7.40 U	7.38 U	7.38 U
Phenanthrene	134 U	6.70 U	6.70 U	80.8 U	**11.0**	7.38 U	7.38 U
Pyrene	67.0 U	6.70 U	**18.3**	80.8 U	**121**	7.38 U	7.38 U

NOTES:

Polynuclear Aromatic Compounds (PAHs) analyzed by USEPA Method 8270M-SIM
(µg/kg) = micrograms per kilogram
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected
(RR) = Surrogate recovery out of control on initial run (T-SS-14). Sample was reextracted out of hold time.

COPPOR0006371

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	KINDER MORGAN							CONOCOPHILLIPS
SAMPLE ID	G-HP-6 (12)	G-HP-7 (18)	G-HP-12 (12)	G-HP-13 (18)	G-RF-2 (11)	G-RF-4 (15)	G-RF-4 (15)D	T-HP-1 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/02/98	11/04/98	04/01/99	03/31/99	10/29/98	10/29/98	10/29/98	11/03/98
DEPTH (feet)	12	18	12	18	11	15	15	24
CONSTITUENT								
Acenaphthene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Acenaphthylene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Anthracene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Benzo(a)anthracene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	**0.00776**
Benzo(a)pyrene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	**0.00734**
Benzo(b)fluoranthene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Benzo(ghi)perylene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Benzo(k)fluoranthene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Benzoic acid	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzyl alcohol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Bromophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Butyl benzyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl-3-methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chloroaniline	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Bis(2-chloroethoxy)methane	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroethyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroisopropyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chloronaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Chrysene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Di-n-butyl phthalate	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Di-n-octyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Dibenzo(a,h) anthracene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Dibenzofuran	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
1,2-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COPPOR0006372

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	KINDER MORGAN							CONOCOPHILLIPS
SAMPLE ID	G-HP-6 (12)	G-HP-7 (18)	G-HP-12 (12)	G-HP-13 (18)	G-RF-2 (11)	G-RF-4 (15)	G-RF-4 (15)D	T-HP-1 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/02/98	11/04/98	04/01/99	03/31/99	10/29/98	10/29/98	10/29/98	11/03/98
DEPTH (feet)	12	18	12	18	11	15	15	24
CONSTITUENT								
1,4-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3,3-Dichlorobenzidine	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Diethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4-Dimethylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dimethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4,6-Dinitro-2-methylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dinitrophenol	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
2,4-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,6-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-ethylhexyl)phthalate	2.00 U	2.00 U	**3.85**	**3.94**	2.00 U	2.00 U	2.00 U	0.500 U
Fluoranthene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	**0.00879**
Fluorene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Hexachlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hexachlorobutadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorocyclopentadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Indeno(1,2,3-cd)pyrene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Isophorone	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylnaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Naphthalene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
2-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
3-Nitroaniline	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

COPPOR0006373

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	KINDER MORGAN							CONOCOPHILLIPS
SAMPLE ID	G-HP-6 (12)	G-HP-7 (18)	G-HP-12 (12)	G-HP-13 (18)	G-RF-2 (11)	G-RF-4 (15)	G-RF-4 (15)D	T-HP-1 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/02/98	11/04/98	04/01/99	03/31/99	10/29/98	10/29/98	10/29/98	11/03/98
DEPTH (feet)	12	18	12	18	11	15	15	24
CONSTITUENT								
Nitrobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Nitrophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Nitrophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
N-Nitrosodi-n-propylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
N-Nitrosodiphenylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pentachlorophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phenanthrene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.00700 U
Phenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pyrene	0.00700 U	0.00700 U	0.500 U	0.500 U	0.00700 U	0.00700 U	0.00700 U	0.0130
1,2,4-Trichlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,5-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,6-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

COPPOR0006374

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	CONOCOPHILLIPS Continued						UTILITY BORINGS	
SAMPLE ID	T-HP-2 (24)	T-HP-3 (24)	T-HP-4 (28)	T-HP-4 (28) DUP	T-RF-1 (12)	T-RF-2 (16)	UB-1 (20)	UB-2 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/03/98	11/04/98	11/03/98	11/03/98	10/12/98	10/13/98	03/31/99	03/31/99
DEPTH (feet)	24	24	28	28	12	16	20	24
CONSTITUENT								
Acenaphthene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
Acenaphthylene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
Anthracene	0.00700 U	0.00700 U	0.00700 U	**0.0206**	0.500 U	0.00700 U	0.500 U	0.500 U
Benzo(a)anthracene	0.00700 U	0.00700 U	0.00700 U	**0.0369**	0.500 U	0.00700 U	0.500 U	0.500 U
Benzo(a)pyrene	0.00700 U	0.00700 U	0.00700 U	**0.0309**	0.500 U	0.00700 U	0.500 U	0.500 U
Benzo(b)fluoranthene	0.00700 U	0.00700 U	0.00700 U	**0.0436**	0.500 U	0.00700 U	0.500 U	0.500 U
Benzo(ghi)perylene	0.00700 U	0.00700 U	0.00700 U	**0.0143**	0.500 U	0.00700 U	0.500 U	0.500 U
Benzo(k)fluoranthene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
Benzoic acid	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzyl alcohol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Bromophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Butyl benzyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl-3-methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chloroaniline	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Bis(2-chloroethoxy)methane	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroethyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroisopropyl)ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chloronaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl phenyl ether	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Chrysene	0.00700 U	0.00700 U	0.00700 U	**0.0347**	0.500 U	0.00700 U	0.500 U	0.500 U
Di-n-butyl phthalate	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Di-n-octyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Dibenzo(a,h) anthracene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
Dibenzofuran	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
1,2-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COPPOR0006375

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	CONOCOPHILLIPS Continued						UTILITY BORINGS	
SAMPLE ID	T-HP-2 (24)	T-HP-3 (24)	T-HP-4 (28)	T-HP-4 (28) DUP	T-RF-1 (12)	T-RF-2 (16)	UB-1 (20)	UB-2 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/03/98	11/04/98	11/03/98	11/03/98	10/12/98	10/13/98	03/31/99	03/31/99
DEPTH (feet)	24	24	28	28	12	16	20	24
CONSTITUENT								
1,4-Dichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3,3-Dichlorobenzidine	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Diethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4-Dimethylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dimethyl phthalate	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4,6-Dinitro-2-methylphenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dinitrophenol	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
2,4-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,6-Dinitrotoluene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-ethylhexyl)phthalate	0.500 U	2.00 U	0.500 U	0.500 U	2.00 U	2.00 U	**3.90**	**3.99**
Fluoranthene	0.00700 U	0.00700 U	0.00700 U	**0.0633**	0.500 U	0.00700 U	0.500 U	0.500 U
Fluorene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
Hexachlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hexachlorobutadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorocyclopentadiene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Indeno(1,2,3-cd)pyrene	0.00700 U	0.00700 U	0.00700 U	**0.0119**	0.500 U	0.00700 U	0.500 U	0.500 U
Isophorone	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylnaphthalene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Methylphenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Naphthalene	0.00700 U	0.00700 U	0.00700 U	0.00700 U	0.500 U	0.00700 U	0.500 U	0.500 U
2-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
3-Nitroaniline	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Nitroaniline	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

COPPOR0006376

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	CONOCOPHILLIPS Continued						UTILITY BORINGS	
SAMPLE ID	T-HP-2 (24)	T-HP-3 (24)	T-HP-4 (28)	T-HP-4 (28) DUP	T-RF-1 (12)	T-RF-2 (16)	UB-1 (20)	UB-2 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	11/03/98	11/04/98	11/03/98	11/03/98	10/12/98	10/13/98	03/31/99	03/31/99
DEPTH (feet)	24	24	28	28	12	16	20	24
CONSTITUENT								
Nitrobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Nitrophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Nitrophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
N-Nitrosodi-n-propylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
N-Nitrosodiphenylamine	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pentachlorophenol	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phenanthrene	0.00700 U	0.00700 U	0.00700 U	**0.0533**	0.500 U	0.00700 U	0.500 U	0.500 U
Phenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pyrene	**0.0102**	0.00700 U	**0.0101**	**0.0859**	0.500 U	0.00700 U	0.500 U	0.500 U
1,2,4-Trichlorobenzene	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,5-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,6-Trichlorophenol	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

COPPOR0006377

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	UTILITY BORINGS Continued							
SAMPLE ID	UB-3 (11)	UB-4 (12)	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16)DUP	UB-8 (16)	UB-8 (16)DUP
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	03/31/99	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	12	12	11	16	16	16	16
CONSTITUENT								
Acenaphthene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Acenaphthylene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Anthracene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzo(a)anthracene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzo(a)pyrene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzo(b)fluoranthene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzo(ghi)perylene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzo(k)fluoranthene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Benzoic acid	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzyl alcohol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Bromophenyl phenyl ether	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Butyl benzyl phthalate	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl-3-methylphenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chloroaniline	20.0 U	200 U	20.0 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Bis(2-chloroethoxy)methane	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroethyl)ether	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-chloroisopropyl)ether	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chloronaphthalene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Chlorophenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Chlorophenyl phenyl ether	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Chrysene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Di-n-butyl phthalate	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Di-n-octyl phthalate	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Dibenzo(a,h) anthracene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Dibenzofuran	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
1,2-Dichlorobenzene	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

COPPOR0006378

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	UTILITY BORINGS Continued							
SAMPLE ID	UB-3 (11)	UB-4 (12)	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16)DUP	UB-8 (16)	UB-8 (16)DUP
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	03/31/99	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	12	12	11	16	16	16	16
CONSTITUENT								
1,4-Dichlorobenzene	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3,3-Dichlorobenzidine	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dichlorophenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Diethyl phthalate	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4-Dimethylphenol	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dimethyl phthalate	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4,6-Dinitro-2-methylphenol	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dinitrophenol	20.0 U	200 U	20.0 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
2,4-Dinitrotoluene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,6-Dinitrotoluene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Bis(2-ethylhexyl)phthalate	20.0 U	200 U	20.0 U	**5.43**	**5.97**	**5.35**	**5.84**	**4.71**
Fluoranthene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Fluorene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hexachlorobenzene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hexachlorobutadiene	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorocyclopentadiene	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachloroethane	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Indeno(1,2,3-cd)pyrene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Isophorone	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylnaphthalene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Methylphenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Methylphenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Naphthalene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Nitroaniline	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
3-Nitroaniline	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Nitroaniline	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

COPPOR0006379

TABLE 29B
SUBSURFACE SOIL ANALYTICAL RESULTS - SVOCs
WillbridgeTerminal
Portland, Oregon

	UTILITY BORINGS Continued							
SAMPLE ID	UB-3 (11)	UB-4 (12)	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16)DUP	UB-8 (16)	UB-8 (16)DUP
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	03/31/99	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	12	12	11	16	16	16	16
CONSTITUENT								
Nitrobenzene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2-Nitrophenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
4-Nitrophenol	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
N-Nitrosodi-n-propylamine	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
N-Nitrosodiphenylamine	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pentachlorophenol	10.0 U	100 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phenanthrene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Phenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Pyrene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
1,2,4-Trichlorobenzene	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,5-Trichlorophenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
2,4,6-Trichlorophenol	5.00 U	50.0 U	5.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U

NOTES:
Semivolatile Organic Compounds (SVOCs) analyzed by USEPA Method 8270C
mg/kg = milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Faced Font = Analyte detected

COPPOR0006380

TABLE 30A
SURFACE SOIL ANALYTICAL RESULTS - VOCs
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS							
SAMPLE ID	T-SS-1	T-SS-4	T-SS-7	T-SS-10	T-SS-13	T-SS-13 DUP	T-SS-15	T-SS-16
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/05/98	11/06/98	11/05/98	11/05/98	10/29/98	10/29/98	11/05/98	11/05/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT								
Acetone	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U
Benzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromochloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromodichloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromoform	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromomethane	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Butanone	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U
n-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
sec-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
tert-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Carbon tetrachloride	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Chlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chloroethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Chloroform	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chloromethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
2-Chlorotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dibromo-3-chloropropane	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Dibromochloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dibromoethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibromomethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

COPPOR0000638

TABLE 30A
SURFACE SOIL ANALYTICAL RESULTS - VOCs
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS							
SAMPLE ID	T-SS-1	T-SS-4	T-SS-7	T-SS-10	T-SS-13	T-SS-13 DUP	T-SS-15	T-SS-16
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/05/98	11/06/98	11/05/98	11/05/98	10/29/98	10/29/98	11/05/98	11/05/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT								
Dichlorodifluoromethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
1,1-Dichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1-Dichloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
cis-1,2-Dichloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
trans-1,2-Dichloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichloropropane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichloropropane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
2,2-Dichloropropane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1-Dichloropropene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
cis-1,3-Dichloropropene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
trans-1,3-Dichloropropene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Ethylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Hexachlorobutadiene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
2-Hexanone	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Isopropylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
p-Isopropyltoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Methyl-2-pentanone	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Methylene chloride	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Naphthalene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
n-Propylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Styrene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,1,2-Tetrachloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,2,2-Tetrachloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Tetrachloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Toluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

COPPOR0006382

TABLE 30A
SURFACE SOIL ANALYTICAL RESULTS - VOCs
Willbridge Terminal
Portland, Oregon

	CONOCOPHILLIPS							
SAMPLE ID	T-SS-1	T-SS-4	T-SS-7	T-SS-10	T-SS-13	T-SS-13 DUP	T-SS-15	T-SS-16
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/05/98	11/06/98	11/05/98	11/05/98	10/29/98	10/29/98	11/05/98	11/05/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT								
1,2,3-Trichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,1-Trichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,2-Trichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Trichloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Trichlorofluoromethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
1,2,3-Trichloropropane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trimethylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3,5-Trimethylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Vinyl chloride	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
o-Xylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
m,p-Xylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

NOTES:
Volatile Organic Compounds (VOCs) analyzed by USEPA Method 8260B
µg/kg = Microgram per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006383

TABLE 30B
SUBSURFACE SOIL ANALYTICAL RESULTS - VOCs
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued							CONOCOPHILLIPS
SAMPLE ID	G-HP-6 (12)	G-HP-7 (18)	G-HP-12 (12)	G-HP-13 (18)	G-RF-2 (11)	G-RF-4 (15)	G-RF-4 (15)D	T-HP-1 (24)
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/02/98	11/04/98	04/01/99	03/31/99	10/29/98	10/29/98	10/29/98	11/03/98
DEPTH (feet)	12	18	12	18	11	15	15	24
CONSTITUENT								
Acetone	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U
Benzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromochloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromodichloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromoform	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Bromomethane	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
2-Butanone	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U	2500 U
n-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
sec-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
tert-Butylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Carbon tetrachloride	200 U	200 U	100 U	100 U	200 U	200 U	200 U	200 U
Chlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chloroethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Chloroform	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Chloromethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
2-Chlorotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
4-Chlorotoluene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dibromo-3-chloropropane	200 U	200 U	100 U	100 U	200 U	200 U	200 U	200 U
Dibromochloromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dibromoethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dibromomethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,4-Dichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Dichlorodifluoromethane	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U

COPPOR0006384

TABLE 30B
SUBSURFACE SOIL ANALYTICAL RESULTS - VOCs
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued							
SAMPLE ID	UB-3 (11)	UB-4 (12)	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16) DUP	UB-8 (16)	UB-8 (16) DUP
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	03/31/99	03/31/99	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	12	12	11	16	16	16	16
CONSTITUENT								
1,2,4-Trichlorobenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,1-Trichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,1,2-Trichloroethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Trichloroethene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Trichlorofluoromethane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,3-Trichloropropane	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trimethylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,3,5-Trimethylbenzene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Vinyl chloride	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
o-Xylene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
m,p-Xylene	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U

NOTES:
Volatile Organic Compounds (VOCs) analyzed by USEPA Method 8260B
µg/kg = Microgram per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006385

TABLE 31A
SURFACE SOIL ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued		CONOCOPHILLIPS				
SAMPLE ID	G-SS-12	G-SS-21	T-SS-3	T-SS-3 DUP	T-SS-6	T-SS-11	T-SS-14
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	10/29/98	10/29/98	11/05/98	11/05/98	11/05/98	11/06/98	11/06/98
DEPTH (inches)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
CONSTITUENT							
Arsenic	**3.05**	**8.70**	**3.84**	**4.12**	**4.36**	**6.21**	**3.14**
Barium	**63.2**	**249**	**77.3**	**84.3**	**91.6**	**90.4**	**60.0**
Cadmium	**0.959**	**0.973**	0.500 U	0.500 U	**0.622**	**2.17**	0.500 U
Chromium	**11.0**	**16.7**	**13.3**	**14.3**	**18.7**	**13.7**	**12.8**
Copper	**19.7**	**22.7**	**12.5**	**46.4**	**49.9**	**80.8**	**29.8**
Lead	**16.6**	**19.5**	10.0 U	10.0 U	**23.0**	**29.1**	10.0 U
Mercury	0.0500 U	0.0500 U	**0.0719**	0.0500 U	0.0500 U	**0.253**	0.0500 U
Selenium	0.500 U	0.500 U	**0.609**	**0.658**	0.500 U	**0.663**	**0.661**
Silver	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Zinc	**387**	**76.7**	**46.2**	**105**	**104**	**212**	**56.2**

NOTES:
Total Metals analyzed by USEPA 6000/7000 Series Methods
mg/kg = Milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006386

TABLE 31B
SUBSURFACE SOIL ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued		CONOCOPHILLIPS				UTILITY BORINGS	
SAMPLE ID	G-HP-12 (12)	G-HP-13 (18)	T-HP-1 (24)	T-HP-3 (24)	T-HP-6 (3.5)	T-RF-2 (16)	UB-1 (20)	UB-2 (24)
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	04/01/99	03/31/99	11/03/98	11/04/98	10/14/98	10/13/98	03/31/99	03/31/99
DEPTH (feet)	12	18	24	24	3.5	16	20	24
CONSTITUENT								
Arsenic	**3.05**	**4.54**	**2.96**	**3.23**	**3.44**	**288**	**3.62**	**4.28**
Barium	**60.6**	**61.3**	**81.1**	**90.2**	**85.2**	**187**	**100**	**93.3**
Cadmium	0.500 U	0.500 U	0.500 U	0.500 U	**0.529**	**1.23**	0.500 U	0.500 U
Chromium	**19.3**	**19.8**	**12.9**	**14.8**	**12.0**	**29.8**	**16.6**	**14.1**
Copper	**11.6**	**11.3**	**11.1**	**11.9**	**10.5**	**24.3**	**15.1**	**12.8**
Lead	10.0 U	10.0 U	10.0 U	10.0 U	**13.3**	10.0 U	**3.05**	**2.72**
Mercury	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Selenium	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Silver	2.50 U	2.50 U	1.00 U	1.00 U	1.00 U	1.00 U	0.500 U	0.500 U
Zinc	**47.0**	**46.0**	**43.7**	**64.0**	**42.8**	**57.1**	**54.4**	**46.0**

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TABLE 31B
SUBSURFACE SOIL ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued							
SAMPLE ID	UB-3 (11)	UB-4 (12)	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16) DUP	UB-8 (16)	UB-8 (16)DUP
UNITS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SAMPLE DATE	03/31/99	03/31/99	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	11	12	12	11	16	16	16	16
CONSTITUENT								
Arsenic	**2.20**	**2.68**	**7.89**	**1.20**	**3.55**	**2.98**	**2.98**	**3.02**
Barium	**95.3**	**102**	**114**	**56.8**	**71.0**	**57.5**	**74.1**	**68.1**
Cadmium	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Chromium	**20.6**	**20.9**	**19.9**	**10.2**	**18.0**	**19.8**	**20.8**	**19.5**
Copper	**15.2**	**16.4**	**28.6**	**4.26**	**11.8**	**12.1**	**13.0**	**11.7**
Lead	10.0 U	10.0 U	**34.9**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Mercury	0.0500 U	**0.0612**	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Selenium	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Silver	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U	2.50 U
Zinc	**47.2**	**46.4**	**74.3**	**39.9**	**45.4**	**50.7**	**51.0**	**48.9**

NOTES:
Total Metals analyzed by USEPA 6000/7000 Series Methods
mg/kg = Milligrams per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

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TABLE 32B
SUBSURFACE SOIL ANALYTICAL RESULTS - PESTs
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued			UTILITY BORINGS	
SAMPLE ID	G-HP-10 (17)	G-HP-12 (12)	G-HP-13 (18)	UB-3 (11)	UB-4 (12)
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/04/98	04/01/99	03/31/99	03/31/99	03/31/99
DEPTH (feet)	17	12	18	11	12
CONSTITUENT					
Aldrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
alpha-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
beta-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
delta-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
gamma-BHC (Lindane)	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
alpha-Chlordane	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Chlordane (tech)	150 U	150 U	150 U	150 U	750 U
gamma-Chlordane	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
4,4'-DDD	6.25 U	6.70 U	6.70 U	6.70 U	57.7
4,4'-DDE	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
4,4'-DDT	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Dieldrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan I	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan II	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan Sulfate	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endrin aldehyde	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Heptachlor	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Heptachlor epoxide	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Methoxychlor	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Toxaphene	200 U	200 U	200 U	200 U	1000 U
Endrin ketone	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U

TABLE 32B
SUBSURFACE SOIL ANALYTICAL RESULTS - PESTs
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued					
SAMPLE ID	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16) DUP	UB-8 (16)	UB-8 (16) DUP
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	12	11	16	16	16	16
CONSTITUENT						
Aldrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
alpha-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
beta-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
delta-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
gamma-BHC (Lindane)	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
alpha-Chlordane	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Chlordane (tech)	300 U	150 U	150 U	150 U	150 U	150 U
gamma-Chlordane	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDD	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDE	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDT	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Dieldrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan I	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan II	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan Sulfate	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endrin aldehyde	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Heptachlor	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Heptachlor epoxide	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Methoxychlor	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Toxaphene	400 U	200 U	200 U	200 U	200 U	200 U
Endrin ketone	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U

NOTES:
Organochlorine Pesticides by EPA Method 8081
µg/kg = micrograms per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

TABLE 32B
SUBSURFACE SOIL ANALYTICAL RESULTS - PESTs
Willbridge Terminal
Portland, Oregon

	KINDER MORGAN Continued			UTILITY BORINGS	
SAMPLE ID	G-HP-10 (17)	G-HP-12 (12)	G-HP-13 (18)	UB-3 (11)	UB-4 (12)
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	11/04/98	04/01/99	03/31/99	03/31/99	03/31/99
DEPTH (feet)	17	12	18	11	12
CONSTITUENT					
Aldrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
alpha-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
beta-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
delta-BHC	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
gamma-BHC (Lindane)	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
alpha-Chlordane	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Chlordane (tech)	150 U	150 U	150 U	150 U	750 U
gamma-Chlordane	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
4,4'-DDD	6.25 U	6.70 U	6.70 U	6.70 U	**57.7**
4,4'-DDE	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
4,4'-DDT	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Dieldrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan I	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan II	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endosulfan Sulfate	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endrin	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Endrin aldehyde	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Heptachlor	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Heptachlor epoxide	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Methoxychlor	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U
Toxaphene	200 U	200 U	200 U	200 U	1000 U
Endrin ketone	6.25 U	6.70 U	6.70 U	6.70 U	33.5 U

TABLE 32B
SUBSURFACE SOIL ANALYTICAL RESULTS - PESTs
Willbridge Terminal
Portland, Oregon

	UTILITY BORINGS Continued					
SAMPLE ID	UB-5 (12)	UB-6 (11)	UB-7 (16)	UB-7 (16) DUP	UB-8 (16)	UB-8 (16) DUP
UNITS	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
SAMPLE DATE	04/01/99	03/31/99	04/01/99	04/01/99	04/01/99	04/01/99
DEPTH (feet)	12	11	16	16	16	16
CONSTITUENT						
Aldrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
alpha-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
beta-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
delta-BHC	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
gamma-BHC (Lindane)	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
alpha-Chlordane	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Chlordane (tech)	300 U	150 U	150 U	150 U	150 U	150 U
gamma-Chlordane	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDD	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDE	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
4,4'-DDT	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Dieldrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan I	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan II	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endosulfan Sulfate	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endrin	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Endrin aldehyde	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Heptachlor	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Heptachlor epoxide	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Methoxychlor	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U
Toxaphene	400 U	200 U	200 U	200 U	200 U	200 U
Endrin ketone	13.4 U	6.70 U	6.70 U	6.70 U	6.70 U	6.70 U

NOTES:
Organochlorine Pesticides by EPA Method 8081
µg/kg = micrograms per kilogram
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

TABLE 34
SEEP WATER ANALYTICAL RESULTS - TPH-HCID
Willbridge Terminal
Portland, Oregon

	Kinder Morgan				ConocoPhillips
SAMPLE ID	Seep-N	Seep-S	Seep-1	Seep-2	Seep-27
UNITS	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	09/14/01	09/14/01	04/17/03	04/17/03	07/02/03
CONSTITUENT					
TPH-HCID (G, D, O)	NA	NA	D, O	ND	NA
Gasoline Range	<80.0 U	<80.0 U	<250 U	<250 U	**326**
Diesel Range	<250 U	<250 U	<472 U	<472 U	**1,420**
Heavy Oil Range	<500 U	<500 U	<943 U	<943 U	<962 U

NOTES:
Gasoline Range Hydrocarbons analyzed by NW TPH-Gx Methodology
Diesel and Heavy Oil Range Hydrocarbons analyzed by NW TPH-Dx Methodology with silica gel cleanup
TPH-HCID = Total Petroleum Hydrocarbon - Hydrocarbon Identification
TPH-HCID analyzed by NW TPH Methodology
G, D, O = gasoline, diesel, heavy oil (indicates analyte was detected)
(µg/l) = micrograms per liter
ND = Not detected
NA = Not Analyzed
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006393

TABLE 35
SEEP WATER ANALYTICAL RESULTS - BTEX
Willbridge Terminal
Portland, Oregon

	Kinder Morgan		ConocoPhillips
SAMPLE ID	Seep-1	Seep-2	Seep-27
UNITS	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	04/17/03	04/17/03	07/02/03
CONSTITUENT			
Benzene	<0.500 U	<0.500 U	<0.500 U
Toluene	<0.500 U	<0.500 U	**0.751**
Ethylbenzene	<0.500 U	<0.500 U	<0.500 U
Xylenes	<1.00 U	<1.00 U	**1.69**

NOTES:
BTEX analyzed per EPA Method 8021B
(µg/l) = micrograms per liter
NA = Not Analyzed
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006394

TABLE 36
SEEP WATER ANALYTICAL RESULTS - TOTAL METALS
Willbridge Terminal
Portland, Oregon

	Kinder Morgan		ConocoPhillips
SAMPLE ID	Seep-1	Seep-2	Seep-27
UNITS	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	04/17/03	04/17/03	07/02/03
CONSTITUENT			
Mercury	**0.683**	<0.200 U	<1.60 U
Zinc	**2,710**	**14.3**	<5.00 U

NOTES:
Total Metals analyzed per EPA 6000/7000 Series Methods
(µg/l) = micrograms per liter
NA = Not Analyzed
J = Estimated Value
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

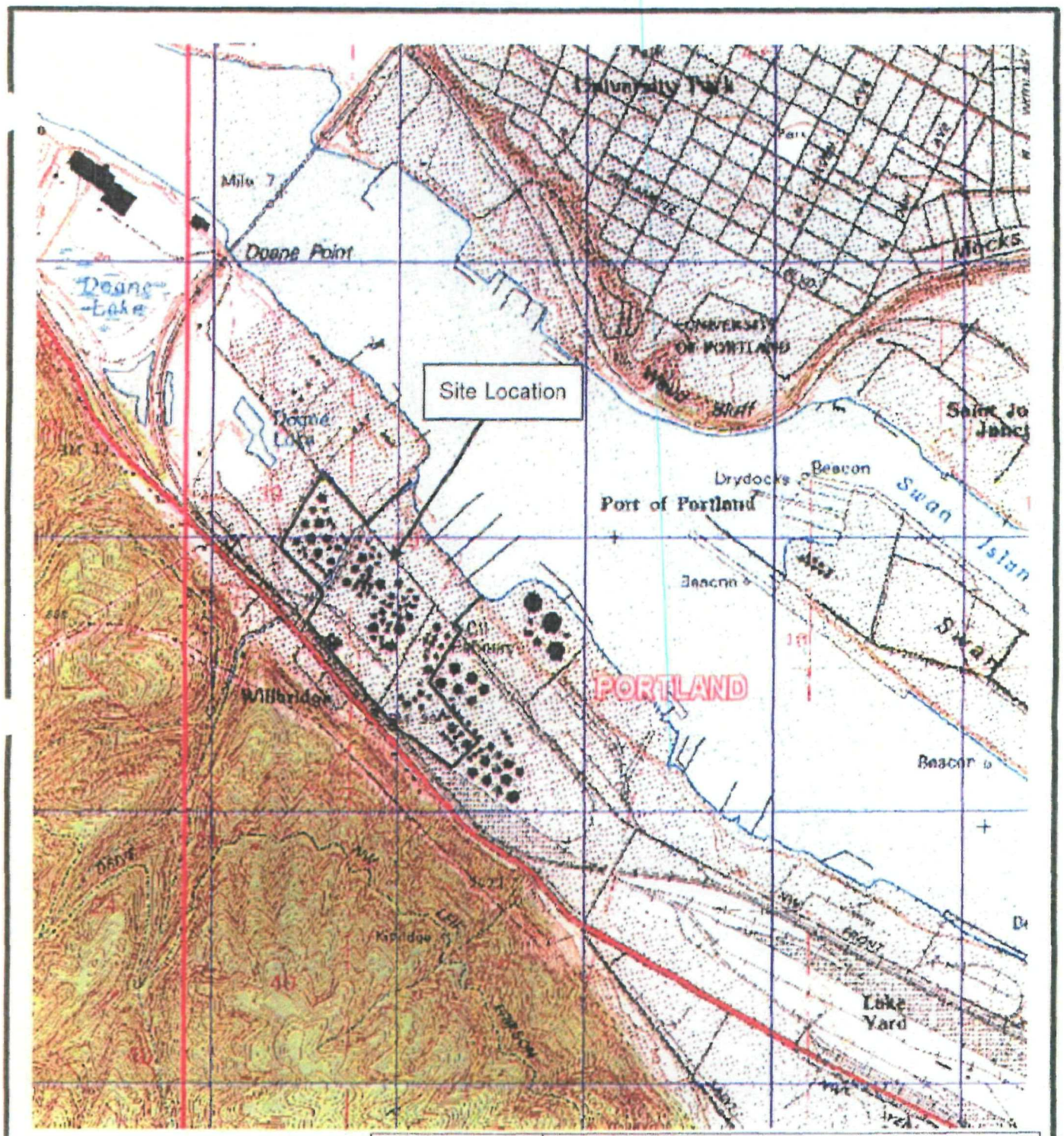
COPPOR0006395

TABLE 38
SEEP WATER ANALYTICAL RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS
Willbridge Terminal
Portland, Oregon

	Kinder Morgan		ConocoPhillips
SAMPLE ID	SEEP-1	SEEP-2	SEEP-27
UNITS	(µg/l)	(µg/l)	(µg/l)
SAMPLE DATE	04/17/03	04/17/03	07/02/03
CONSTITUENT			
Acenaphthene	<0.100 U	<0.100 U	**1.07**
Acenaphthylene	<0.100 U	<0.100 U	<1.00 U
Anthracene	<0.100 U	<0.100 U	<1.00 U
Benzo(a)anthracene	<0.100 U	<0.100 U	<0.200 U
Benzo(a)pyrene	<0.100 U	<0.100 U	<0.200 U
Benzo(b)fluoranthene	<0.100 U	<0.100 U	<0.200 U
Benzo(ghi)perylene	<0.100 U	<0.100 U	<0.200 U
Benzo(k)fluoranthene	<0.100 U	<0.100 U	<0.200 U
Chrysene	<0.100 U	<0.100 U	<0.200 U
Dibenzo(a,h)anthracene	<0.200 U	<0.200 U	<0.400 U
Fluoranthene	<0.100 U	<0.100 U	<1.00 U
Fluorene	<0.100 U	<0.100 U	**3.31**
Indeno(1,2,3-cd)pyrene	<0.100 U	<0.100 U	<0.200 U
Naphthalene	<0.100 U	<0.100 U	<2.00 U
Phenanthrene	<0.100 U	<0.100 U	<1.00 U
Pyrene	<0.100 U	<0.100 U	<0.200 U

NOTES:
Polynuclear Aromatic Compounds (PAHs) analyzed by USEPA Method 8270M-SIM
(µg/l) = Micrograms per liter
U = Analyte included in the analysis but not detected
Bold Face Font = Analyte detected

COPPOR0006396



REFERENCES

DeLorme 3-D Topo Quads

SCALE: 1 : 25,000

KHM

Environmental Management Inc.

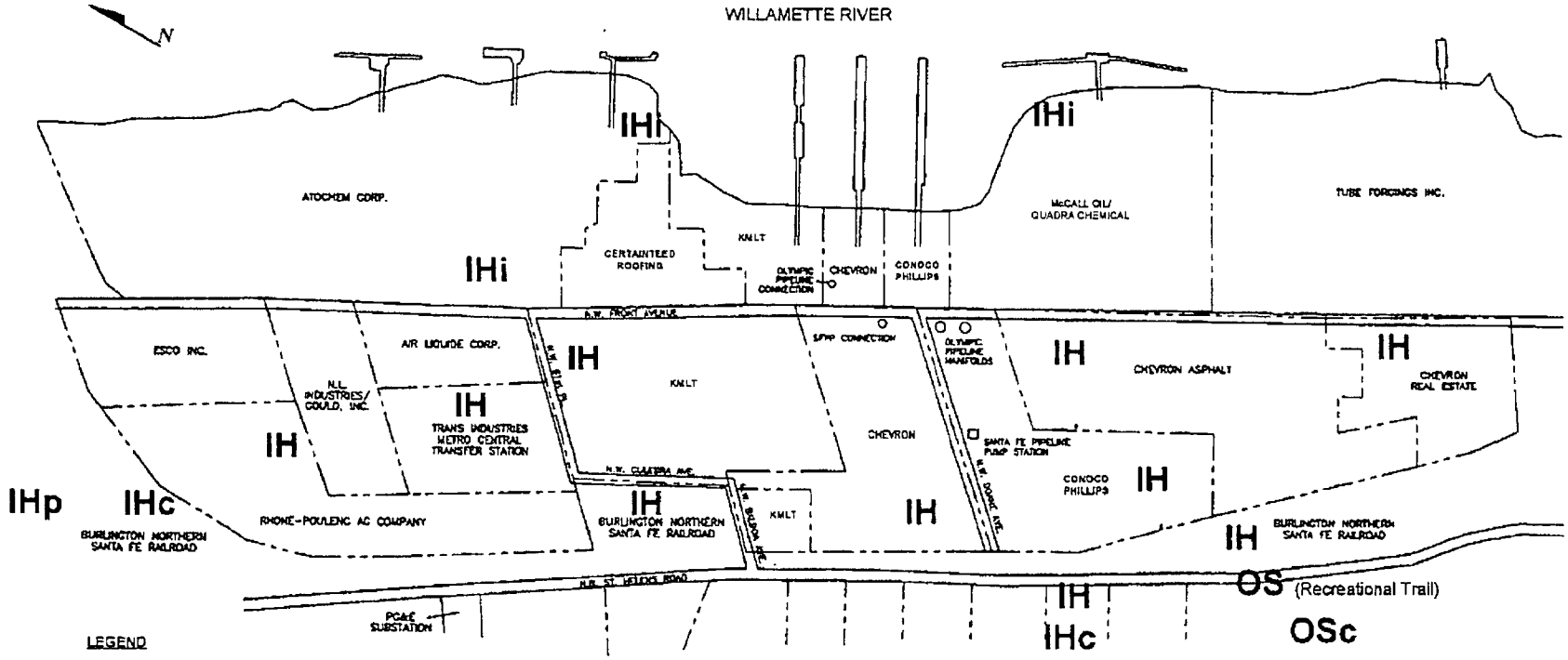
Site Location Map

Wilbridge Bulk Terminals

Portland, Oregon

DATE	PROJECT	FIGURE
11/6/00	B17-01D	1

COPPOR00006398



LEGEND

IH	Heavy Industrial
IHc	Heavy Industrial - Environmental Conservation Overlay Zone
IHi	Heavy Industrial - River Industrial Overlay Zone
IHp	Heavy Industrial - Environmental Protection Overlay Zone
OS	Open Space
OSc	Open Space - Environmental Conservation Overlay Zone
OSp	Open Space - Environmental Protection Overlay Zone

NOT TO SCALE

KHM Environmental Management Inc.

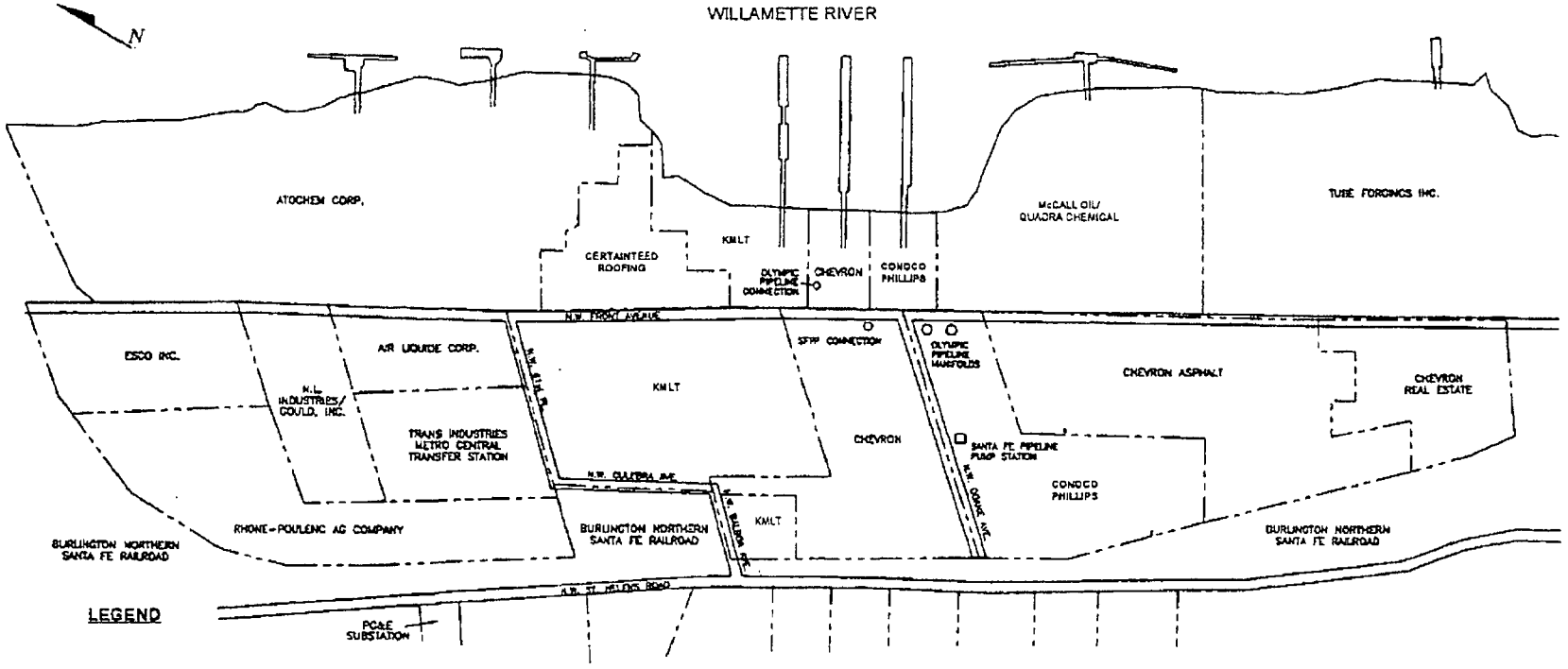
TITLE: Zoning Map

Willbridge Facility
Remedial Investigation
Portland, Oregon

DATE: June 2003 | PROJECT: 817-010 | FIGURE: 4

MAP AND DATA PROVIDED BY PACIFIC ENVIRONMENTAL GROUP

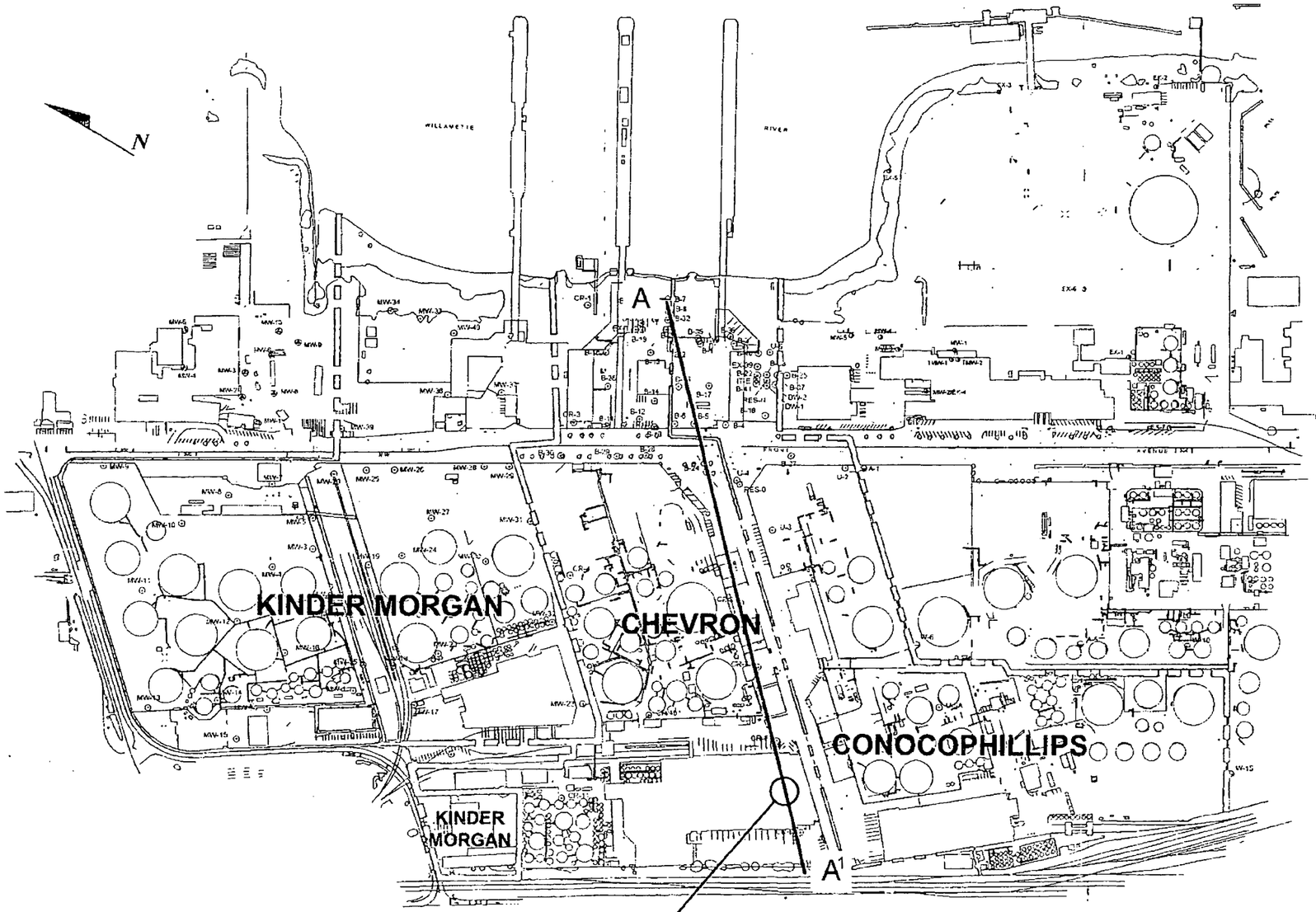
COPPOR00006399



NOT TO SCALE

KHM Environmental Management Inc.	TITLE: Adjacent Land Use		
	Willbridge Facility Remedial Investigation Portland, Oregon		
	DATE: June 2003	PROJECT: B17-01G	FIGURE: 5

MAP AND DATA PROVIDED BY PACIFIC ENVIRONMENTAL GROUP



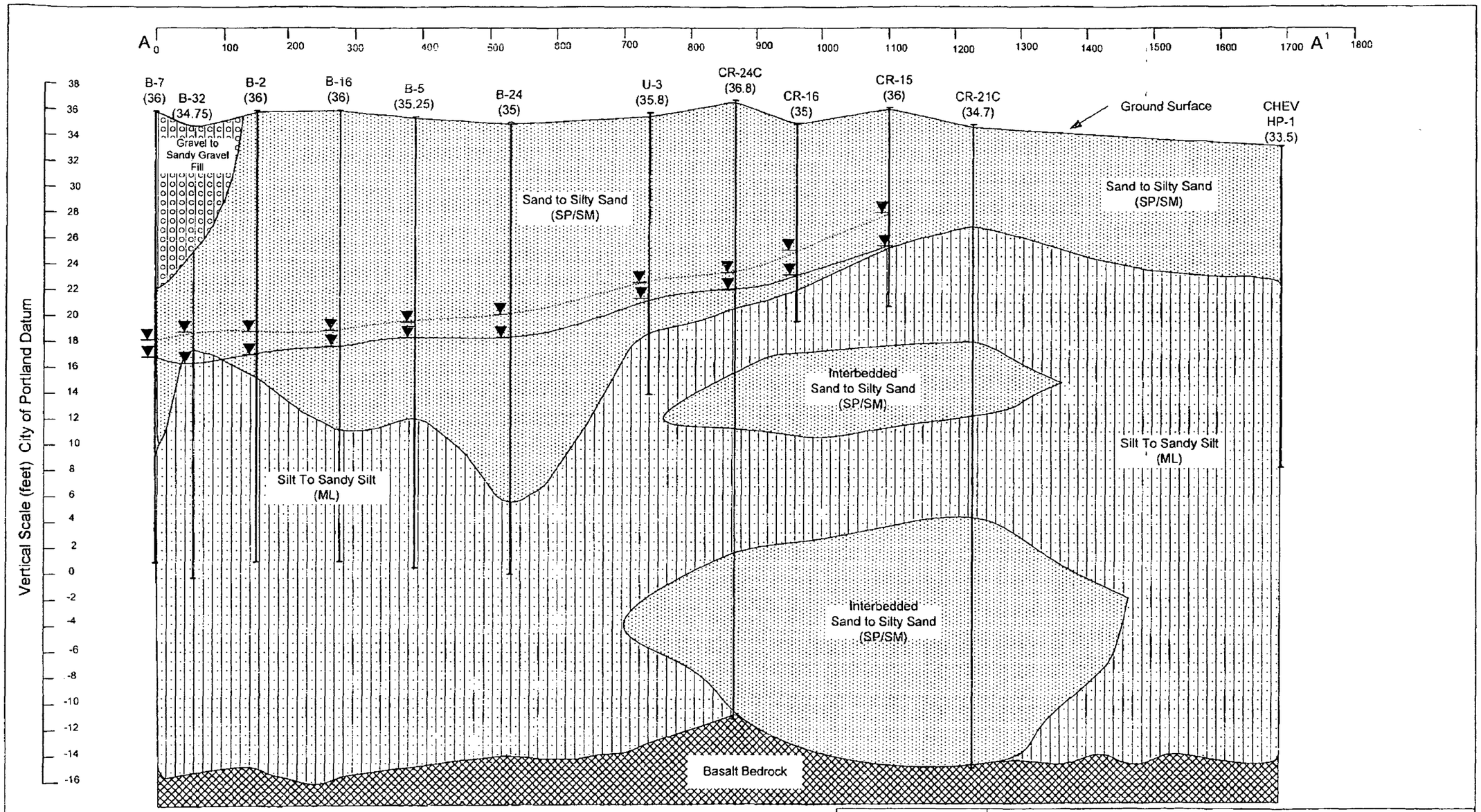
KHM
ENVIRONMENTAL MANAGEMENT INC.

Geologic Cross-Section Map

Willbridge Facility
Remedial Investigation
Portland, Oregon

DATE June 2002 | PROJECT B17-410 | FIGURE 14

COPPOR0006400



High and low groundwater elevations observed during quarterly gauging between 2-14-00 and 3-19-03

CR-21C (34.7) Designation of monitoring well or soil boring and (Elevation)

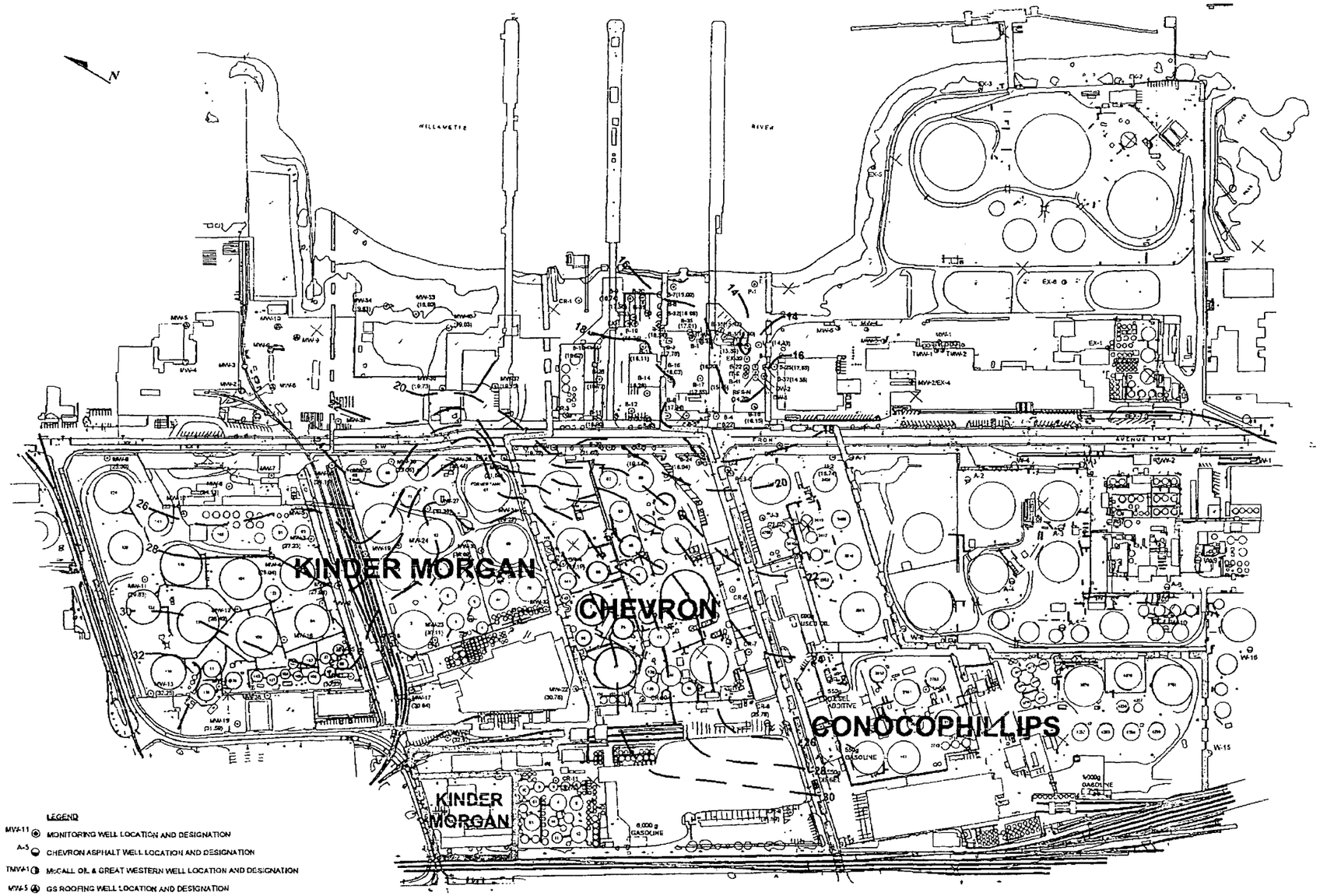
KHM
Environmental Management Inc.

GEOLOGIC CROSS SECTION A -A'

Willbridge Facility
Remedial Investigation
Portland, Oregon

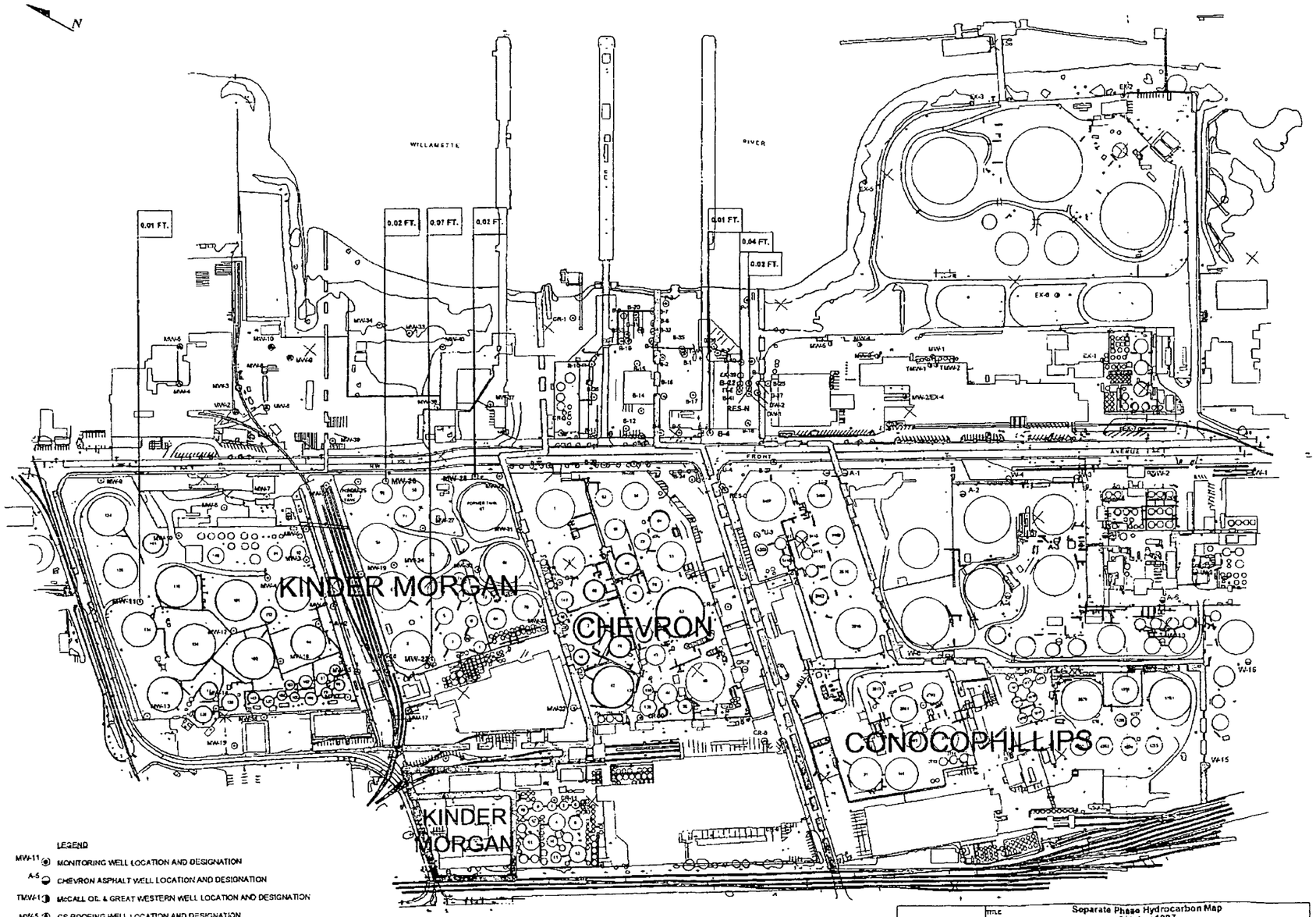
DATE	PROJECT	FIGURE
June 2003	B17-01G	15

COPPOR0006401



KHM ENVIRONMENTAL MANAGEMENT INC.	Title: Groundwater Elevation Contour Map October 1997		
	Willbridge Facility Remedial Investigation Portland, Oregon		
	Date: June 2003	Project: 817-015	Figure: 16

COPPOR0006402



KHM ENVIRONMENTAL MANAGEMENT INC.	TITLE	Separate Phase Hydrocarbon Map October 1997
		Willbridge Facility Remedial Investigation Portland, Oregon
	DATE: June 2003	PROJECT: 817-01G
		FIGURE: 17

COPPOR00006403

N

LEGEND

B-1, CR-1 ◉ MONITORING WELL LOCATION AND DESIGNATION

CHEV-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")

CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION

CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION

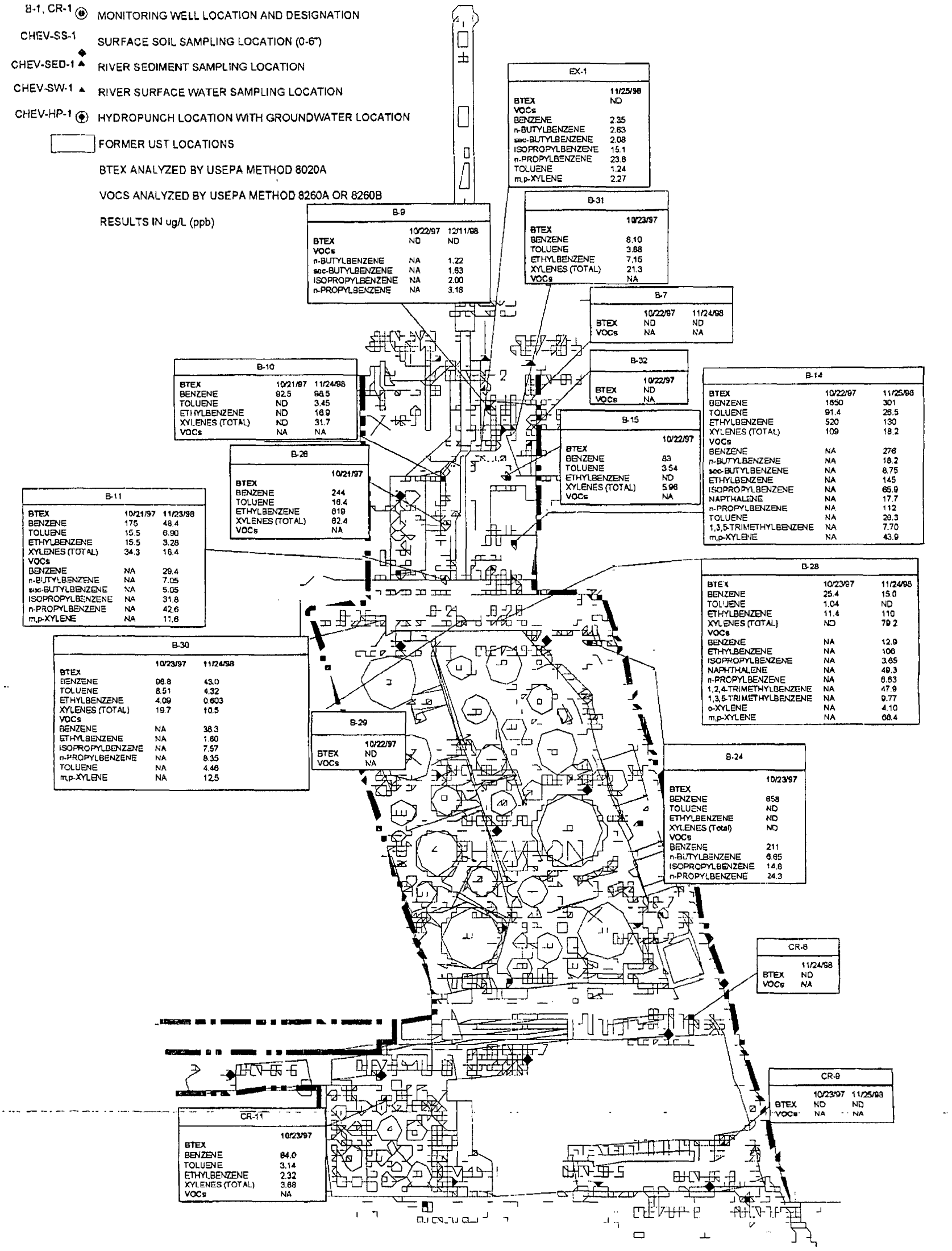
CHEV-HP-1 ◉ HYDROPUNCH LOCATION WITH GROUNDWATER LOCATION

▭ FORMER UST LOCATIONS

BTEX ANALYZED BY USEPA METHOD 8020A

VOCS ANALYZED BY USEPA METHOD 8260A OR 8260B

RESULTS IN ug/L (ppb)



0 ft. 120 ft. 200 ft. 400 ft.

APPROXIMATE SCALE

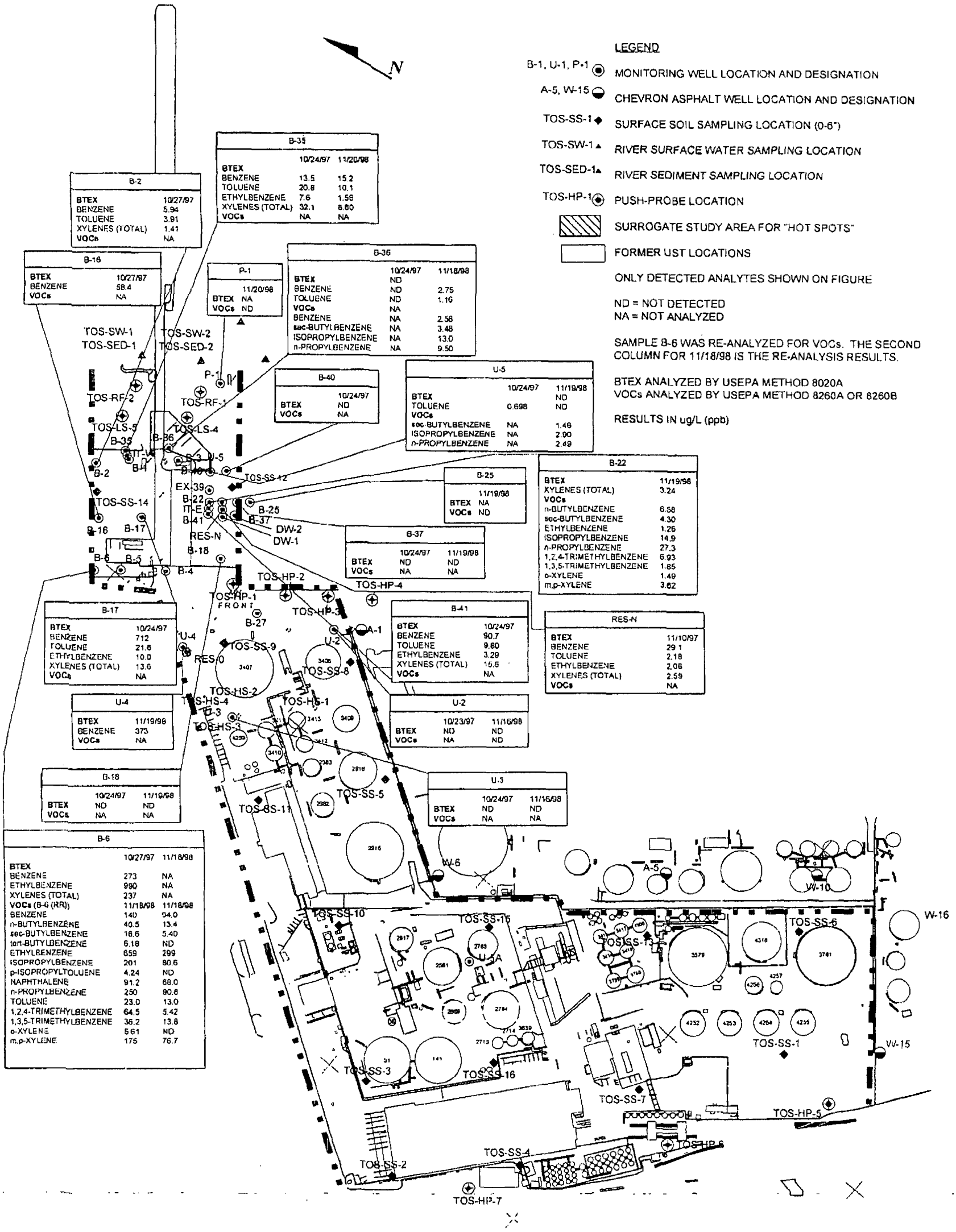
KHM Environmental Management Inc.

TITLE: **Groundwater Analytical Results - BTEX and VOCs October 1997 and November, December 1998**

Willbridge Facility - Chevron
Remedial Investigation
Portland, Oregon

DATE: June 2003 | PROJECT: B17-01G | FIGURE: 19

COPPOR00006404



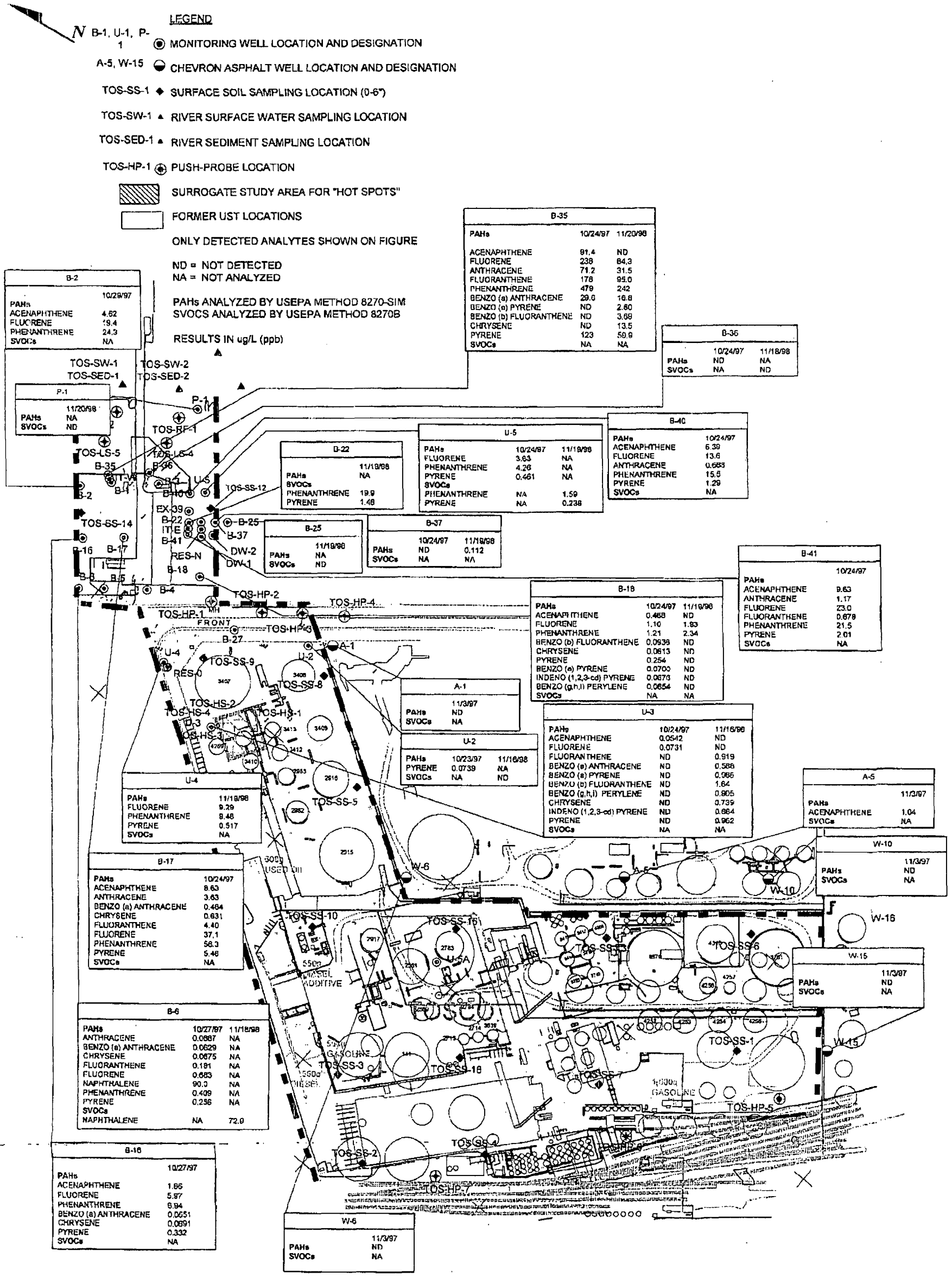
KHM
Environmental Management Inc.

TITLE **Groundwater Analytical Results - BTEX and VOCs October 1997 and November 1998**

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE June 2003 | PROJECT B17-01G | FIGURE 21

COPPOR00006405

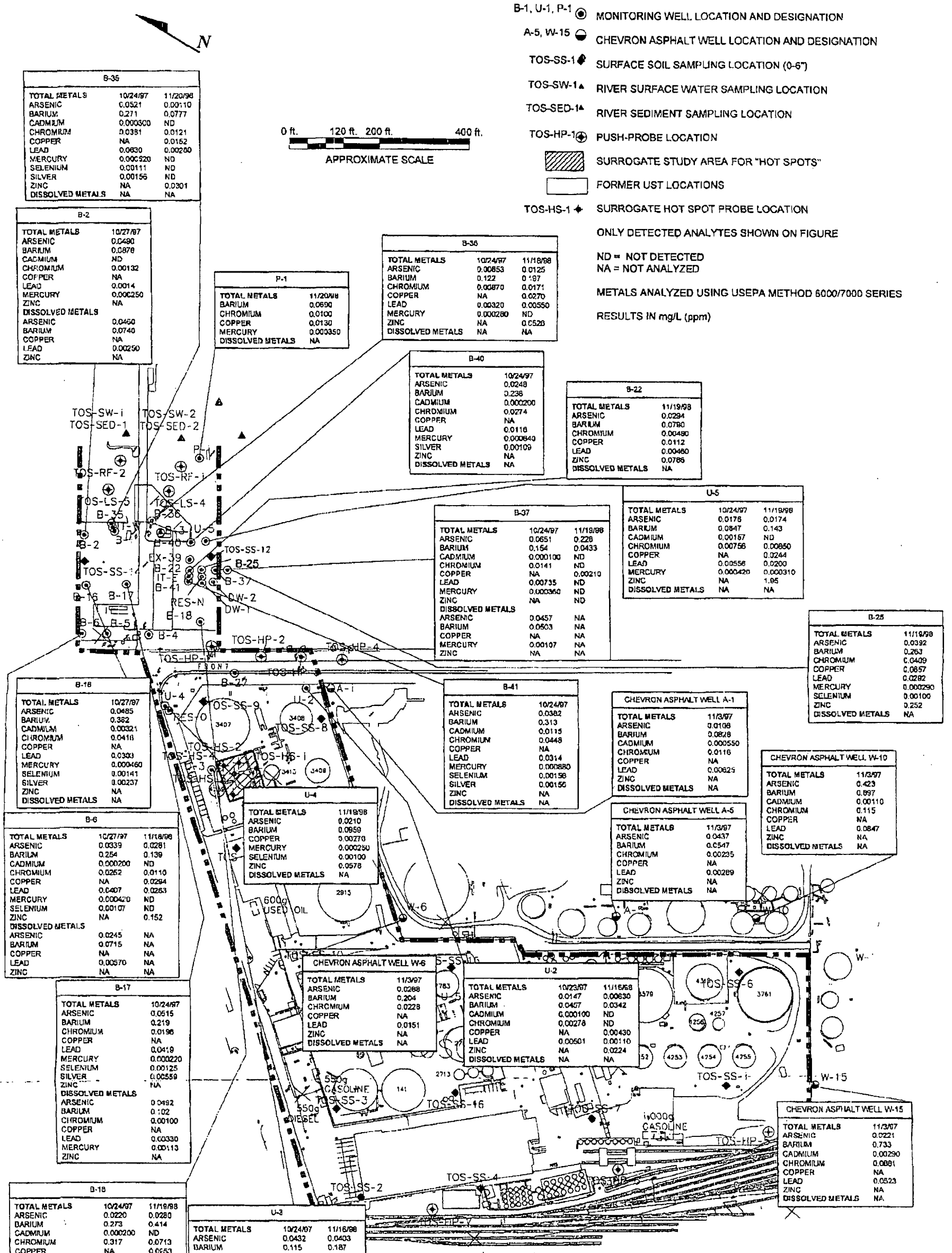


KHM Environmental Management Inc.

Groundwater Analytical Results - PAHs and SVOCs
October- November 1997 and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE June 2003 | PROJECT B17-01G | FIGURE 24



B-35		
TOTAL METALS	10/24/97	11/20/98
ARSENIC	0.0521	0.00110
BARIUM	0.271	0.0777
CADMIUM	0.000300	ND
CHROMIUM	0.0381	0.0121
COPPER	NA	0.0152
LEAD	0.0630	0.00260
MERCURY	0.000520	ND
SELENIUM	0.00111	ND
SILVER	0.00156	ND
ZINC	NA	0.0301
DISSOLVED METALS	NA	NA

B-2	
TOTAL METALS	10/27/97
ARSENIC	0.0490
BARIUM	0.0878
CADMIUM	ND
CHROMIUM	0.00132
COPPER	NA
LEAD	0.0014
MERCURY	0.000250
ZINC	NA
DISSOLVED METALS	
ARSENIC	0.0460
BARIUM	0.0740
COPPER	NA
LEAD	0.00250
ZINC	NA

P-1	
TOTAL METALS	11/20/98
BARIUM	0.0690
CHROMIUM	0.0100
COPPER	0.0130
MERCURY	0.000350
DISSOLVED METALS	NA

B-36		
TOTAL METALS	10/24/97	11/18/98
ARSENIC	0.00853	0.0125
BARIUM	0.122	0.197
CHROMIUM	0.00870	0.0171
COPPER	NA	0.0270
LEAD	0.00320	0.00550
MERCURY	0.000280	ND
ZINC	NA	0.0526
DISSOLVED METALS	NA	NA

B-40	
TOTAL METALS	10/24/97
ARSENIC	0.0248
BARIUM	0.238
CADMIUM	0.000200
CHROMIUM	0.0274
COPPER	NA
LEAD	0.0116
MERCURY	0.000640
SILVER	0.00109
ZINC	NA
DISSOLVED METALS	NA

B-22	
TOTAL METALS	11/19/98
ARSENIC	0.0294
BARIUM	0.0780
CHROMIUM	0.00480
COPPER	0.0112
LEAD	0.00460
ZINC	0.0786
DISSOLVED METALS	NA

B-37		
TOTAL METALS	10/24/97	11/19/98
ARSENIC	0.0651	0.228
BARIUM	0.154	0.0433
CADMIUM	0.000100	ND
CHROMIUM	0.0141	ND
COPPER	NA	0.00210
LEAD	0.00735	ND
MERCURY	0.000360	ND
ZINC	NA	ND
DISSOLVED METALS		
ARSENIC	0.0457	NA
BARIUM	0.0503	NA
COPPER	NA	NA
MERCURY	0.00107	NA
ZINC	NA	NA

U-5		
TOTAL METALS	10/24/97	11/19/98
ARSENIC	0.0176	0.0174
BARIUM	0.0847	0.143
CADMIUM	0.00157	ND
CHROMIUM	0.00756	0.00650
COPPER	NA	0.0244
LEAD	0.00556	0.0200
MERCURY	0.000420	0.000310
ZINC	NA	1.95
DISSOLVED METALS	NA	NA

B-25	
TOTAL METALS	11/19/98
ARSENIC	0.0392
BARIUM	0.263
CHROMIUM	0.0409
COPPER	0.0857
LEAD	0.0282
MERCURY	0.000290
SELENIUM	0.00100
ZINC	0.252
DISSOLVED METALS	NA

B-16	
TOTAL METALS	10/27/97
ARSENIC	0.0485
BARIUM	0.362
CADMIUM	0.00321
CHROMIUM	0.0416
COPPER	NA
LEAD	0.0303
MERCURY	0.000460
SELENIUM	0.00141
SILVER	0.00237
ZINC	NA
DISSOLVED METALS	NA

B-41	
TOTAL METALS	10/24/97
ARSENIC	0.0382
BARIUM	0.313
CADMIUM	0.0115
CHROMIUM	0.0448
COPPER	NA
LEAD	0.0314
MERCURY	0.000880
SELENIUM	0.00156
SILVER	0.00156
ZINC	NA
DISSOLVED METALS	NA

CHEVRON ASPHALT WELL A-1	
TOTAL METALS	11/3/97
ARSENIC	0.0106
BARIUM	0.0828
CADMIUM	0.000550
CHROMIUM	0.0116
COPPER	NA
LEAD	0.00625
ZINC	NA
DISSOLVED METALS	NA

CHEVRON ASPHALT WELL W-10	
TOTAL METALS	11/3/97
ARSENIC	0.423
BARIUM	0.897
CADMIUM	0.00110
CHROMIUM	0.115
COPPER	NA
LEAD	0.0847
ZINC	NA
DISSOLVED METALS	NA

B-6		
TOTAL METALS	10/27/97	11/18/98
ARSENIC	0.0339	0.0281
BARIUM	0.254	0.139
CADMIUM	0.000200	ND
CHROMIUM	0.0252	0.0110
COPPER	NA	0.0294
LEAD	0.0407	0.0263
MERCURY	0.000420	ND
SELENIUM	0.00107	ND
ZINC	NA	0.152
DISSOLVED METALS		
ARSENIC	0.0245	NA
BARIUM	0.0715	NA
COPPER	NA	NA
LEAD	0.00570	NA
ZINC	NA	NA

U-4	
TOTAL METALS	11/19/98
ARSENIC	0.0210
BARIUM	0.0959
COPPER	0.00270
MERCURY	0.000250
SELENIUM	0.00100
ZINC	0.0578
DISSOLVED METALS	NA

CHEVRON ASPHALT WELL A-5	
TOTAL METALS	11/3/97
ARSENIC	0.0437
BARIUM	0.0547
CHROMIUM	0.00235
COPPER	NA
LEAD	0.00269
ZINC	NA
DISSOLVED METALS	NA

CHEVRON ASPHALT WELL W-6	
TOTAL METALS	11/3/97
ARSENIC	0.0268
BARIUM	0.204
CHROMIUM	0.0228
COPPER	NA
LEAD	0.0151
ZINC	NA
DISSOLVED METALS	NA

U-2		
TOTAL METALS	10/23/97	11/16/98
ARSENIC	0.0147	0.00630
BARIUM	0.0457	0.0342
CADMIUM	0.000100	ND
CHROMIUM	0.00278	ND
COPPER	NA	0.00430
LEAD	0.00501	0.00110
ZINC	NA	0.0224
DISSOLVED METALS	NA	NA

B-17	
TOTAL METALS	10/24/97
ARSENIC	0.0515
BARIUM	0.219
CHROMIUM	0.0196
COPPER	NA
LEAD	0.0419
MERCURY	0.000220
SELENIUM	0.00125
SILVER	0.00559
ZINC	NA
DISSOLVED METALS	
ARSENIC	0.0492
BARIUM	0.102
CHROMIUM	0.00100
COPPER	NA
LEAD	0.00330
MERCURY	0.00113
ZINC	NA

CHEVRON ASPHALT WELL W-15	
TOTAL METALS	11/3/97
ARSENIC	0.0221
BARIUM	0.733
CADMIUM	0.00290
CHROMIUM	0.0881
COPPER	NA
LEAD	0.0523
ZINC	NA
DISSOLVED METALS	NA

B-18		
TOTAL METALS	10/24/97	11/19/98
ARSENIC	0.0220	0.0280
BARIUM	0.273	0.414
CADMIUM	0.000200	ND
CHROMIUM	0.317	0.0713
COPPER	NA	0.0553
LEAD	0.0162	0.0492
MERCURY	0.000400	0.000670
SELENIUM	0.00139	0.00160
SILVER	0.00110	ND
ZINC	NA	0.286
DISSOLVED METALS	NA	NA

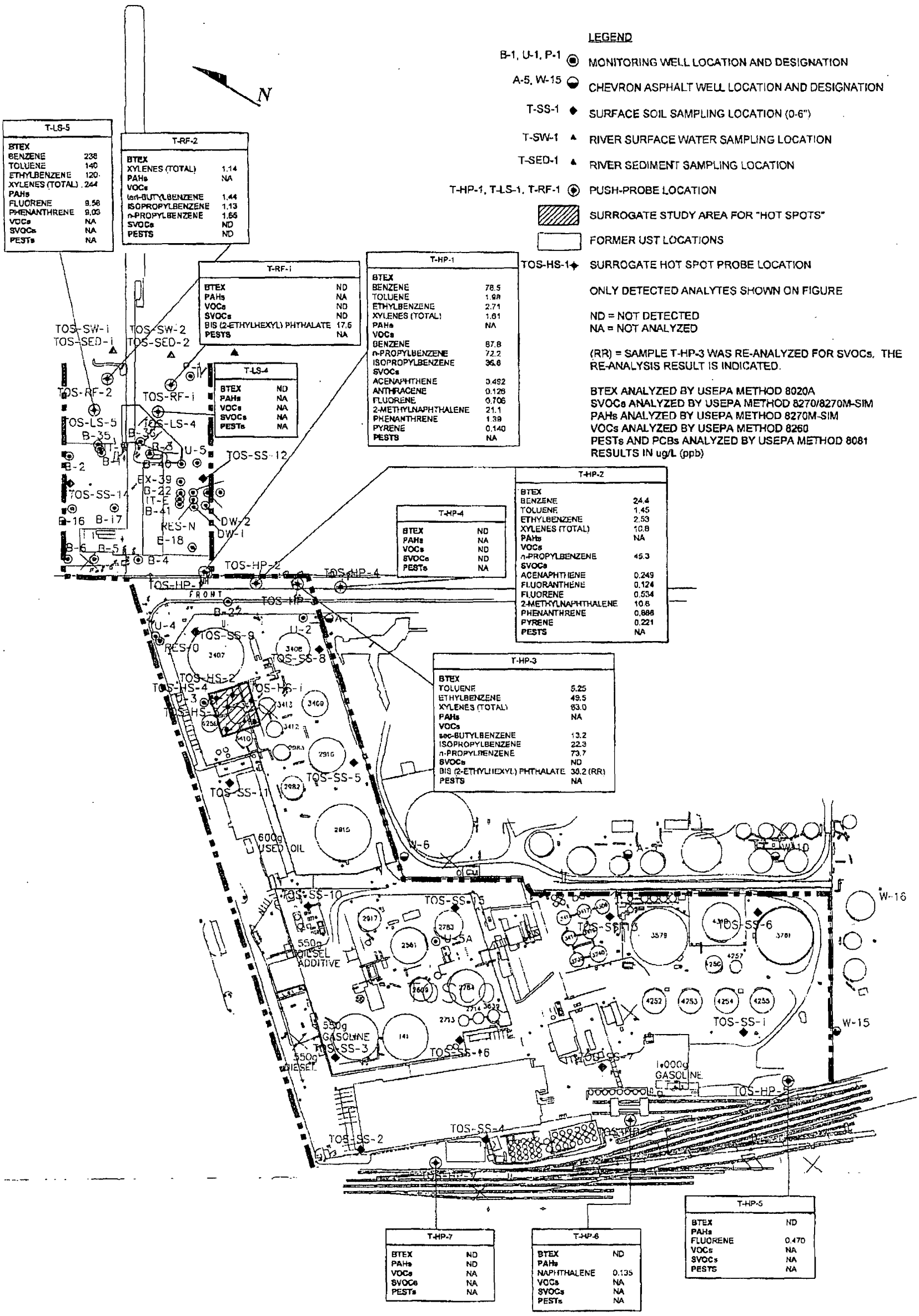
U-3		
TOTAL METALS	10/24/97	11/16/98
ARSENIC	0.0432	0.0403
BARIUM	0.115	0.187
CHROMIUM	0.00429	0.0622
COPPER	NA	0.0350
LEAD	0.0129	0.0953
SELENIUM	0.00110	0.00170
ZINC	NA	0.308
DISSOLVED METALS		
ARSENIC	NA	0.0249
BARIUM	NA	0.0880
MERCURY	NA	0.000400
SELENIUM	NA	0.00100
ZINC	NA	0.0737

KHM Environmental Management Inc.

Groundwater Analytical Results - Total and Dissolved Metals
October 1997 and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	27

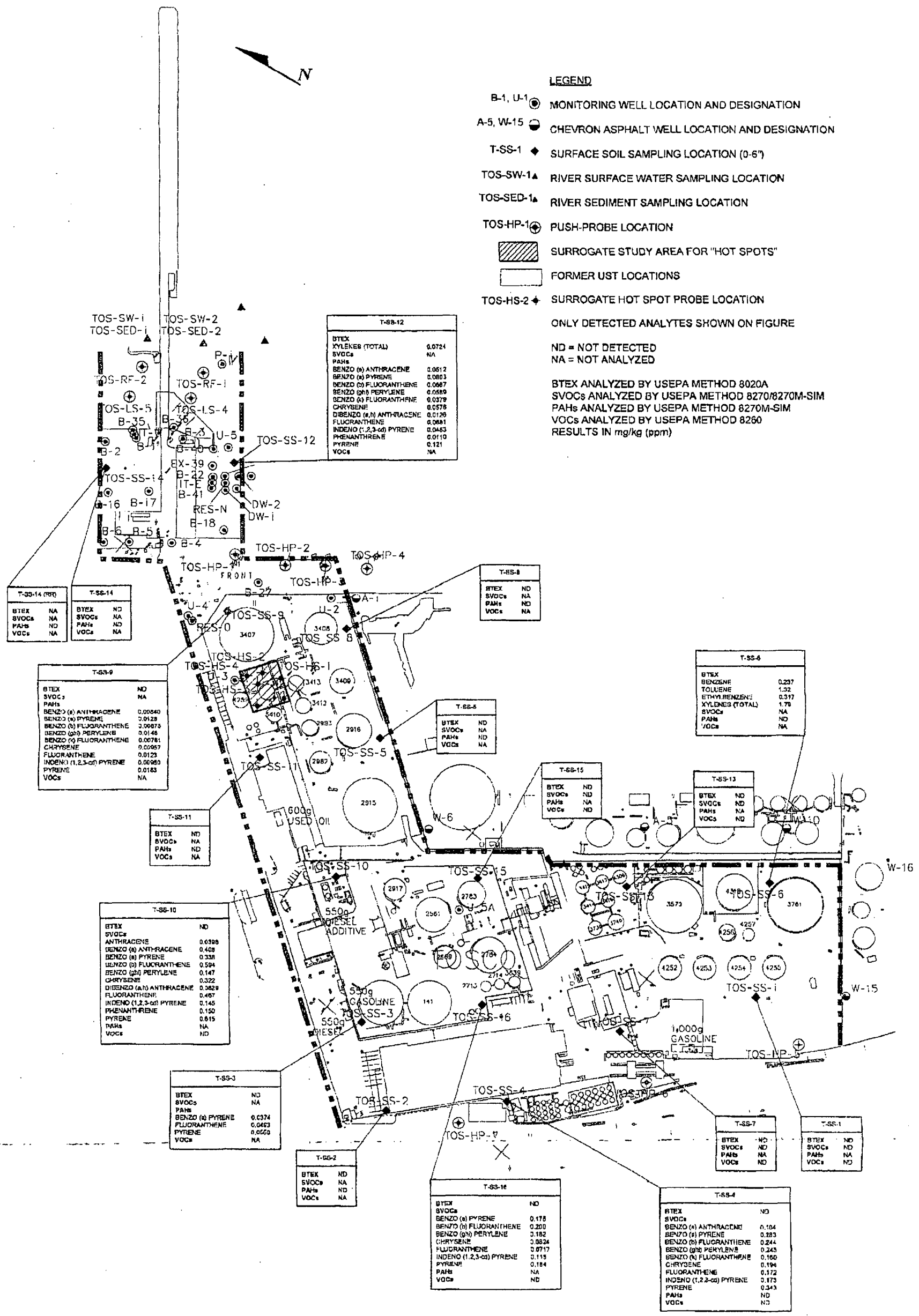


KHM Environmental Management Inc.

Hydropunch Groundwater Analytical Results - BTEX, PAHs, VOCs, SVOCs, and Pesticides - October and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	31

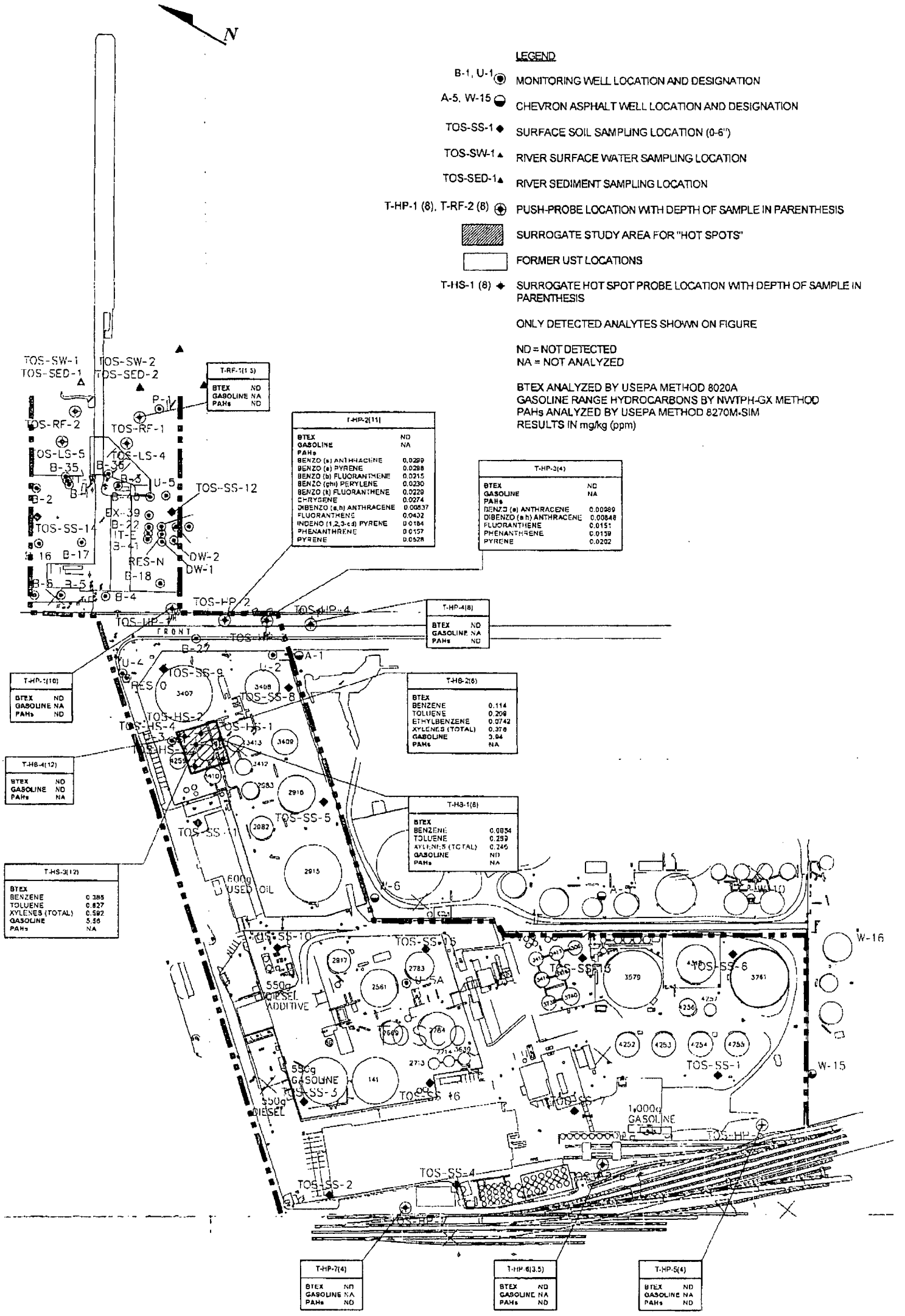


KHM
Environmental Management Inc.

Surface Soil Analytical Results - BTEX, PAHs, VOCs, and SVOCs October and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	35

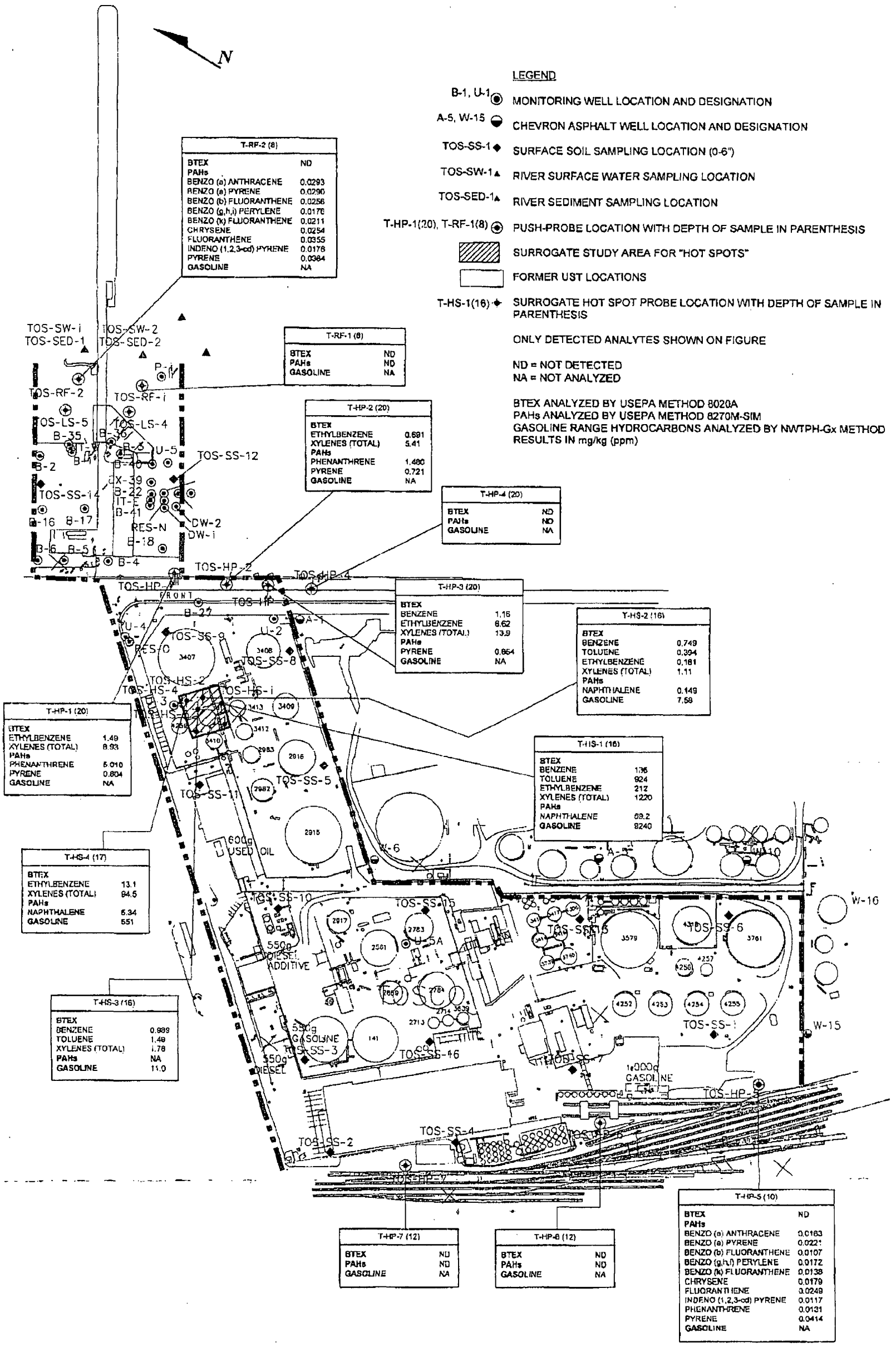


KHM Environmental Management Inc.

Vadose Zone Soil Analytical Results - BTEX, Gasoline Range Hydrocarbons, and PAHs - October - November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	38

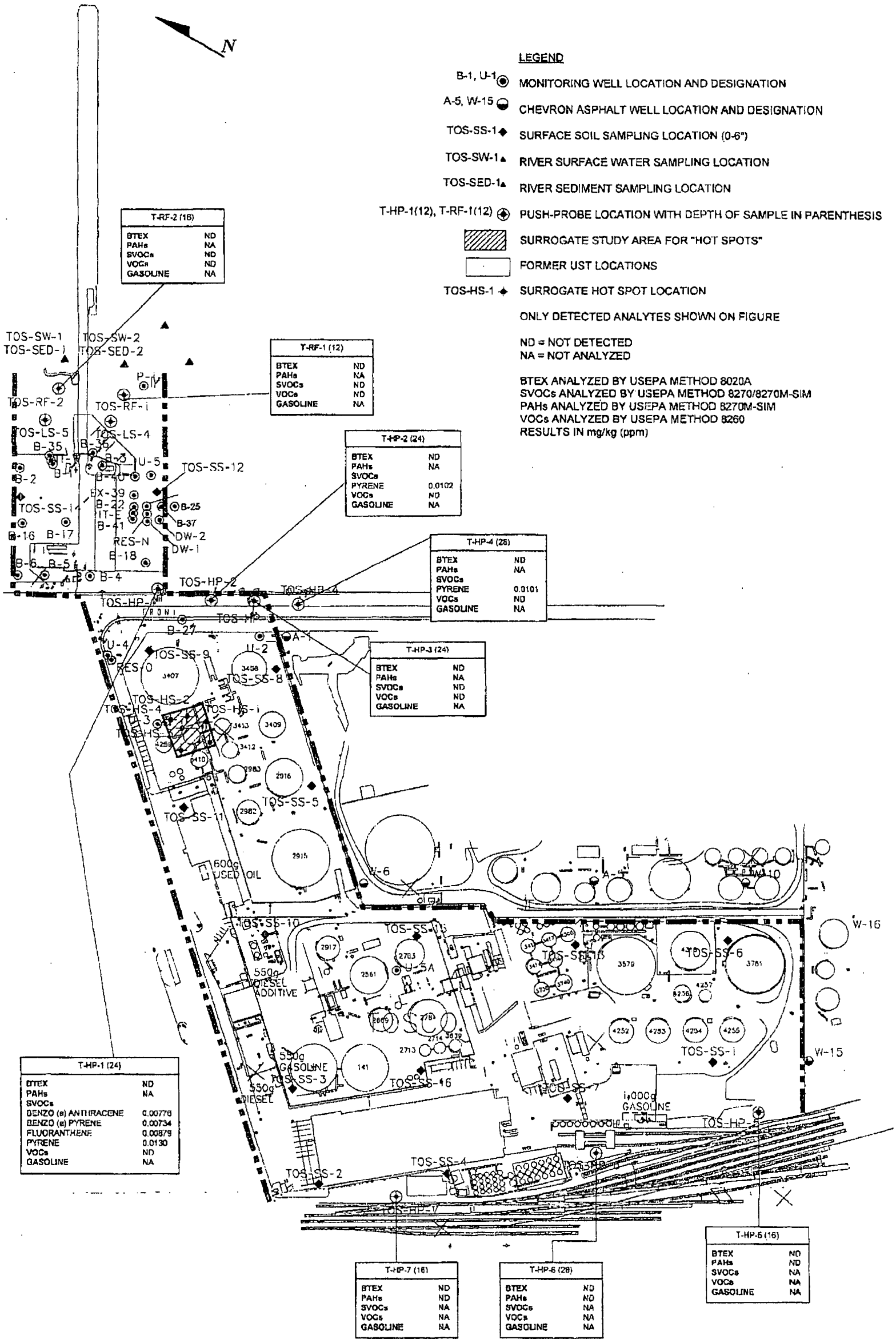


KHM
Environmental Management Inc.

Capillary Fringe Soil Analytical Results - BTEX, PAHs & Gasoline Range Hydrocarbons - October and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	41

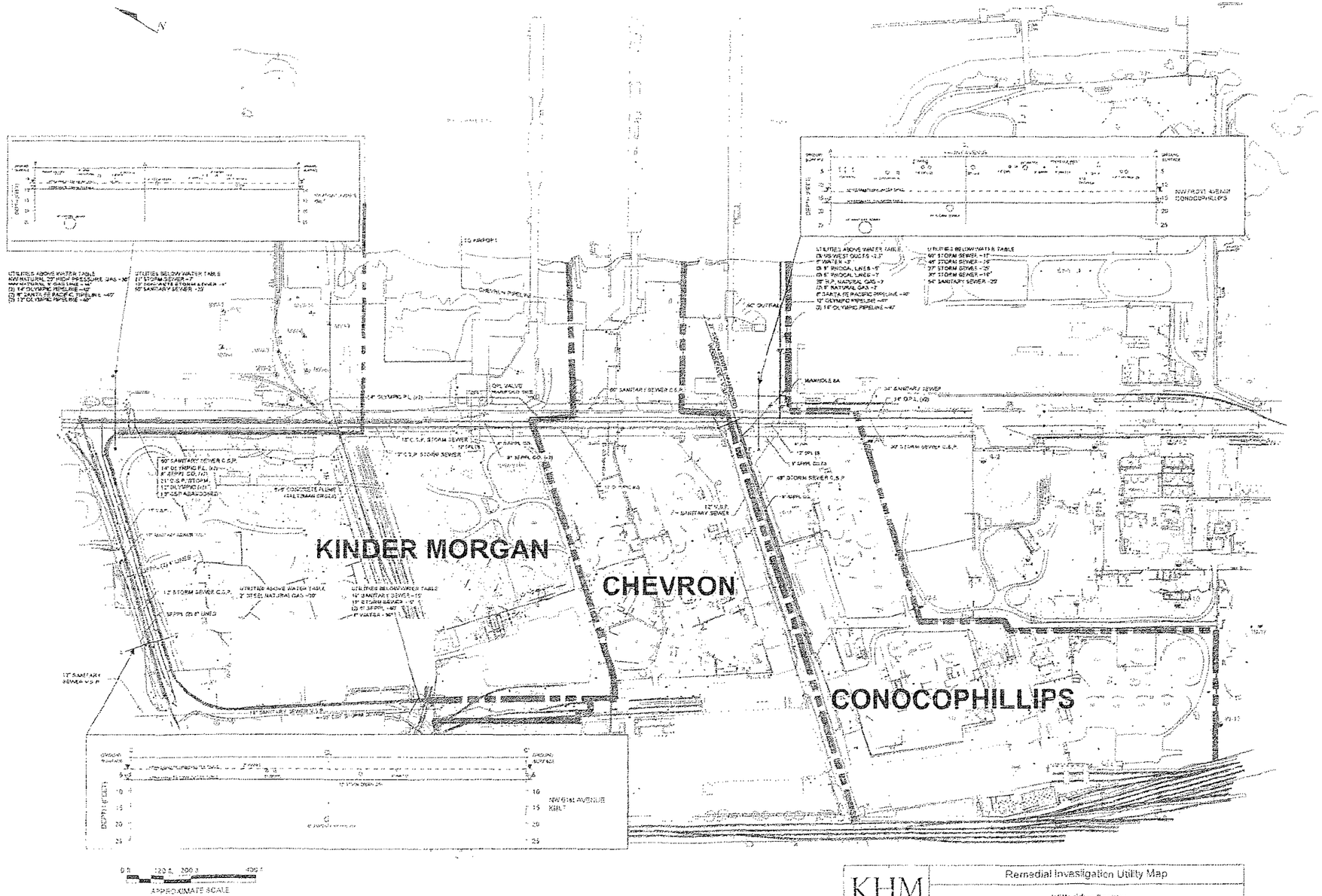


KHM Environmental Management Inc.

Saturated Zone Soil Analytical Results - BTEX, PAHs, VOCs, & SVOCs
October and November 1998

Willbridge Facility - CONOCOPHILLIPS
Remedial Investigation
Portland, Oregon

DATE	PROJECT	FIGURE
June 2003	B17-01G	44



KHM ENVIRONMENTAL MANAGEMENT INC.	Remedial Investigation Utility Map		
	Willbridge Facility Remedial Investigation Portland, Oregon		
	DATE: June 2003	PROJECT: 317-01G	FIGURE: 45

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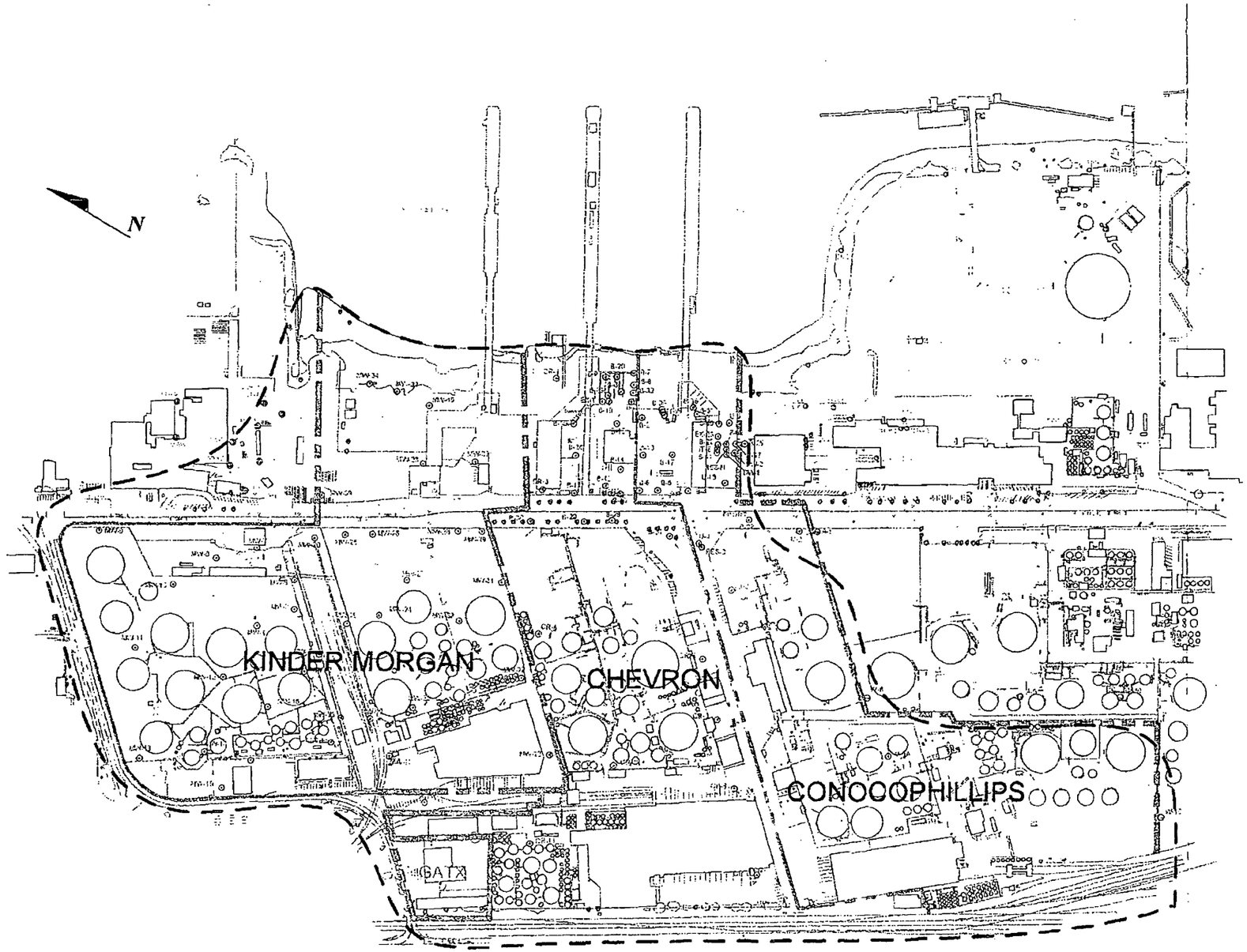

LEGEND

Locality of Facility

KHM ENVIRONMENTAL MANAGEMENT INC	Locality of Facility Map		
	Willbridge Facility **Remedial Investigation** **Portland, Oregon**		
	DATE: June 2003	PROJECT: B17-01G	FIGURE: 46

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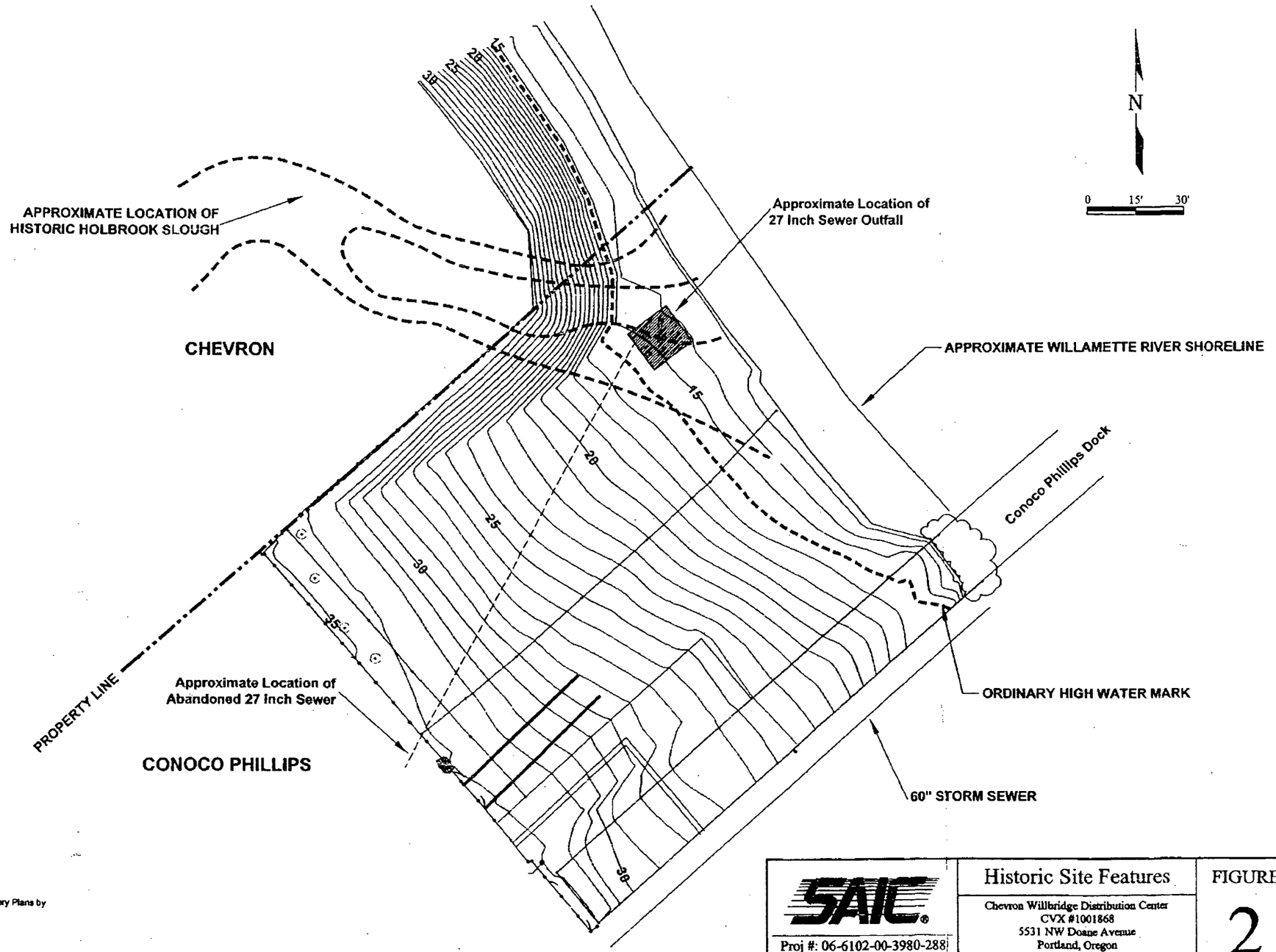

NOTES

1) Location of Holbrook Slough inferred from 5/88 Trench Recovery Plans by Riedel Environmental

2) Base Map Provided by RSV Engineering Wilsonville, Oregon

SAIC®	Historic Site Features	FIGURE
Proj #: 06-6102-00-3980-288	Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon	2
100-1868HolbrookBaseMap(fig2).dwg	Date: 07/28/04 Drawn By: EML	

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DISCHARGE MONITORING REPORTS	
November 2007 DMR	12/7/2007
October 2007 DMR	11/5/2007
September 2007 DMR	10/8/2007
August 2007 DMR	9/10/2007
July 2007 DMR	8/14/2007
June 2007 DMR	7/5/2007
May 2007 DMR	6/14/2007
April 2007 DMR	5/8/2007
March 2007 DMR	4/6/2007
Febraury 2007 DMR	3/14/2007
January 2007 DMR	2/13/2007
December 2006 DMR	1/2/2007
November 2006 DMR	12/1/2006
October 2006 DMR	11/10/2006
September 2006 DMR	10/3/2006
August 2006 DMR	9/7/2006
July 2006 DMR	8/10/2006
June 2006 DMR	6/28/2006
May 2006 DMR	6/5/2006
April 2006 DMR	5/5/2006
March 2006 DMR	4/7/2006
Febrauary 2006 DMR	3/3/2006
January 2006 DMR	2/6/2006
December 2005 DMR	1/9/2006
November 2005 DMR	12/8/2005
October 2005 DMR	11/3/2005
September 2005 DMR	10/7/2005
August 2005 DMR	9/9/2005
July 2005 DMR	8/11/2005
June 2005 DMR	6/28/2005
May 2005 DMR	6/9/2005
April 2005 DMR	5/10/2005
March 2005 DMR	4/5/2005
February 2005 DMR	3/10/2005
January 2005 DMR	2/14/2005
December 2004 DMR	1/10/2005
November 2004 DMR	12/3/2004
October 2005 DMR	11/9/2004
September 2004 DMR	10/15/2004
August 2004 DMR	9/13/2004
June 2004 DMR	7/14/2004
May 2004 DMR	6/9/2004
April 2004 DMR	5/7/2004
March 2004 DMR	4/12/2004
February 2004 DMR	3/12/2004
January 2004 DMR	1/30/2004
December 2003 DMR	1/9/2004
November 2003 DMR	11/5/2003
October 2003 DMR	10/29/2003
September 2003 DMR	10/15/2003
August 2003 DMR	9/3/2003
July 2003 DMR	8/11/2003
June 2003 DMR	7/9/2003
May 2003 DMR	6/9/2003
April 2003 DMR	5/13/2003
March 2003 DMR	4/11/2003
February 2003 DMR	2/25/2003
November 2002 DMR	12/12/2002
October 2002 DMR	11/5/2002

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Project Manager: BJP

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BY:

LETTER OF TRANSMITTAL

To:	Mr. Eric DeBerry	**From:**	Brian Pletcher
Company:	Industrial Source Control Division Water Pollution Control 6543 N. Burlington Avenue Portland, OR 97203-5452	**Date:**	July 5, 2007
Re:	Discharge Monitoring Report June 2007 Tosco-Chevron Remediation Site	**Project No.**	PTWB-05P-2.0001 Permit No. 500.015

Mr. DeBerry:

Water samples were collected by a representative of Delta Environmental Consultants, Inc. on June 13, 2007. Samples (Grab) were collected by discharging water from sample ports on the process piping directly into laboratory prepared containers. The sample containers were sealed, labeled, placed in a cooler with ice and transported to the project laboratory. The effluent samples were analyzed for HEM Oil and Grease (EPA Method 1664A) and benzene, toluene, ethylbenzene and xylene (BTEX) (EPA Method 8021B). Laboratory analysis was performed by Test America Laboratories (Test America) in Beaverton, Oregon. A copy of the laboratory analytical reports is included.

The monitoring was conducted in accordance with the City of Portland Industrial Wastewater Discharge Permit No. 500.015. The discharge monitoring report (DMR) is being submitted as the self-monitoring report and is included. All parameters monitored were within the limits listed in the facility's discharge permit.

If you have any questions regarding the enclosed DMR, please feel free to contact me at (503) 639-8098. Thank you.

Brian Pletcher
Delta Environmental Consultants, Inc.

cc: Mike Noll, Noll Environmental Inc.

Inogen

7150 SW HAMPTON, SUITE 220, TIGARD, OR 97223 USA
PHONE 503.639.8098 / 800.477.7411 FAX 503.639.7619 WWW.DELTAENV.COM

CITY OF PORTLAND
INDUSTRIAL WASTEWATER DISCHARGE
SELF-MONITORING REPORT

INDUSTRY NAME: Tosco-Chevron Remediation Site

PERMIT NUMBER: 500.015

REPORT DUE DATE: July 15, 2007

SAMPLING PERIOD: June 2007

For Industrial Source Control Division Use Only

Date Postmarked/Received **Date Entered**

Entered By:

Comments:

SAMPLE DATE	POINT OF COMPLIANCE	SAMPLE TYPE
6/13/07	1A	GRAB

PARAMETER	ANALYSIS METHOD	REPORTED CONCENTRATION		MDL	LIMITS DAILY	LIMITS MONTHLY	COMMENTS
HEM Oil & Grease (Total)[1]	EPA 1664A	ND	mg/L	4.81	N/A	N/A	
HEM Oil and Grease (Non-Polar)	APHA/EPA		mg/L	5.00	110 mg/L	N/A	Not analyzed
HEM Oil and Grease (Polar)	APHA/EPA		mg/L	5.00		N/A	Not analyzed
pH	Field Meter	6.9	SU		5.0 - 11.5	N/A	
BTEX	EPA 8021B	ND	mg/L	0.0025	0.75 mg/L		
Totalizer Reading	Field	24,745,268	gal		N/A	N/A	

1 If the value of HEM Oil and Grease Total is greater than 110 mg/L, then the Permittee shall analyze the sample for the HEM Oil and Grease Non-Polar constituent

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Signature: _____ Date: 7/9/07

CITY OF PORTLAND
INDUSTRIAL WASTEWATER DISCHARGE
SELF-MONITORING REPORT

INDUSTRY NAME: Tosco-Chevron Remediation Site

PERMIT NUMBER: 500.015

REPORT DUE DATE: July 15, 2007

SAMPLING PERIOD: June 2007

For Industrial Source Control Division Use Only

Date Postmarked/Received | Date Entered

Entered By:

Comments:

SAMPLE DATE	POINT OF COMPLIANCE	SAMPLE TYPE
6/13/07	1A	GRAB

PARAMETER	ANALYSIS METHOD	REPORTED CONCENTRATION	MDL	LIMITS DAILY	LIMITS MONTHLY	COMMENTS
HEM Oil & Grease (Total) [1]	EPA 1664A	ND mg/L	4.81	N/A	N/A	
HEM Oil and Grease (Non-Polar)	APHA/EPA	mg/L	5.00	110 mg/L	N/A	Not analyzed
HEM Oil and Grease (Polar)	APHA/EPA	mg/L	5.00		N/A	Not analyzed
pH	Field Meter	6.9 SU		5.0 - 11.5	N/A	
BTEX	EPA 8021B	ND mg/L	0.0025	0.75 mg/L		
Totalizer Reading	Field	24,745,268 gal		N/A	N/A	

1 If the value of HEM Oil and Grease Total is greater than 110 mg/L, then the Permittee shall analyze the sample for the HEM Oil and Grease Non-Polar constituent.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Signature: Date: 7/9/07

T:\Willbridge\Willbridge Discharge Permit (DMR)\2007\Willbridge DMR June 2007\June 07.doc

Form 13-1A

TestAmerica
ANALYTICAL TESTING CORPORATION

PORTLAND OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906-9200 fax: (503) 906-9210

June 26, 2007

Brian Pletcher
Delta Consultants - Tigard
7150 SW Hampton - Suite 220
Tigard, OR 97223

RE: Willbridge Terminal -Conoco Phillips

Enclosed are the results of analyses for samples received by the laboratory on 06/13/07 14:36. The following list is a summary of the Work Orders contained in this report, generated on 06/26/07 15:32.

If you have any questions concerning this report, please feel free to contact me.

Work Order	Project	ProjectNumber
PQF0499	Willbridge Terminal -Conoco	ORZ0922-OM

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full without the written approval of the laboratory.

Sarah Rockwell, Project Manager

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ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008 /132
ph: (503) 906-9200 fax: (503) 906-9210

Delta Consultants - Tigard	Project Name:	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number:	ORZ0922-OM	Report Created:
Tigard, OR 97223	Project Manager:	Brian Pletcher	06/26/07 15:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Post	PQF0499-01	Water	06/13/07 08:10	06/13/07 14:36

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full, without the written approval of the laboratory.

Sarah Rockwell

Sarah Rockwell, Project Manager

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Delta Consultants - Tigard	Project Name:	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number:	ORZ0922-OM	Report Created
Tigard, OR 97223	Project Manager:	Brian Pletcher	06/26/07 15:32

BTEX per EPA Method 8021B

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PQF0499-01 (Post)		**Water**			**Sampled: 06/13/07 08:10**					
Benzene	EPA 8021B	ND	----	0.500	ug/l	1x	7060620	06/14/07 11:41	06/14/07 17:51	
Toluene	"	ND	----	0.500	"	"	"	"	"	
Ethylbenzene	"	ND	----	0.500	"	"	"	"	"	
Xylenes (total)	"	ND	----	1.00	"	"	"	"	"	
Surrogate(s): 4-BFB (PID)			*94.0%*		*70 - 130 %*	"			"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full, without the written approval of the laboratory.

Sarah Rockwell

Sarah Rockwell, Project Manager

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BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Delta Consultants - Tigard	Project Name:	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number	ORZ0922-OM	Report Created:
Tigard, OR 97223	Project Manager	Brian Pletcher	06/26/07 15:32

Oil and Grease Analysis per EPA Method 1664

TestAmerica - Portland, OR

Analyte	Method	Result	MDL*	MRL	Units	Dil	Batch	Prepared	Analyzed	Notes
PQF0499-01 (Post)		**Water**			**Sampled: 06/13/07 08:10**					
Oil & Grease	EPA 1664	ND	-----	4.81	mg/l	1x	7060719	06/18/07 13:15	06/18/07 17:43	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full without the written approval of the laboratory.

Sarah Rockwell, Project Manager

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ANALYTICAL TESTING CORPORATION

PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Delta Consultants - Tigard	Project Name:	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number:	ORZ0922-OM1	Report Created:
Tigard, OR 97223	Project Manager:	Brian Pletcher	06/26/07 15:32

BTEX per EPA Method 8021B - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 7060620 **Water Preparation Method: EPA 5030B**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7060620-BLK1)									Extracted: 06/14/07 11:41					
Benzene	EPA 8021B	ND		0.500	ug/l	1X							06/14/07 13:43	
Toluene	"	ND		0.500	"	"							"	
Ethylbenzene	"	ND		0.500	"	"							"	
Xylenes (total)	"	ND		1.00	"	"							"	
Surrogate(s): 4-BFB (FID)		*Recovery: 102%*			*Limits: 70-130%*	"							*06/14/07 13:43*	
LCS (7060620-BS1)									Extracted: 06/14/07 11:41					
Benzene	EPA 8021B	20.3		0.500	ug/l	1X		20.0	102%	(75-125)			06/14/07 13:15	
Toluene	"	21.1		0.500	"	"		"	106%	(80-120)			"	
Ethylbenzene	"	21.9		0.500	"	"		"	110%	(80-130)			"	
Xylenes (total)	"	64.2		1.50	"	"		60.0	107%	"			"	
Surrogate(s): 4-BFB (FID)		*Recovery: 102%*			*Limits: 70-130%*	"							*06/14/07 13:15*	
Matrix Spike (7060620-MS1)							QC Source: PQF0499-03		Extracted: 06/14/07 11:41					
Benzene	EPA 8021B	16.0		0.500	ug/l	1X	0.115	20.0	79.4%	(65-144)			06/14/07 14:10	
Toluene	"	16.0		0.500	"	"	ND	"	80.0%	(70-135)			"	
Ethylbenzene	"	16.7		0.500	"	"	0.156	"	82.7%	(65-145)			"	
Xylenes (total)	"	55.1		1.50	"	"	0.567	60.0	82.8%	(60-145)			"	
Surrogate(s): 4-BFB (FID)		*Recovery: 103%*			*Limits: 70-130%*	"							*06/14/07 14:10*	
Matrix Spike Dup (7060620-MSD1)							QC Source: PQF0499-01		Extracted: 06/14/07 11:41					
Benzene	EPA 8021B	14.3		0.500	ug/l	1X	0.125	20.0	70.9%	(65-144)	11.2%	(20)	06/14/07 14:38	
Toluene	"	14.4		0.500	"	"	ND	"	72.0%	(70-135)	10.5%	"	"	
Ethylbenzene	"	15.0		0.500	"	"	0.156	"	74.2%	(65-145)	10.7%	"	"	
Xylenes (total)	"	49.5		1.50	"	"	0.592	60.0	74.8%	(60-145)	10.0%	"	"	
Surrogate(s): 4-BFB (FID)		*Recovery: 93.8%*			*Limits: 70-130%*	"							*06/14/07 14:38*	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report shall not be reproduced except in full without the written approval of the laboratory.

Sarah Rockwell

Sarah Rockwell, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906-9200 fax: (503) 906-9210

Delta Consultants - Tigard	Project Name	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number	ORZ0922-OM	Report Created:
Tigard, OR 97223	Project Manager	Brian Pletcher	06/26/07 15:32

Oil and Grease Analysis per EPA Method 1664 - Laboratory Quality Control Results

TestAmerica - Portland, OR

QC Batch: 7060719 **Water Preparation Method: O&G prep CE**

Analyte	Method	Result	MDL*	MRL	Units	Dil	Source Result	Spike Amt	% REC	(Limits)	% RPD	(Limits)	Analyzed	Notes
Blank (7060719-BLK1)								Extracted: 06/18/07 09:40						
Oil & Grease	EPA 1664	ND	---	5.00	mg/l	1x	--	--	--	-	-	--	06/18/07 17:43	
LCS (7060719-BS1)								Extracted: 06/18/07 09:40						
Oil & Grease	EPA 1664	35.9	---		mg/l	1x	--	40.2	87.1%	(78-114)	--	--	06/18/07 17:43	
Matrix Spike (7060719-MS1)					QC Source: PQF0312-04			Extracted: 06/18/07 09:40						
Oil & Grease	EPA 1664	35.6	---		mg/l	1x	0.306	40.2	89.3%	(78-114)	--	--	06/18/07 17:43	

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Sarah Rockwell, Project Manager

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PORTLAND, OR 9405 S.W. NIMBUS AVENUE
BEAVERTON, OR 97008-7132
ph: (503) 906.9200 fax: (503) 906.9210

Delta Consultants - Tigard	Project Name:	**Willbridge Terminal -Conoco Phillips**	
7150 SW Hampton - Suite 220	Project Number:	ORZ0922-OM	Report Created
Tigard, OR 97223	Project Manager:	Brian Pletcher	06/26/07 15:32

Notes and Definitions

Report Specific Notes:

None

Laboratory Reporting Conventions:

DET	-	Analyte DETECTED at or above the Reporting Limit. Qualitative Analyses only.
ND	-	Analyte NOT DETECTED at or above the reporting limit (MDL or MRL, as appropriate)
NR/NA	-	Not Reported / Not Available
dry	-	Sample results reported on a Dry Weight Basis. Results and Reporting Limits have been corrected for Percent Dry Weight
wet	-	Sample results and reporting limits reported on a Wet Weight Basis (as received). Results with neither 'wet' nor 'dry' are reported on a Wet Weight Basis
RPD	-	RELATIVE PERCENT DIFFERENCE (RPDs calculated using Results, not Percent Recoveries).
MRL	-	METHOD REPORTING LIMIT. Reporting Level at, or above, the lowest level standard of the Calibration Table
*MDL**	-	*METHOD DETECTION LIMIT. Reporting Level at, or above, the statistically derived limit based on 40CFR, Part 136, Appendix B* *MDLs are listed on the report only if the data has been evaluated below the MRL. Results between the MDL and MRL are reported as Estimated Results.
Dil	-	Dilutions are calculated based on deviations from the standard dilution performed for an analysis, and may not represent the dilution found on the analytical raw data.
Reporting Limits	-	Reporting limits (MDLs and MRLs) are adjusted based on variations in sample preparation amounts, analytical dilutions and percent solids, where applicable.
Electronic Signature	-	Electronic Signature added in accordance with TestAmerica's *Electronic Reporting and Electronic Signatures Policy*. Application of electronic signature indicates that the report has been reviewed and approved for release by the laboratory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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Sarah Rockwell

Sarah Rockwell, Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

11720 North Creek Pkwy N Suite 400, Bothell, WA 98011-8244 425-420-9200 FAX 420-9210
11922 E. First Ave, Spokane, WA 99206-5302 509-924-9200 FAX 924-9290
9405 SW Nimbus Ave, Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT: Delta Consultants
REPORT TO: Jake Neal, Delta Consultants
ADDRESS: Tigard, OR
PHONE: 503-639-8098 Fax: 503-639-7619
PROJECT NAME: Willbridge DMR
PROJECT NUMBER: OR70922 om
SAMPLED BY: NWH

INVOICE TO: Delta
P.O. NUMBER:

TURNAROUND REQUEST
In Business Days *
Organic & Inorganic Analyses: 10 (STD) 7 5 4 3 2 1 <1
Petroleum Hydrocarbon Analyses: 5 (STD) 4 3 2 1 <1
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges

PRESERVATIVE

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	EPA/APHA 1664 oil & grease	8020 BTEX											MATRIX (W, S, O)	# OF CONT.	LOCATION / COMMENTS	TA WO ID
1	Post	6-13-7 / 8:10	X	X											W	3		
2																		
3																	pH=6.9	
4																	Totalizer=	
5																	8,023,240	
6																		
7																		
8																		
9																		
10																		

RELEASED BY: [signature] DATE: 06-13-07
PRINT NAME: Nate Hemphill FIRM: Delta TIME: 13:20
RECEIVED BY: [signature] DATE: 6-13-07
PRINT NAME: Jeremy Morgan FIRM: TAP TIME: 1320
RELEASED BY: DATE:
PRINT NAME: FIRM: TIME:
RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS
TEMP:
PAGE 1 OF 1

COC REV 05/2006

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requ[illegible] in this chain of custody form and for any additional analyses performed on this project.
Payment for services is due within 30 days from the date of invoice unless otherwise contracted. Sample(s) will be disposed of after 30 days unless otherwise contracted.

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TestAmerica Sample Receipt Checklist

Received by: [illegible]
Date: 6-13-[illegible]
Time: 1320
Initials: [illegible]

Unpacked by: [illegible]
Date: 6/13/[illegible]
Initials: [illegible]

Logged-in by:
Date: 6/13
Initials: SM

Work Order No. PQF0499 163
Client: [illegible]
Project: [illegible] DMR

Temperature out of range
___ No Ice
___ Ice Melted
___ Win 4 Hours
___ Other

***ESI Clients (see Section C)

Cooler Temperature (IR) 4.8 °C plastic glass NA (oil/air samples, ESI client)

A

Custody Seals: (#___)

Signature Y N Dated: 6-13-[illegible]
X None

Container Type:
1 #Cooler(s)
___ #Box(s)
___ None (#Other: ___)

Coolant Type:
___ Gel Ice
X Loose Ice
___ None

Packing Material:
X Bubble Bags
___ Styrofoam Cubbies
___ None (1 Other: plastic) [illegible]

Received from:
X TA Courier
___ Senvoy
___ UPS
___ Fed Ex
___ Client
___ TDP
___ DHL
___ SDS
___ Mid-Valley
___ GS/TA
___ GS/Senvoy
___ Other: ___

B

Sample Status:
(If N circled, see NOD)

General:			
Intact?	Y	N	
# Containers Match COC?	Y	N	none given
IDs Match COC?	Y	N	
For Analyses Requested:			
Correct Type & Preservation?	Y	N	
Adequate Volume?	Y	N	
Within Hold Time?	Y	N	
Volatiles:			
VOAs Free of Headspace?	Y	N	NA
TB on COC? not provided	Y	N	NA
Metals:			
HNO3 Preserved?	Y	N	NA

C

***ESI Clients Only

Temperature Blank: 4.8 °C not provided

All preserved bottles checked Y N NA (voas/soils/all unp.)
All preserved accordingly? Y N (see NOD) NA (voas/soils/all unp.)

Army Corp: Geiger (ticks/min): ___ ___ ___ ___

Temperatures (IR): ___ °C ___ °C ___ °C ___ °C
(left) (middle) (right) (air)

Project Managers:

Comments: ___

PM Reviewed: ___ (Initial/Date)

COPPOR00006428

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

Water Pollution Control Laboratory
6543 N. Burlington Ave., Portland, Oregon 97203-5452
(503) 823-5600

Expiration Date : 09/15/07
Permit Number: 500.015
Page: i

WASTEWATER DISCHARGE PERMIT

ISSUED TO:	Tosco Refining Co. / Chevron Products Co.
SIC CODE:	2992, 5171
PLANT TYPE:	Groundwater Remediation Site
EPA CATEGORY:	Non-Categorical
LOCATION:	5528 NW Doane Ave. Portland, Oregon 97210
MAILING ADDRESS:	c/o ICHM Environmental Management, Inc. 123 NE 3rd Ave. #300 Portland, Oregon 97232
RESPONSIBLE OFFICIAL:	David W. Holthe
PHONE NUMBER:	(503) 248-1538
FAX NUMBER:	(503) 248-1522
EXPIRATION DATE:	09/15/07

INDUSTRIAL SOURCE CONTROL MANAGER — Gerald W. Baumgartner — Effective Date

PREPARED BY: Eric De Berry
CHECKED BY : Miguel Santana

Test America certification

OLELAP

Oregon Environment Laboratoric Accreditation Program

~~OR100021~~

OR 100021

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INTRODUCTION

PERMITTED ACTIVITIES

The permittee is authorized to discharge industrial wastewater to the City of Portland's sewer system in compliance with Chapter 17.34 of the City Code, the Bureau of Environmental Services Administrative Rules and any applicable provisions of federal or state laws or regulations and in accordance with discharge point(s), effluent limitations, monitoring requirements, and all other conditions set forth herein.

It is the permittee's duty to comply with all conditions of this permit. Any noncompliance with permit requirements constitutes a violation of Chapter 17.34 of Portland's City Code and, as such, subjects the permittee to enforcement action(s).

Schedule A
WASTEWATER DISCHARGE LIMITATIONS

Listed below are the waste discharge limitations not to be exceeded after the permit effective date. Applicable regulations include Chapters 17.34 and 17.36 of the Code of the City of Portland and 40 CFR 403. The point of compliance with the discharge limitations shall be 1A.

POC (*)	Pollutant Name	Local Limit Daily Max (mg/L)	Categorical Limit (mg/L mg/l, lb / off lb) Daily	Monthly
	METALS			
	Arsenic	0.2		
	Cadmium	0.7		
	Chromium	5.0		
	Copper	3.7		
	Lead	0.7		
	Mercury	0.010		
	Molybdenum	1.4		
	Nickel	2.8		
	Selenium	0.6		
	Silver	0.4		
	Zinc	3.7		
	NON-METALS (INORGANICS)			
	Cyanide	1.2		
*	**pH**	**5.0-11.5 su**		
	Sulfide	4.0		
	NON-METALS (ORGANICS)			
	1,2-Dichloroethane	0.50		
	2,4-Dinitrotoluene	0.13		
	Acrylonitrile	1.00		
	Chlordane	0.03		
	Chlorobenzene	0.20		
	Chloroform	0.20		
	Nitrobenzene	2.00		
	Pentachlorophenol	0.04		
	Trichloroethylene	0.20		
*	**Non-polar Oil & Grease**	**110**		
	Total Toxic Organics	see note 7		
	Permit Specific Limits	see note 5		

Notes:

1. This schedule may be revised upon written notification by the City to accommodate process changes by the permittee or as determined by the Director of Environmental Services.

2. In addition to the limits stated in Schedule A, the permittee shall comply with all other applicable City, State and Federal regulations.

3. The pollutant parameters marked with an asterisk (*) are the pollutants of concern. At a minimum, the permittee is required to monitor for pollutants of concern. All limits are applicable at the point of compliance.

4. The permittee is required to meet the MOST stringent limitation listed, denoted in bold type in the above table, when comparing the *Local Limit* column with the *Categorical Limit* column.

5. The City has Pollutant Prohibitions for certain individual organic compounds that are not amenable to biological treatment or that have a screening value or local limit that is less than the practical method detection level (MDL). Discharges containing concentrations of a prohibited pollutant above the MDL, as listed in Appendix 4, is a violation of City Code and this permit.

Schedule B
MONITORING AND REPORTING REQUIREMENTS

I. Final Compliance report (samples for analysis to be taken within the first 90 days of operation after the issuance of this permit):

Parameter	Sample Type	First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Metals													
Arsenic (total)	Composite										✓	✓	✓
Cadmium (total)	Composite										✓	✓	✓
Chromium (total)	Composite										✓	✓	✓
Copper (total)	Composite										✓	✓	✓
Lead (total)	Composite										✓	✓	✓
Non Metals													
pH	Grab										✓	✓	✓
Oil and Grease (total)	Grab										✓	✓	✓
BTEX	Grab										✓	✓	✓
Due Dates		Feb 15	Mar 15	Apr 15	May 15	Jun 15	Jul 15	Aug 15	Sept 15	Oct 15	Nov 15	Dec 15	Jan 15

I. Final Compliance Report, Notes:

1. Final Compliance Reports (FCR) as per Section 17.34.060 (a)(4)(c)(b) shall be submitted to the Industrial Source Control Division by the 15th of the month following the conclusion of the monitoring period. Sampling, analysis, and reporting will be according to the preceding table.

2. At the end of the Final Compliance monitoring period, the industrial discharger shall submit to the Industrial Source Control Division a report indicating whether the applicable pretreatment standards or requirements are being met on a consistent basis. A certification statement is included on the last FCR of the Final Compliance period. If the pretreatment standards are not being met, a supplemental report must be submitted describing any additional operation, maintenance and pretreatment necessary to bring the industry into compliance.

3. All official sampling shall be taken at the approved Sampling Location (see Appendix 2).

4. The permittee shall analyze samples for all listed parameters plus any other which might be expected to be present in significant quantities.

5. FCRs shall include signed and completed Chain of Custody forms for all laboratory analyses.

6. The permittee should instruct its laboratory that, if the oil and grease (total) concentration exceeds 110 mg/L, the laboratory should determine the concentrations of the polar and non-polar oil and grease fractions.

Schedule B
MONITORING AND REPORTING REQUIREMENTS

II. Periodic Compliance Self-Monitoring Report

Parameter	Sample Type	First Quarter			Second Quarter			Third Quarter			Fourth Quarter		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Non-Metals													
pH	Grab	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oil and Grease (total)	Grab	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BTEX	Grab	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Due Dates		Feb 15	Mar 15	Apr 15	May 15	Jun 15	Jul 15	Aug 15	Sept 15	Oct 15	Nov 15	Dec 15	Jan 15

II. Periodic Compliance Self-Monitoring Report, Notes:

1. Periodic Compliance Reports are to be submitted to the Industrial Source Control Division by the 15th of the month following the conclusion of the reporting period. Sampling, analysis, and reporting will follow the schedule above.

2. All official sampling shall be taken at the approved sampling location. (See Appendix 2: sampling location map.)

3. The permittee shall analyze samples for all listed parameters plus any other which might be expected to be present in significant quantities.

4. The permittee shall submit all self-monitoring results to the Industrial Source Control Division as part of their monitoring and reporting requirements.

5. All monitoring results are to be mailed to:

Industrial Source Control Division
Bureau of Environmental Services
City of Portland
6543 N. Burlington Ave.
Portland, OR 97203

6. Periodic Compliance Reports are to be submitted by the 15th of each month following the report period for each sampling location. The reports shall consist of:

    a. Statement of compliance/noncompliance, signed by the officially designated contact person (statement is found on bottom of the self-monitoring report form).

    b. Sample analysis results recorded on the appropriate self-monitoring report form and chain of custody for sample collected.

    c. Originals of all laboratory analysis sheets showing who analyzed sample, date and time sample was analyzed, analytical methods used, method detection limit, test result, and quality assurance/quality control.

    d. Copies of pH charts (if any) showing violations (if any).

    e. Any other reports that may be required.

    f. Calculations of monthly average, if appropriate.

7. The permittee should instruct its laboratory that, if the oil and grease (total) concentration exceeds 110 mg/L, the laboratory should determine the concentrations of the polar and non-polar oil and grease fractions.

8. The City may reduce or increase the frequency of sampling, based on the analytical results submitted.

9. As per 40 CFR 403.12(g)(5), if an industrial user subject to the reporting requirements of Schedule B monitors any parameter from the official sampling location more frequently than required, using procedures specified in Schedule E14(c), the results of their monitoring must be submitted in the required report.

Schedule C
COMPLIANCE SCHEDULE

Schedule D
SPECIAL CONDITIONS

As per 17.34.040 (c), the Director of Environmental Services may limit the characteristics or volume of the ground water discharged to the City sewer system.

The table below lists the benchmark indicators for discharging treated groundwater to the City sanitary sewer. In the event treated groundwater from Tosco-Chevron., contains a parameter with a concentration greater than the benchmark, cease discharging and notify the City within 24 hours of becoming aware of the analysis results.

Pollutant	Benchmark Concentration mg/L
Cadmium (total)	0.06
Chromium (total)	0.34
Copper (total)	0.23
Lead (total)	0.10
Mercury (total)	0.0013
Nickel (total)	0.25
Silver (total)	0.036
Zinc (total)	0.47
Benzene (total)	0.05
BTEX (total)	0.75
Non-Polar Oil & Grease	10.0

The City may require a report detailing the cause of the excursion, the work done to rectify the problem, and the results of the re-sampled effluent, before the discharge is allowed to continue.

Schedule E
GENERAL CONDITIONS

1. Accidental Spill Prevention Plan

To comply with Section 17.34.090 of the City Code, the permittee shall submit a new or revised Accidental Spill Prevention Plan (ASPP) to the Industrial Wastewater Management Section 90 days after the effective date of this permit. The plans shall include the following elements.

a. A description of the hazardous substances handled and their potential points of entry into the City sewer system or storm runoff

b. A description of the measures to be taken to prevent entry at the described points before a spill occurs

c. Measures to be taken to contain a spill if one occurs

d. A description of employee training in the prevention and control of spills

e. A posted notice informing employees of the requirement to notify the Bureau of Environmental Services in case of spills or uncontrolled discharges.

2. Appeal

Upon receipt of a final industrial wastewater discharge permit, a permittee may appeal any of its terms or conditions to the Code Hearings Officer in accordance with procedures set out at Chapter 22.10 of the Portland City Code; provided that such an appeal shall include a copy of the permit that is the subject of the appeal, shall state the basis for the appeal, and shall be filed with the Code Hearings Officer and the Bureau of Environmental Services.

3. Authorized Discharge

All discharge and activities authorized herein shall be consistent with the terms and conditions of this permit, Chapter 17.34 of the City Code and the Administrative rules. The discharge of any pollutant in excess of these limits shall constitute a violation of the terms and conditions of this permit.

4. Bypass or Diversion

The diversion or bypass (the intentional diversion of wastestreams from any portion of a permittee's treatment facility) of any discharge, from facilities used by the permittee, to maintain

compliance with the terms and conditions of this permit is prohibited except:

a. When unavoidable to prevent loss of life or severe property damage.

b. When excessive storm drainage or runoff would damage facilities necessary for compliance with the terms and conditions of this permit.

4. Bypass or Diversion (continued)

The permittee shall immediately notify the City in writing of each such diversion or bypass, in accordance with the procedure specified in condition No. 23.

5. Certification

Legible copies of all applications, reports, and information submitted to the City shall be signed and certified as follows in accordance with 40 CFR 403.12.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

6. Chemical Storage

Chemicals shall be stored in a manner that will prevent the entry of these substances into the sanitary, combined sewer, or storm sewer system, or waters of the state.

7. Continuous Compliance

Compliance with Schedule E, No. 23 shall not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit.

8. Dilution Prohibition

It is unlawful for a discharger to use dilution as a partial or complete substitute for adequate treatment to achieve compliance with the standards and limitations set forth in this permit. The Director may impose mass limitations on dischargers who are using dilution to meet the applicable pretreatment standards or the requirement set forth in this permit.

9. Enforcement Provision

A violation of any conditions, standards or requirements of this permit constitutes a violation of Chapter 17.34 of the City Code and any rules promulgated thereunder. Therefore, the City may seek any or all of the remedies or penalties provided for in Section 17.34.110 of the City Code, including recovery of costs incurred by the City, in response to the following:

a. Any violation by the permittee of the provisions in this Industrial Wastewater Discharge Permit.

b. Any violation by the permittee of the provisions of the City Code.

9. Enforcement Provision (continued)

c. Any violation by the permittee of an Enforcement Action requirement with respect to provisions set forth in this Industrial Wastewater Discharge Permit and the City Code and Administrative Rules.

The range or severity of enforcement actions taken by the City against the permittee will be determined by, but not limited to, the nature, magnitude, duration, and frequency of the violation as provided by City Code and Administrative Rules.

10. Extra-Strength Sewer Charge (ESSC)

Discharges exceeding 300 mg/L for the 5-day biochemical oxygen demand (BOD) or 350 mg/L total suspended solids (TSS) concentrations (as defined in Section 17.36.060(1) of the City Code) shall be subject to the extra-strength sewer charge (ESSC) established in Section 17.36.060(1).

11. Hazardous Waste Notification

The industrial user shall notify the Industrial Source Control Division Section, the POTW, the EPA Regional Waste Management Division Director, and State hazardous waste authorities in writing of any discharge into the POTW of a substance, which, if otherwise disposed of, would be a hazardous waste under 40 CFR Part 261. Such notification must include the name of the hazardous waste as set forth in 40 CFR Part 261, the EPA hazardous waste number, and the type of discharge (continuous, batch, or other). If the industrial user discharges more than 100 kilograms of such waste per calendar month to the POTW, the notification shall also contain the following information to the extent such information is known and readily available to the industrial user: an identification of the hazardous constituents contained in the wastes, an estimation of the mass and concentration of such constituents in the wastestream discharged during that calendar month, and an estimation of the mass of constituents in the wastestream expected to be discharged during the following 12 months.

12. Inspection and Entry

The permittee shall, at all reasonable times, allow authorized representatives of the City:

a. To enter the permittee's premises where an effluent source or disposal system is located or where any records associated with this permit are kept.

b. To have access to any required records and permission to copy these records. At no time can wastewater effluent data be claimed or held as confidential information.

c. To inspect and evaluate any monitoring equipment or monitoring methods required by this permit.

d. To sample any discharge to the sewer system.

13. Liability

The City of Portland, its officers, agents or employees shall not sustain any liability due to the issuance of this permit or the construction or maintenance of facilities resulting from this permit.

14. Monitoring

a. The permittee shall record the following information:

* The exact date, time, and place of sampling
* Name of person who collected the sample(s)
* Type of sample(s) collected
* The dates analyses were performed
* Who performed the analyses
* The analytical techniques or methods used
* The results of all required analyses
* Whether quality assurance and quality control laboratory procedures are followed

b. Samples and measurements, taken to meet the requirements of the above condition, shall be representative of the effluent. Grab samples must be collected for pH, cyanide, phenol, sulfide, volatile organic compounds and oil and grease monitoring.

c. All sampling and analytical methods used to meet the monitoring requirements specified in this permit shall, unless otherwise approved in writing by the City, conform to the Guidelines Establishing Test Procedures for the Analysis of

Pollutants as specified in 40 CFR, Part 136. Laboratory quality assurance and quality control programs should be documented. EPA QA/QC programs should be followed.

d. The permittee is required to document proper installation, and maintenance of flow monitoring and sampling equipment.

e. If the results of the permittee's wastewater analysis indicate that a noncompliance has occurred, the permittee must notify the City's Industrial Source Control Division Section within 24 hours of becoming aware of the noncompliance. The permittee must also repeat the sampling within 24 hours of the effluent noncompliance or next process day and submit the analysis to the City within 30 days after becoming aware of the noncompliance.

14. Monitoring (continued)

f. The permittee shall take all reasonable steps to minimize or correct any adverse impact to the POTW or the environment resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

g. If requested, the permittee shall provide or split discharge samples with the City of Portland Water Pollution Control Laboratory.

15. Permit Modification

This permit may be modified with 30 days prior written notification, in whole or in part, for causes including but not limited to the following:

a. A change in the City's NPDES permit or any other condition that requires either a temporary or permanent elimination of any authorized discharge.

b. To incorporate new or revised federal, state, or local pretreatment standards or requirements.

c. Information indicating that the permitted discharge poses a threat to the City's collection and treatment system, POTW personnel, or the receiving waters and sludge.

d. To correct typographical or other errors in the permit.

e. Any significant change in the volume of a permitted discharge.

16. Permit Renewal

This permit is issued to a specific entity and cannot be transferred by the industrial user and must be renewed pursuant to Section 17.34.070 of the Code of the City of Portland and Permit Applications must be received 90 days prior to:

a. Expiration date of current permit.

b. In the event the permittee plans to cease operations at the present location, and plans to relocate within the City of Portland's jurisdiction and continue the same permitted activities.

c. The permitted industrial process being significantly altered or changed so that pollutants not specifically mentioned in the current permit are present in the permittee's discharge.

17. Permit Suspension or Termination

a. Violation of any terms or conditions of this permit or any applicable rule, standard, or order of the director of the Bureau of Environmental Services.

17. **Permit Suspension or Termination (continued)**

b. Obtaining this permit by misrepresentation or failure to fully disclose all relevant facts.

c. Falsifying self-monitoring reports.

d. Tampering with monitoring equipment.

e. Refusing to allow prompt access to the facility premises and records.

f. Failure to meet effluent limitations.

g. Failure to pay fines.

h. Failure to meet compliance schedules.

18. **Plant Closure**

In the event the permittee plans to cease operations at the present business location, and not to relocate within the City of Portland's jurisdiction, the permittee shall inform this office, in writing, 60 days prior to plant closure.

19. **Property Rights or Privileges**

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges; it does not authorize any injury to private property or any invasion of personal rights; and it does not authorize any infringements or federal, state, or local laws or regulations.

20. **Records Retention**

All records of monitoring activities and results, including all original strip chart recordings for continuous monitoring instrumentation (and calibration and maintenance records), shall be retained by the permittee for a minimum of three years. This retention period shall be extended during the course of any unresolved litigation pertaining to the discharge of pollutants by the permittee, or whenever it is requested by the City, the Approval Authority (DEQ), the Regional Administrator (EPA).

21. **Reporting Requirements**

a. Accidental or Slug Loading

The permittee shall notify the City immediately, either in person or by telephone (Duty Officer Pager # 323-3398 and Lead Operator CBWTP # 823-2530), if accidental or slug loading to the sanitary sewer occurs. A formal written report, discussing circumstances and remedies, shall be submitted to the City within 5 days of the occurrence.

21. Reporting Requirements (continued)

b. Changes in Wastewater Characteristics

The permittee shall give notice to the Industrial Source Control Division Section 90 days before any facility expansion, production increase, or process modifications that result in new or substantially increased discharges or a change in the nature of the discharge.

c. Change in representative

If the responsible corporate official changes, notify the City within 10 days, as per 40 CFR 403.12 (l) (4).

22. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to the other circumstances and the remainder of this permit shall not be affected.

23. Slug Load Notification

If the permittee is unable to comply with all the conditions of this permit due to a breakdown of equipment or facilities, an accident caused by human error or negligence, or any other cause such as an act of nature, or should any condition cause the release of any slug load, the permittee shall:

a. Immediately take action to stop, contain, clean up the unauthorized discharges, and correct the problem.

b. Immediately call the Lead operator of the Columbia Boulevard Wastewater Treatment Plant (823-2530) so that plant personnel can evaluate the impact of the discharge and take corrective action. Notify Industrial Source Control by calling the Duty Officer, pager # 323-3398.

c. Within five (5) days submit a detailed written initial report to the City describing the breakdown, the actual quantity of resultant waste discharges, the corrective action taken, the steps taken to prevent recurrence, and any other pertinent information.

Samples shall be taken immediately upon discovery of the Slug load. Within 15 days, a follow-up report shall be submitted. The report shall contain analysis of samples taken during such discharge and samples taken after normal conditions have been restored. The samples, at a minimum, shall be analyzed for the parameters required in Schedule B. Sampling shall be continued until all parameters are within discharge limits.

24. Upset

a. Definition:

For the purposes of this section, upset means an exceptional incident in which there is unintentional and temporary noncompliance with applicable pretreatment standards, because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an Upset:

An upset will constitute an affirmative defense to an action brought for noncompliance with applicable pretreatment standards, if the requirements of paragraph c are met.

c. Conditions Necessary for a Demonstration of an Upset:

A permittee who wishes to establish the affirmative defense of an upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and the permittee can identify the specific cause(s) of the upset.

(2) The facility was, at the time, being operated prudently, efficiently, and in compliance with applicable operation and maintenance procedures.

(3) The permittee has submitted the following information to the Industrial Source Control Division within 24 hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within 5 days).

* A description of the indirect discharge and cause of noncompliance

* The period of noncompliance, including exact dates and times or, if not corrected, the anticipated duration of noncompliance

* Steps planned or now being taken to reduce, eliminate, and prevent recurrence of the noncompliance

d. Burden of Proof

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset shall have the burden of proof.

e. Permittee Responsibility in Case of an Upset.

24. Upset (continued)

If reduction, loss, or failure of its treatment facility occurs, the permittee shall control production of all discharges in order to maintain compliance with applicable pretreatment standards until the facility is restored or an alternative method of treatment is provided. This requirement especially applies if the primary source of the treatment facility power is reduced, lost, or failed.

Appendix 1
DEFINITIONS

Abbreviations

BOD_5	Five-day biochemical oxygen demand
mg/L	Milligrams per liter
k	Kilograms
m^3/d	Cubic meters per day
ppm	Parts per million (assumed equal to milligrams per liter)
POTW	Publicly owned treatment works
WPCL	Water Pollution Control Laboratory

Averages for BOD, TSS, and chemical parameters are based on arithmetic mean of samples taken.

Definitions

Bypass

The intentional diversion of wastestreams from any portion of a permittee's treatment facility..

Compatible Pollutant

Biochemical oxygen demand, suspended solids, pH and fecal coliform bacteria, and additional pollutants that the City treatment works is designed to treat.

Conventional Pollutants

Classification of industrial pollutants, which includes BOD (biochemical oxygen demand), suspended solids, fecal coliform, pH (acidity/alkalinity), and other pollutants so designated by EPA, as defined by Section 304(a)(4) of the Clean Water Act.

Director of Environmental Services

The Director of Environmental Services of the City of Portland, Oregon, or that person's duly authorized representative or agent.

City, or City of Portland

The municipality of Portland, Oregon, a municipal corporation of the State of Oregon, acting through the City Council or any board, committee, body, official, or person to whom the Council shall have lawfully delegated the power to act on behalf of the City. Unless a particular board, committee, official, or person is specifically designated in these rules and regulations, wherever action by the City is explicitly required or implied herein, it shall be understood to mean action by the Director of Environmental Services of Portland, Oregon, or that person's duly authorized representative or agent.

Effective Date of this Permit

The date this permit is signed by the Director of the Bureau of Environmental Services.

Expiration Date

From 1 to 5 years beyond the effective date of this permit.

Hazardous or toxic substances

Hazardous or toxic substances are those substances referred to in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S. Code 9601 et seq.), section 502(13) of the Clean Water Act, and any other substances so designated by the Director of Environmental Services and contained in rules adopted pursuant to this Chapter.

Industrial Waste

Any liquid, solid, or gaseous substance (or combination thereof) resulting from any process of industry, manufacturing, commercial food processing, business, agriculture, trade, or research, including but not limited to the development, recovery, or processing of natural resources and leachate from landfills or other disposal sites.

Industrial Wastewater Discharge Permit

A permit to discharge industrial wastewater into the City sewer system issued under the authority of the City Code, which prescribes certain discharge requirements and limitation.

Interference

Interference means a discharge which, alone or in conjunction with a discharge or discharges from other sources, inhibits or disrupts the normal operation of the City sewer system, or which causes a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or any increase in the cost of treatment of sewage or in the cost of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations); Section 405 of the Clean Water Act, the Solid Waste Disposal Act (including Title II, more commonly referred to as the Resource Conservation and Recovery Act), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of RCRA, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Maximum Daily Discharge Limitation

The highest allowable daily discharge.

Nonconventional Pollutants

All pollutants that are not specifically designated as either conventional or toxic.

Oil and Grease

Fats, Oils and Grease. Fats, oils and grease are those substances which are measured by USEPA Method 1664: N-Hexane Extractable Method (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM).

(a) Non-polar fats, oils and grease are that portion of fats, oils and grease which is measured as non-polar (from petroleum sources) by USEPA Method 1664.

(b) Polar fats, oils and grease are that portion of fats, oils and grease which is determined to be polar (of animal or vegetable origin) by USEPA Method 1664.

Pass Through

Pass through means a discharge which exits the POTW into waters of the United States in Quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

POTW

POTW means Publicly Owned Treatment Works, which includes any devices and systems, owned by a State or municipality, used in the collection, transportation, storage, treatment, recycling and reclamation of wastewater.

Pretreatment

The reduction of the amount of pollutants, the elimination of pollutants, or the alternation of the nature of pollutant properties in wastewater to a non-harmful state, prior to or in lieu of discharge of such pollutants into the City sewer system.

Sampling

a. The "monthly average" other than pH is the arithmetic mean of samples collected curing a calendar month.

b. The "daily maximum" is defined as the greatest allowable value for any calendar day.

c. A "24-hour composite" sample shall mean a flow-proportioned mixture of not less than eight discrete aliquots. Each aliquot shall be a grab sample of not less than 100 ml and shall be collected and preserved in accordance with 40 CFR part 136 and amendments.

d. A "Grab" sample is an individual sample collected in less than 15 minutes, without regard for flow or time.

e. A "Grab-Composite" is a minimum of four grab samples collected and preserved over a 24-hour period and combined to provide a representative sample of effluent being discharged.

Schedule of Compliance

A schedule of remedial measures, including an enforceable sequence of actions or operations leading to compliance with an effluent limitation or other limitation, prohibition, or standard.

Severe Property Damage

Substantial physical damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

Slugload

A slugload is any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge.

Solid Waste

Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permits.

Solid Waste Disposal

The final placement of refuse that cannot be salvaged or recycled.

Solvent Management Plan

A plan that specifies the toxic organic compounds used, the method of disposal used (instead of dumping into wastestreams), and procedures for ensuring that toxic organics do not spill or leak into wastewater discharged to the City sewer system.

Total Dissolved Solids

The total dissolved (filterable) solids as determined by use of the method specified in the list of approved test procedures.

Total Organic Active Ingredients

The sum of all organic active ingredients covered by the organic pesticide chemicals manufacturing subcategory, which are manufactured at a facility subject to the effluent guidelines for pesticides chemicals manufacturing.

Total Solids

The sum of dissolved and undissolved constituents in water or wastewater, usually expressed as milligrams per liter.

Total Suspended Solids

Total suspended matter that either floats on the surface or is in suspension in water or wastewater and that are removable by laboratory filtering (as described in *Standard Methods for the Examination of Water and Wastewaters*, current edition) or Guidelines Establishing Test Procedures for the analysis of Pollutants, contained in 40 CFR 136, as published in the *Federal Register*.(Bureau of Environmental Services Administrative Rules I[22])

Upset

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with applicable pretreatment standards, because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Waste

Unwanted materials left over from manufacturing processes, or refuse from places of human or animal habitation.

Wastewater

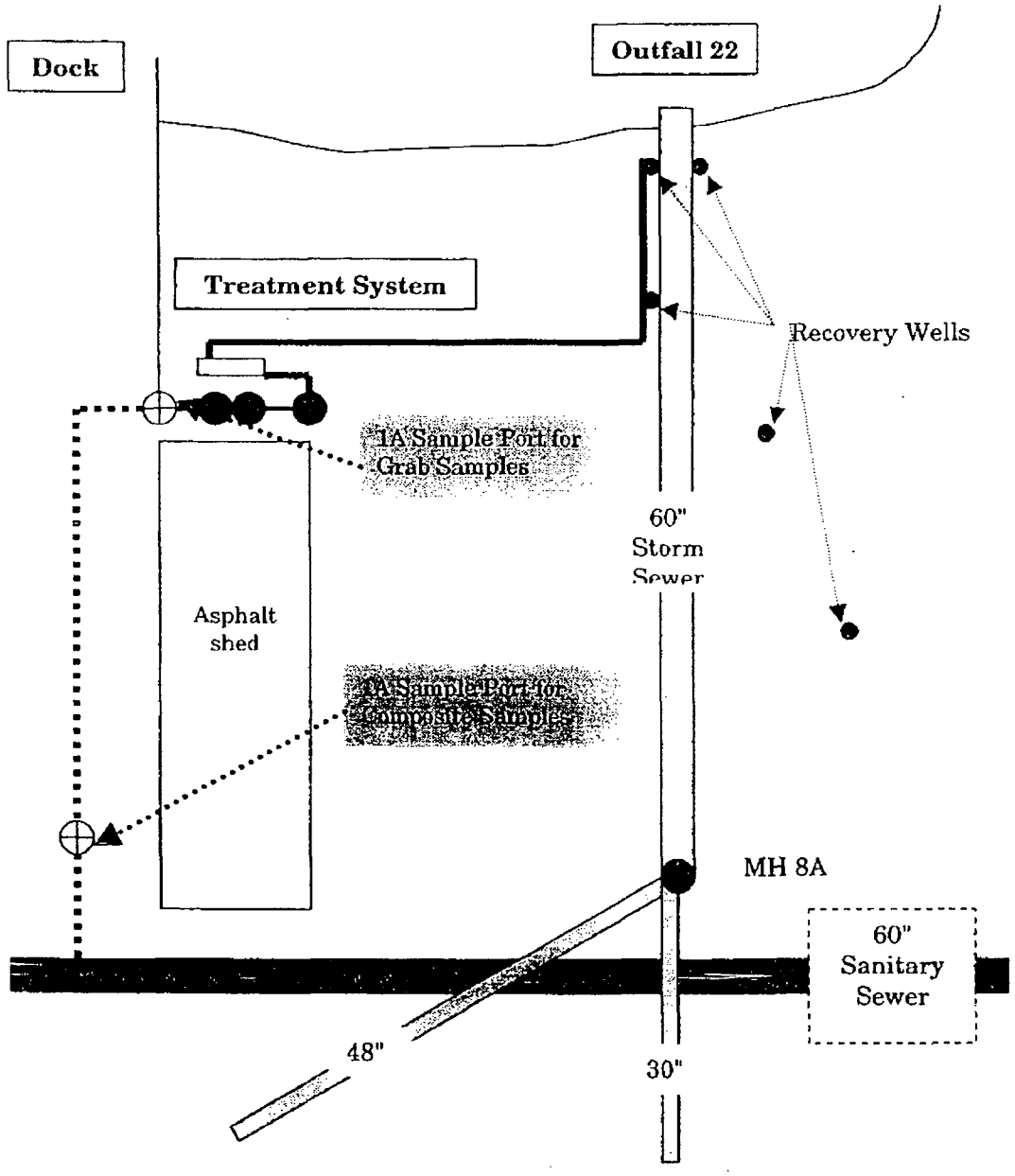
Industrial waste, sewage, or any other waste, including that which may be combined with any groundwater, surface water, or stormwater that may be discharged to the city sewer system.

Water Pollution

The addition of enough harmful or objectionable material to damage water quality.

Appendix 2
SAMPLING LOCATION MAP

A: DIAGRAM OF DISCHARGE POINTS & POINT OF COMPLIANCE



Appendix 3
RESERVED: ACCIDENTAL SPILL PREVENTION PLAN

To be prepared by the permittee and approved by the City. The Accidental Spill Prevention Plan must be submitted by December 15th, 2002.

Appendix 4
Individual Organic Compounds - Pollutant Prohibitions

POLLUTANT PROHIBITIONS	*METHOD DETECTION LIMIT(mg/L)*
Volatiles	
Bromodichloromethane	0.010
Bromoform	0.010
Bromomethane	0.010
1,1,1,2-Tetrachloroethane	0.010
Chloromethane	0.010
Dibromochloromethane	0.010
Vinyl Chloride	0.050
Base/Neutral extractables	
1,2-Diphenylhydrazine	0.010
1,3-Dichlorobenzene	0.010
2,6-Dinitrotoluene	0.010
4-Bromophenyl-Phenyl Ether	0.010
Bis (2-Chloroethoxy)methane	0.010
Bis (2-Chloroisopropyl)ether	0.010
Hexachlorobenzene	0.005
Hexachlorobutadiene	0.005
Hexachlorocyclopentadiene	0.005
N-Nitroso-Di-N-Propylamine	0.005
Pesticides	
4,4-DDD (p,p-TDE)	0.001
4,4-DDE (p,p-DEX)	0.001
4,4-DDT	0.001
a-BHC (alpha)	0.001
b-BHC (beta)	0.001
d-BHC (delta)	0.001
Dieldrin	0.001
Endosulfan II (beta)	0.001
Endosulfan Sulfate	0.001
Endosulfan-I (alpha)	0.001
Endrin	0.001
Endrin Aldehyde	0.001
g-BHC (gamma) (Lindane)	0.001
Heptachlor	0.001

COPPOR00006455

Heptachlor Epoxide	0.001
Toxaphene	0.001
Polychlorinated biphenyls (PCBs)	
PCB 1016	0.001
PCB 1221	0.001
PCB 1232	0.001
PCB 1242	0.001
PCB 1248	0.001
PCB 1254	0.001
PCB 1260	0.001

Permit Amendments

Reserved

CITY OF PORTLAND, OREGON - BUREAU OF DEVELOPMENT SERVICES

1900 SW Fourth Avenue, Suite 5000 • Portland, Oregon 97201 • www.bds.ci.portland.or.us

Landscape Certification

COPY

Site Information

Date _____ Permit Number 04-052768 / 04-052771 CO

Site Location/Street Address _____

City _____ State _____ Zip Code _____

Landscape Certifier Information - Check one

Self Certification | **Third Party Certification**

☐ Self Certification | ☐ Landscape Architect ☐ Landscape Contractor ☐ Arborist ☐ Other

Name _____

Registration or License Type and Number _____ exp Date _____

Street Address _____

City _____ State _____ Zip Code _____

Day Phone _____ FAX _____ email _____

Number of required trees planted
Number of required shrubs planted
Irrigation ☐ **Temporary** ☐ **Permanent** ☐ **None**
Landscaping installed according to approved plans? ☐ **Yes** ☐ **No**
If no, you must attach approved plans showing all substitutions made. All substitutions must be within the limits allowed by City code.

The property owner is responsible for ensuring that the required landscaping is installed correctly.

If the landscaping installation is falsely certified, it does not relieve the property owner of the responsibility for providing the required landscaping. The City of Portland does not in any way guarantee the performance of Landscape Certifiers.

If a false or incorrect Certification is submitted, BDS will take one or more of the following steps to seek correction of the situation:

- BDS will work with the Certifier to ensure that the required landscaping is installed in accordance with the approved plans.
- The Site Development Section may withhold final approval of the site work until the landscaping has been installed correctly and verified.
- Where applicable, the issuance of the Certificate of Occupancy may be delayed.
- If necessary, the case may be referred to the Compliance Services Section of BDS to carry out code enforcement activities, which may result in fines being assessed.

By signing this form, I certify that the landscaping at this site was installed in accordance with the approved plans.

_____

Self or Third Party Landscape Certifier's Signature Date

Submit this completed form to BDS Site Development, attn: Donna Ault, 1900 SW Fourth Avenue, Suite 5000, Portland OR, 97201. Third Party Certification must include a copy of the plan showing the approved plantings.

more information on back

COPPOR00006458

October 5, 2004
Project 06-6102-00-3980-285
DCN: C03-SAI-1001868-01-06012

City of Portland, Oregon
Bureau of Development Services
1900 S.W. Fourth Street
Portland, Oregon 97201

RE: Urban Forestry (Street Tree) Review Checklist

Chevron Willbridge Distribution Center	**and**	**Conoco Phillips Terminal**
5331 NW Doane Avenue		**5528 NW Doane Avenue**
Portland, Oregon		**Portland, Oregon**

DEQ WMCSR-NWR-94-06

To Whom It May Concern:

Attached is the completed Urban Forestry (Street Tree) Review Checklist to obtain a Site Development Permit for the installation of a sheet pile wall as a source control measure at the Chevron Willbridge Distribution Center (Chevron) and Conoco Phillips Terminal in Portland, Oregon. Chevron and Conoco Phillips are requesting are requesting permit approval to install the proposed source control measure under Oregon Department of Environmental Quality Consent Order WMCSR-NWR-94-06.

This package includes a narrative summary and a signed Urban Forestry (Street Tree) Review Checklist.

If you have any questions or need additional information, please contact Gerard Koschal at (503) 554-8852 or Kevin Schleh (503) 243-2070.

Sincerely,

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Kevin Schleh, R.G.
Senior Project Manager

City of Portland
APPROVED
DEC 2 8 2004
Permit Number

Science Applications International Corporation
1220 SW Morrison Avenue, Suite 500 / Portland, Oregon 97205 / tel: 503.243.6175 / fax: 503.243.1863 / www.saic.com

Narrative Summary
Urban Forestry (Street Tree) Review Checklist
Chevron Willbridge Distribution Center and Conoco Phillips Terminal
October 5, 2004

APPLICANTS:

Gerald Henderson
Chevron Products Company
5924 NW Front Avenue
Portland, OR 97210
(503) 221-7714

Martin A. Cramer
Conoco Phillips
5528 NW Doane Avenue
Portland, OR 97210
(503) 248-1517

CONSULTANTS:

Environmental Consultants:
Gerald Koschal, R.G., Senior Geologist
SAIC
1220 SW Morrison St., Ste. 500
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(503) 554-8852

Kevin Schleh, R.G., Senior Project Manager
SAIC
1220 SW Morrison St., Ste. 500
Portland, OR 97205
(503) 243-6421

Engineering Consultant:
Brad Berggren, P.E., R.G.
RSV Engineering, Inc.
31960 SW Charbonneau Dr., Ste. 101
Wilsonville OR 97070
(503) 694-6960

Property Information:

5531 NW Doane Avenue (Tax Lot # 1N1E18C 800)
Owner: Port of Portland
Lessee: Chevron Texaco

5528 NW Doane Avenue (Tax Lot # 1N1E18C 900)
Owner: Port of Portland
Lessee: Conoco Phillips

Owner: Port of Portland
Zone: IH (Heavy Industrial); Overlay: i (River Industrial)
Comprehensive Plan Designation: IS (Industrial Sanctuary)
Plan District: GS (Guild's Lake Industrial Sanctuary Plan District)
Zone Map: 2423

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P R
DEC 2
Permit

Narrative Summary
Urban Forestry (Street Tree) Review Checklist
Chevron Willbridge Distribution Center and Conoco Phillips Terminal
October 5, 2004

Introduction:

Chevron and Conoco Phillips are proposing to install a sheet pile wall as a source control measure under State of Oregon Department of Environmental Quality (DEQ) Consent Order WMCSR-NWR-94-06. The installation of this wall will replace the existing Holbrook Trench recovery system and eliminate seepage of separate phase hydrocarbon (SPH) from the area of the 27-inch sewer outfall and the Holbrook Slough into the Willamette River, enhance recovery of SPH, and control the flow of dissolved-phase petroleum hydrocarbons in groundwater to the river. During high river flow events, SPH and dissolved phase petroleum hydrocarbons could migrate into the Willamette River. The proposed sheet pile wall will meet the DEQ requirements for upland source control of contaminants to the Willamette River. In addition, the mitigation of the SPH seeps will help protect, conserve, enhance, and maintain the natural, scenic, historical, economic, and recreational qualities of lands along Portland's rivers and it provides for a more aesthetically pleasing environment along the Willamette River.

Proposed Project:

Similar projects have been completed in the area of the Site, with the most recent having been completed in 2001 at a 60 inch sewer outfall. The City of Portland Land Use Review Case Number for this project is LUR 01-00517 GW. During these projects, trees have been planted in all available locations along the frontage roads. Currently, an application for Greenway Review has been submitted to the City of Portland Bureau of Development Services (Case Number LU 04-045492 GW). Mr. Mark Walhood has been the primary contact for the Greenway Review. Ms. Rondi Felton of the City of Portland Bureau of Environmental Services Industrial Source Control Division has been contacted regarding the proposed work near the abandoned 27 inch sewer pipeline.

The purpose of the project is to mitigate potential migration pathways for groundwater seeps to the Willamette River by constructing a barrier wall and installing an extraction system on the landward side of the wall to remove SPH. The potential migration pathways include the alignment of an abandoned sewer and the former Holbrook Slough. The sheet pile wall has been proposed as a remedial measure to eliminate seepage of SPH from the area of the 27-inch sewer outfall and the Holbrook Slough into the Willamette River, enhance recovery of SPH, and to control the flow of dissolved-phase petroleum hydrocarbons in groundwater to the river. Chevron and Conoco Phillips propose to replace the existing recovery system with a new sheet pile wall and SPH recovery system that has been designed to encompass the mouth of the historic Holbrook Slough and for continuous operation that will not be affected by river flow stages. The sheet pile cutoff wall is necessary because multiple seeps have been observed in this area, and it is not effective to attempt to identify the source of individual seeps. Accordingly, the most effective solution to the problems at this site is to install the wall to cutoff migration pathways and to collect any SPH or dissolved phase petroleum hydrocarbons in a trench recovery system. Please see the attached "*Proposed Source Control Measure*" for a detailed description of the proposed project.

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Number

RSV
ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists

October 4, 2004

City of Portland
APPROVED
DEC 2 8 2004
Permit Number

Mr. Gerald O'Regan
ChevronTexaco
P.O. Box 6001, Building K, Room 2216
San Ramon, California 94583-2324

Re: PROPOSED CUTOFF WALL
Chevron/ConocoPhillips - Willbridge Former 27-Inch Storm Sewer Area
NW Front & NW Doane Avenue
Portland, Oregon

Dear Mr. O'Regan:

The purpose of this letter is to present a summary of the slope stability evaluation for the Proposed Cutoff Wall at the Willbridge Former 27-Inch Storm Sewer Area. Design elements of the proposed cutoff wall are shown on drawings prepared by RSV Engineering, Inc. (August 2004). Wall pressure loads applicable to the exposed wall face portion of the wall retaining proposed fill and resistance pressures (active earth pressure loading and passive earth pressure resistance) are also estimated.

Slope Stability Evaluation

An evaluation was made of the slope in the project area adjacent to the Willamette River, with the addition of the proposed wall and retained fill. Temporary construction loads were included in a stability analysis as part of the evaluation.

The existing slope has a bench approximately 14 feet in width at approximate elevation 14 feet. The existing slope above the bench is approximately 20 feet in height with a slope of approximately 1.5(H):1.0(V) and with a slope of approximately 1.2:1.0 below the bench downward to river level. It is my understanding that the existing slope has stood for over 30 years and at this time shows no obvious visible signs of instability.

Three soil borings were conducted in March 2004 from the top of the slope, by RSV Engineering, Inc., to explore subsurface conditions of the slope. Logs for these three soil borings are attached (Attachment A). Soil laboratory tests were conducted on selected soil samples recovered during drilling and sampling of the soil borings in order to obtain properties of in-situ soils in the slope. In general, borings indicated granular soils overlying intermediate silts, the top of which are just below the bench. Earlier this year, a water level was recorded just above the top of the intermediate silt zone.

31960 S.W. Charbonneau Dr., Suite 101 • Wilsonville, OR 97070
phone: 503.694.6960 • fax: 503.694.6962

A stability analysis was performed on a critical cross-section through the area of the proposed wall. The section was taken approximately perpendicular to the Willamette River looking in the upstream direction. The ground surface was taken from a partial topography survey at the Willbridge Terminal, dated March 26, 2004, by Chase, Jones & Associates, Inc., registered professional land surveyors. Subsurface conditions were estimated based upon the borings mentioned above. A slope stability analysis of the section was conducted with XSTABL© Version 5 with circular surface search and Simplified Bishop Method features. Three cases analyzed were: construction loading at the top of slope, existing conditions, and proposed permanent conditions. It was found that the factors of safety against a slope shear failure for these three cases were within approximately one percent.

Based upon the results of the soil borings, soil laboratory testing, and stability analysis, it was concluded that between construction conditions, existing conditions, and conditions proposed for permanent improvement, *i.e.* with the addition of the wall and retained fill, there was not a substantial change in the stability of the existing slope.

Wall Pressures

With respect to wall pressures, an active earth pressure loading of 33 psf/ft of depth was estimated based upon $\phi = 36°$, an active earth pressure coefficient (k_a) of 0.26, and a moist unit weight (γ_m) of 125 pcf, for Sand Fill. Similarly, active earth pressures of 38 and 13 psf/ft and passive earth pressures of 390 and 114 psf/ft were estimated for in-situ sand and silt, respectively, with a water level approximately at the top of silt. A pressure distribution diagram for the proposed wall is attached (Attachment B), as well as an evaluation of the wall's embedment length.

Please do not hesitate to let me know if additional information is required or if there are any questions on the analyses and evaluations performed.

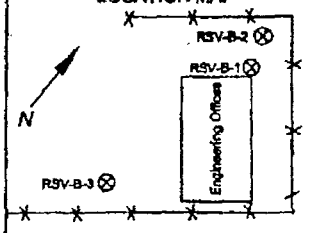
Sincerely,
RSV ENGINEERING, INC.

Brad J. Berggren, P.E., R.G
Principal Engineer/Vice President

ATTACHMENT A
SOIL BORING LOGS

RSV
ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
Wilsonville, Oregon 97070
TEL (503) 694-6960
FAX (503) 694-6962

LOCATION MAP



WELL/BORING NUMBER RSV-B-1

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/31/04 - 4/1/04

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)		First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION AND INTERVAL / REC %				
	50-1"								GM	Silty Gravel with Sand (GM) gray, subangular, occasional cobble, moist, very dense.	Concrete; 8.25-inch Diameter Borehole; 2-inch Diameter Expanding Gasket Locking Well Cap; Bentonite Chips; 2-inch Diameter Schedule 40 PVC Casing
	28										
	33										
	38										
	22										
	30										
	32				RSV-B-1 @5'	5				Pushed cobble, no sample.	
SS	37										
	35									Pulled sampler and removed cobble. Shallow rocks pushing augers off hole, pulled out augers and removed rocks by hand, resumed with 6.5" ID augers.	
	34										
	50-6"										
	10										
	12										
	8										
	7										
	8										
SS	12				RSV-B-1 @10'	10				Shelby tube crushed, no sample.	
	20										
	16										
	15										
	10										
	12										
	20										
	16										
	10										
	12										
SS	16				RSV-B-1 @15'	15			SP	Sand (SP), gray, fine-medium grained, loose, wet.	
	6										
	5										
	6										
	8										
	7										
	8										
	11										
	9										
	3			▽							
SS	8				RSV-B-1 @20'	20				As Above	
	8									Shelby Tube from 21' - 23'	
	6										
	12										
	8										
	6										
SS	8				RSV-B-1 @25'	25				Silt (ML), greenish gray, soft, wet.	
	1										
	2										
	1										
	1										
	2										
	3										
	3										
	5										
	8										
SS	4				RSV-B-1 @30'	30				@ 30': brown	
	5										
	5										
	1										
	2										
	3										
	5										
	9										
	5										
	6										
	6										

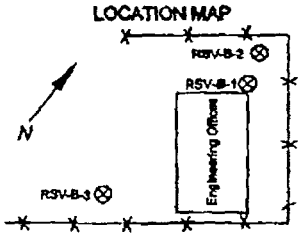
DRILLING CONTRACTOR: GeoTech Explorations
DRILLING METHOD: Hollow-Stem Auger
SAMPLING METHOD: Split Spoon
DRILLING START TIME: 9:00
DRILLING END TIME:13:00

WELL ID TAG: L67967
WELL START CARD NO.: 164581
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

RSV ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
Wilsonville, Oregon 97070
TEL (503) 694-6960
FAX (503) 694-6962

LOCATION MAP

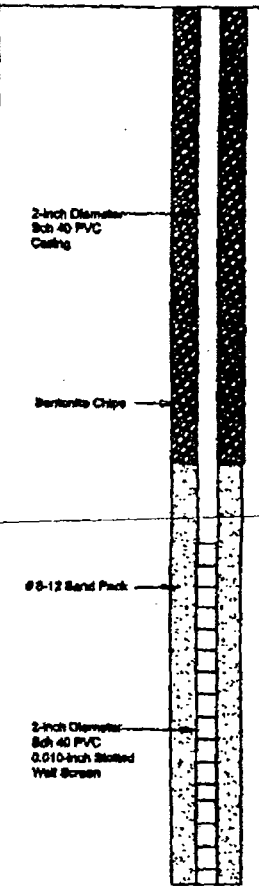


WELL/BORING NUMBER RSV-B-1
Page 2 of 2

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/31/04 - 4/1/04

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
	4				RSV-B-1 @35'	35		ML	Shelby Tube from 35' - 37'
	5								
	6								
	6								
	4								
	4								
	5								
	5								organics, wood fragments
	1								
	3								
	4				RSV-B-1 @40'	40			As Above
	5								
	2								
	3								
	7								
	7								
	3								
	7								
	8								
	11								
	3				RSV-B-1 @45'	45			As Above
	7								
	9								
	12								
	1								
	4								
	9								
	9								
	4								
	7								
	7				RSV-B-1 @50'	50			As Above
	8								
	4								
	6								
	9								
	13								
	3								
	3								
	5								
	10								As Above
	5				RSV-B-1 @55'	55			
	7								
	11								
	23								
	7								
	12								
	14								
	22								
	16								
	8								
	13				RSV-B-1 @60'	60			As Above
						65			

BOREHOLE/WELL CONSTRUCTION DETAIL



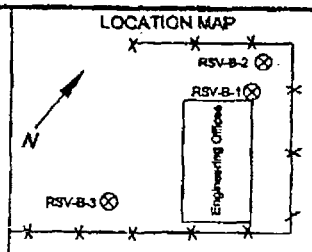
DRILLING CONTRACTOR: GeoTech Explorations
DRILLING METHOD:Hollow Stem Auger
SAMPLING METHOD: Split Spoon
DRILLING START TIME: 9:00
DRILLING END TIME:13:00

WELL ID TAG: L67967
WELL START CARD NO.: 164581
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

RSV
ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
Wilsonville, Oregon 97070
TEL (503) 694-6960
FAX (503) 694-6962

LOCATION MAP



WELL/BORING NUMBER RSV-B-2

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/30/04

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	Free Water	LAB SAMPLE I.D.	DEPTH (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
							GW	Gravel, brown, well graded, occasional cobble, some sand and fines, very dense, dry.	
								@3ft.: refusal, moved boring 5' toward Front Ave.	
	50-6"				5			Pushed cobble with sampler.	
SS	12/9/8			RSV-B-2 @10'	10			As Above	bentonite
SS	9/10/11			RSV-B-2 @15'	15			As Above	
SS	1/3/5		▽	RSV-B-2 @20'	20		SP	SAND, gray, fine-medium grained, loose, wet.	
SS	3/5/3			RSV-B-2 @25'	25			As Above	
SS	5/6/5			RSV-B-2 @30'	30			SILT, greenish gray, soft, wet.	

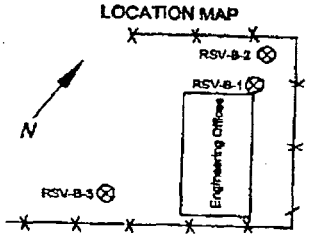
DRILLING CONTRACTOR: GeoTech Explorations
DRILLING METHOD: Hollow-Stem Auger
SAMPLING METHOD: Split Spoon
DRILLING START TIME:
DRILLING END TIME:

WELL ID TAG:
WELL START CARD NO.:
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

RSV ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
Wilsonville, Oregon 97070
TEL (503) 694-6960
FAX (503) 694-6962

LOCATION MAP



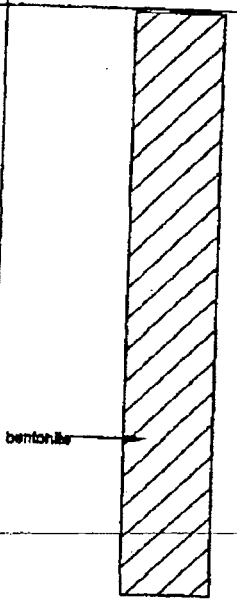
WELL/BORING NUMBER **RSV-B-2**

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/30/04

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH (ft) bgs	SAMPLE LOCATION & INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
SS	4/8/8				RSV-B-2 @35'	35				ML	gravelly medium SAND, gravels to 4"
SS	4/5/6				RSV-B-2 @40'	40					@40 ft: brown, organics (grasses, wood chips)
SS	7/13/15				RSV-B-2 @45'	45					As Above
SS	6/8/9				RSV-B-2 @50'	50					As Above
	50-5"					55					
						60					
						65					

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: GeoTech Explorations
DRILLING METHOD:Hollow-Stem Auger
SAMPLING METHOD: Split Spoon
DRILLING START TIME:
DRILLING END TIME:

WELL ID TAG:
WELL START CARD NO.:
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

RSV ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
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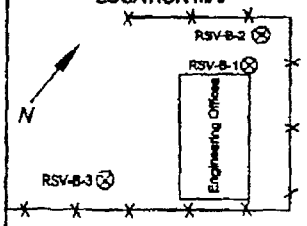
FAX (503) 694-6962

LOCATION MAP



WELL/BORING NUMBER RSV-B-3

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/30/04

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH (ft bgs)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
	20/20/15				5		GM	Silty Gravel with sand (GM-GW), brown, angular-subangular, dense, moist	
SS	11/9/9			RSV-B-3 @10'	10		SP	Sand (SP), gray, fine-medium grained, loose, wet.	bentonite
SS	6/8/7		▽	RSV-B-3 @15'	15			Shelby Tube from 15' - 17' @ 16': wet	
SS	1/2/3			RSV-B-3 @20'	20			SILT (ML), greenish gray, soft, wet.	
SS	3/5/4			RSV-B-3 @25'	25			As Above	
SS	3/4/5			RSV-B-3 @30'	30			@ 30': brown, some organics	

SAMPLE INFORMATION

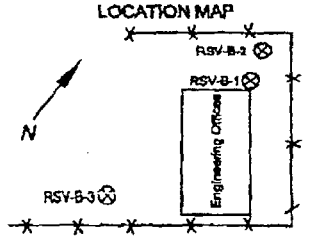
DRILLING CONTRACTOR: GeoTech Explorations
DRILLING METHOD: Hollow-Stem Auger
SAMPLING METHOD: Split Spoon
DRILLING START TIME:
DRILLING END TIME:

WELL ID TAG:
WELL START CARD NO.:
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

RSV
ENGINEERING, INC.
31960 SW Charbonneau Drive, #101
Wilsonville, Oregon 97070
TEL (503) 694-6960
FAX (503) 694-6962

LOCATION MAP



WELL/BORING NUMBER **RSV-B-3**
Page 2 of 2

PROJECT NAME: 27-Inch Pipeline Cut-off Wall
PROJECT NUMBER: 02-158
LOCATION: Chevron/Texaco Willbridge Terminal
LOGGED BY: Dan Becraft
REVIEWED BY: Brad Berggren
DATE: 3/30/04

SAMPLE INFORMATION									STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	FREE Water	LAB SAMPLE I.D.	DEPTH (ft)	SAMPLE LOCATION	SAMPLE RETRIEVAL	REC %			
SS	1/4/5				RSV-B-3 @35'	35				ML	As Above	bentonite
SS	4/6/7				RSV-B-3 @40'	40					As Above	
						45						
						50						
						55						
						60						
						65						

ING CONTRACTOR: GeoTech Explorations
ING METHOD: Hollow-Stem Auger
LING METHOD: Split Spoon
DRILLING START TIME:
DRILLING END TIME:

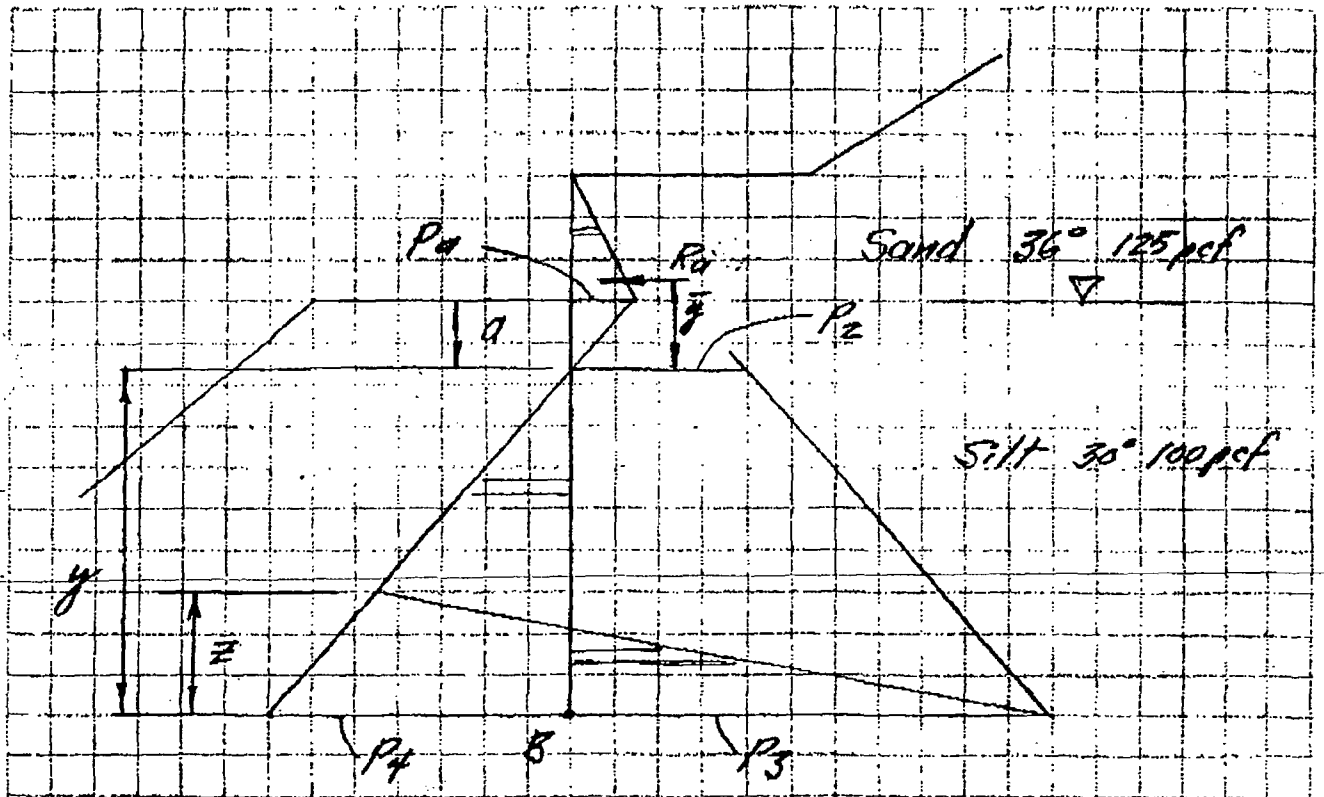
WELL ID TAG:
WELL START CARD NO.:
RIM ELEVATION:
CASING ELEVATION:
DATUM:

TIME	DATE	DTW

ATTACHMENT B
PRESSURE DISTRIBUTION DIAGRAM

BLOOM CONSULTANTS, LLC 1870 North Roselle Road, Suite 101 • Schaumburg, IL 60195 • Phone (847) 781-5353 • Fax (847) 843-3047

Client: RSV Engineering, Inc.		Page: 1
Project: Willbridge Cutoff Wall		Project No: 5443-1118
Calculations For: Sheetpile Wall	Prepared By: Andrew J. Frano	Date: 10-4-04
	Reviewed By:	Date:



Bowles '68 p. 374

$P_a = 33(6) = 198$ psf

$a = \frac{198}{38(3.00 - 0.33)} = 1.95'$

$R_a = \frac{1}{2}(198)(6 + 1.95) = 787.05$ #

$P_z = 6(125)3.00 + 1.95(38)2.67 = 2447.85$ psf

BLOOM CONSULTANTS, LLC
...rg, IL 60195 • Phone (847) 781-5353 • Fax (847) 843-3047

Post-it® Fax Note 7671	Date 10-4-04	# of pages ▶ 3
To Brad Berggren	From Andy Frano	
Co./Dept. RSV	Co. Bloom	
Phone # (503) 694-6960	Phone # (847) 781-5353	
Fax # (503) 694-6962	Fax # (847) 843-3047	

Client:
Project:
Calculation

Page: 2
Project No:
Date:
Date:

$$p_3 = p_2 + 38(2.67)\,y$$

$$p_4 = 38(2.67)\,y$$

Try F.S. = 1.5

$$p_2 = 6(125)\frac{3}{1.5} + 1.95(38)\left(\frac{3}{1.5} - .33\right) = 1623.75 \text{ psf}$$

$$p_3 = p_2 + 38\left(\frac{3}{1.5} - .33\right)y = 1624 + 63.46\,y$$

$$p_4 = 38\left(\frac{3}{1.5} - .33\right)y = 63.46\,y$$

$$\Sigma F_x = 0$$

$$R_a + (p_4 + p_3)\frac{z}{2} - p_3\frac{y}{2} = 0$$

$$z = \frac{p_3\frac{y}{2} - R_a}{p_4 + p_3}(2) = \frac{p_3 y - 2R_a}{p_4 + p_3}$$

$$\Sigma M_B = 0$$

$$R_a(y + \bar{y}) + \frac{z}{3}(p_4 + p_3)\frac{z}{2} - p_4\frac{y}{2}\frac{y}{3} = 0$$

E

BLOOM CONSULTANTS, LLC 1870 North Roselle Road, Suite 101 • Schaumburg, IL 60195 • Phone (847) 781-5353 • Fax (847) 843-3047

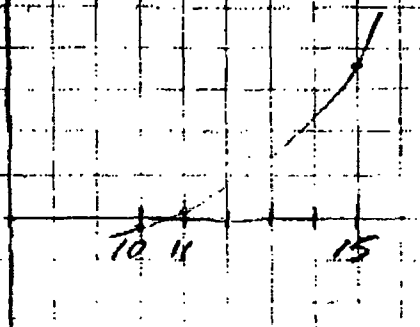
Client:		Page: 3
Project:		Project No:
Calculations For:	Prepared By:	Date:
	Reviewed By:	Date:

$$y^4 + y^3\left(\frac{P_2}{38 \times 1.67}\right) - y^2\frac{6R_a}{63.5} + y\left(\frac{6R_a}{63.5^2}(2\bar{y}\,63.5 + P_2)\right) - \frac{6R_a\bar{y}P_2 + 4R_a^2}{63.5^2} = 0$$

$$\bar{y} = \frac{6 + 1.95(2)}{3} = 3.3'$$

$$y^4 + y^3(25.6) - y^2(99.2) - y(3392.7) - 6,890.8 = 0$$

y	$f(y)$
15	71,923.7
10	-5,137.8
11	3,500.9



Required embedment for FS of 1.5 = 1.95 + 10.60

= 12.55' < 20' ok

SAIC
An Employee-Owned Company

September 22, 2004
Project 06-6102-00-3980-285
DCN No.: CO3-SAI-1001868-01-05933

Mr. Mark Walhood
City of Portland, Bureau of Development Services
Land Use Review
1900 SW 4th Avenue, Suite 4500
Portland, Oregon 97201

RE: Landscape Plan for the Proposed Source Control Measure

Chevron Willbridge Distribution Center
5331 NW Doane Avenue
Portland, Oregon
and
Conoco Phillips Terminal
5528 NW Doane Avenue
Portland, Oregon
DEQ WMCSR-NWR-94-06

Dear Mr. Walhood:

In accordance with your September 15, 2004 letter regarding Land Use Review (LU-045492 GW), Science Application International Corporation (SAIC) has prepared the attached Landscape Plan. As stated in your letter, one tree was selected for every 20 feet of river frontage, and one shrub was selected for every 2 feet of river frontage. Because the entire area is covered with a flexible pavement, no groundcover will be required.

Requirements set forth by the US Coast Guard dictate that trees may not be planted near security fences. Based on this requirement, trees and shrubs will be planted in a clustered area along the upland portion of the source control wall on the ConocoPhillips portion of the project area. The approximate location and species of tree or shrub is identified on the attached Landscape Plan. As specified in the City of Portland's Tree and Landscaping Manual, tree size will be a minimum of 2 inches and shrubs will be a minimum of 2 gallons. Irrigation will be completed by hand methods until the plants are established.

If you have any questions or need additional information, please contact Kevin Schleh (503) 243-2070.

Sincerely,

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Kevin Schleh, R.G.
Senior Project Manager

City of Portland
APPROVED
DEC 28 2004
Permit Number

04.052771-CO

City of Po
APPRO
DEC 2
Permit

Science Applications International Corporation
220 SW Morrison Avenue, Suite 500 | Portland, Oregon 97205 | tel: 503.243.6175 | fax: 503.243.1883 | www.saic.com

PROPOSED SOURCE CONTROL WALL

N

0 15' 30'

LEGEND

a	(3) Rosa nutkana (wild rose)
b	(3) Cornus sericea ssp sericea (dogwood)
c	(2) Spiraea douglasii (hardhack)
d	(3) Holodiscus discolor (ocean spray)
e	(3) Physocarpus capitatus (ninebark)
A	(1) Salix lucida (willow)

GREENWAY SETBACK

APPROXIMATE WILLAMETTE RIVER SHORELINE

Conoco Phillips Dock

PROPERTY LINE

ORDINARY HIGH WATER MARK

TES

Map Provided by RSV Engineering Wilsonville, Oregon

tland
VED
2004

SAIC

Proj #: 06-6102-00-3980-28

100-1868Greenway_map(fig1).dw

PROPOSED GREENWAY PLANTING PLAN

Chevron Willbridge Distribution Center
CVX #1001868
5531 NW Doane Avenue
Portland, Oregon

Date: 09/17/04 Drawn By: JDH

FIGURE

1

COPPOR0006476

PROPOSAL FOR SOURCE CONTROL MEASURE

Chevron Willbridge Distribution Center
5531 NW Doane Avenue
Portland, Oregon
And
Conoco Phillips Terminal
5528 NW Doane Avenue
Portland, Oregon

DEQ WMCSR-NWR-94-06

August 13, 2004

Prepared for:

ChevronTexaco

6001 Bollinger Canyon Road K2240
San Ramon, CA 94583

Prepared by:

SAIC®
An Employee-Owned Company

Science Applications International Corporation
1220 SW Morrison Avenue, Suite 500
Portland, Oregon 97205

City of Portland
APPROVED
DEC 2 8 2004
Permit Number

Contract No. 99014508
SAIC Project 06-6102-00-3980-285

04-052765 & 04-052766

PROPOSAL FOR SOURCE CONTROL MEASURE

Chevron Willbridge Distribution Center
5531 NW Doane Avenue
Portland, Oregon
And
Conoco Phillips Terminal
5528 NW Doane Avenue
Portland, Oregon

DEQ WMCSR-NWR-94-06

August 13, 2004

Prepared by:

An Employee-Owned Company
Science Applications International Corporation
1220 SW Morrison Avenue, Suite 500
Portland, Oregon 97205

Kevin Schleh, R.G.
Senior Project Manager

Gerard Koschal, R.G.
Senior Geologist

SAIC Project 06-6102-00-3980-285
DCN: C03-SAI-1001868-01-05715

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Appendix A Summary of Historic Boring and Test Pit Logs

ATTACHMENTS

Attachment A Sheet Pile Wall Engineering Design

1.0 INTRODUCTION

Science Applications International Corporation (SAIC) is submitting this proposal to the Oregon Department of Environmental Quality (DEQ) for the installation of a sheet pile wall as a source control measure at the Chevron (Chevron) Willbridge Distribution Center and the Conoco Phillips Terminal in Portland, Oregon (Figure 1). Chevron and Conoco Phillips are requesting DEQ approval to install the wall as a source control measure under DEQ Consent Order WMCSR-NWR-94-06.

The purpose of the wall is to mitigate potential migration pathways for groundwater seeps to the Willamette River. The potential migration pathways include the alignment of an abandoned sewer and the former Holbrook Slough. The location of the proposed wall is at river mile 7.8 along the west bank of the Willamette River between the Chevron and Conoco Phillips docks. The property is owned by the Port of Portland and the Oregon Division of State Lands, and is leased to Chevron and Conoco Phillips.

1.1 Background

Portions of the Chevron and Conoco Phillips terminals overlie the historic Holbrook Slough and Kittridge Lake. A silt ridge (natural levee) separated Kittridge Lake from the Willamette River. As the Holbrook Slough formed, it cut through the silt ridge, connecting Kittridge Lake to the Willamette River. With development of the terminals, the Holbrook Slough and Kittridge Lake were filled with dredge sand. During this period of development, a sewer pipe was constructed parallel to NW Doane Avenue with an outfall at the mouth of the Holbrook Slough. In 1927, the sewer was replaced with a 27-inch diameter wood stave sewer (27-inch sewer).

Separate phase hydrocarbons (SPH) have been observed being conveyed through the 27-inch sewer, and seeping from the area around the outfall. In an effort to mitigate these migration pathways, a weir was constructed at the outfall to collect SPH being conveyed through the 27-inch sewer, and absorbent booms were placed in the Willamette River around the area where SPH was observed to be seeping. In 1982, the City of Portland Bureau of Environmental Services (BES) replaced the 27-inch sewer with a 60-inch diameter concrete storm water pipeline located south of the Conoco Phillips dock (Figure 2). The BES reportedly abandoned the 27-inch sewer and outfall by filling them with concrete. After the 27-inch sewer and outfall had been abandoned, SPH was periodically observed seeping from the area around the outfall.

In 1988, at the direction of DEQ, the Holbrook Trench recovery system was installed to intercept and prevent seepage of SPH into the Willamette River (Figure 3). The Holbrook Trench recovery system is comprised of a barrier wall with a synthetic liner, two trenches, and a recovery sump. At installation, the system recovered SPH and effectively minimized seepage into the river. The system was operated continuously until 1992, and intermittently until 1997. By 1997, SPH seepage was only observed during periodic events that occurred with specific flow conditions in the Willamette River. The system was not operated between 1997 and 2001. Since 2001, the system has been used during periods of low river flow.

Based on the results of prior site investigations and remedial efforts, SPH appears to be migrating through the dredge sand fill in the historic channel of the Holbrook Slough, periodically seeping into the Willamette River from the area of the 27-inch sewer outfall.

2.0 INTERIM INVESTIGATION AND REMEDIAL MEASURES

Since 1997, SPH has been observed to seep from the area around the 27-inch sewer outfall during stages of low river flow, and when the river flow decreases from high stages at an approximate elevation of 16 feet to an approximate elevation of 11 feet. Globules of SPH are observed in the river beyond the existing trench system during low flow stages. When the river flow decreases from high to low flow conditions, SPH is observed seeping from the toe of the Chevron rip rap slope. Based on these observations, the SPH migration appears to be affected with specific changes in river flow levels.

2001

In the summer of 2001, the Holbrook Trench recovery system was re-started to conduct a groundwater pumping test. The recovery sump was operated at a pump removal rate of three gallons per minute to assess groundwater drawdown in and around the Holbrook Trench recovery system. As the river stages increased during the winter months, the river flow rose over the top of the barrier wall of the Holbrook Trench recovery system at an elevation of approximately 11 feet. At this point, the recovery system was inundated with river water and the system was shut down. Based on observations from operating the recovery system and the river flow conditions exhibiting SPH seepage, a new barrier wall and recovery system were proposed to replace the Holbrook Trench recovery system to eliminate SPH seepage and improve the future remedial efforts.

2002

The Holbrook Trench recovery system was operated in the summer of 2002 after river levels fell below an elevation of 11 feet. Several phases of sub-surface exploration were completed to assess the feasibility of the proposed wall system, and to begin the design process. Delta Consultants provided the environmental services during this time period. A summary of exploratory boring and test pit logs are provided in Appendix A.

On May 8, 2002, 19 exploratory geoprobe borings were drilled in an effort to define the contact of the dredge sand fill material and native silt in the Holbrook Slough, and to identify the alignment of the abandoned 27-inch sewer pipeline (Figure 4). The results of this exploration provided a baseline delineation of the fill material within the slough, including mapping a depression in the silt ridge south of the inferred location of the 27-inch sewer outfall. The location of the 27-inch sewer pipeline was not identified during this phase of exploration. Due to limiting factors associated with geoprobe sampling methodology, sample recovery was observed to be poor and the exact elevation of the dredge sand/silt contact was not determined.

On June 24, 2002, 13 exploratory test pits were excavated parallel to the river between an elevation of 18 and 22 feet, and near the inferred confluence of the 27-inch sewer outfall and Holbrook Slough, to supplement the findings of the geoprobe exploration and to continue efforts to identify the alignment of the 27-inch sewer (Figure 5). The test pits allowed for better observations of sub-surface conditions for the identification of the contact of the dredge sand and silt, and characterization of petroleum hydrocarbon impacts in the area of the former Holbrook Slough at the boundary between the Chevron and Conoco Phillips properties. Groundwater was observed to seep from the dredge sand fill in the test pits at a slow rate (less than 1 gallon per minute), with an increase in flow to moderate rates (1 to 3 gallons per minute) at lower elevations where it is influenced by the river. SPH was only encountered in the dredge sand fill extending from the base of the rip rap slope, and measurable thicknesses of SPH were only encountered in test pits

completed at the base of the slope. The native silt was not observed to be impacted by petroleum hydrocarbons and was observed to be moist. These observations indicated that groundwater encountered in the dredge sand fill is perched above the native silt, and that SPH is confined to the channel of the historic Holbrook Slough. The alignment of the abandoned 27-inch sewer pipeline was not identified during this phase of exploration; however, pieces of vitreous clay pipe were encountered and were suspected to be remnants of the sewer line replaced by the 27-inch sewer.

Six soil samples were collected from the dredge sand at the contact with the native silt for laboratory analyses of gasoline range petroleum hydrocarbons by North West Method NWTPH-Gx, and diesel range petroleum hydrocarbons by North West Method NWTPH-Dx, and volatile organic compounds (VOC's) by Environmental Protection Agency (EPA) Method 8260B. The analytical results are summarized in Tables 1 through 5. The analytical results showed detection diesel range petroleum hydrocarbons and VOC's in soil samples T-1, T-6, T-7 and T-8. Based on the results for soil samples T-1 and T-8, follow-up analyses were performed for polynuclear aromatic hydrocarbons (PAH's) by EPA Method 8270C SIM, heavy metals by EPA 6000/7000 series Methods, and polychlorinated biphenyls (PCB's) by EPA Method 8082.

The results of laboratory analysis showed the presence of diesel range petroleum hydrocarbons and associated fractions of VOC's and PAH's in T-1, T-6, T-7 and T-8. Low concentrations of gasoline range petroleum hydrocarbons were detected in T-6 and T-7, however, based on the setting where the impacts are present, these detections may be anomalous as a result of fractionation or degradation of the diesel range petroleum hydrocarbons. The follow-up analyses for heavy metals and PCBs showed no detection at or above the respective method detection limits. The analytical results for T-8 showed a detection of diesel range petroleum hydrocarbons at 20,600 milligrams per kilogram (mg/kg). It was later observed that test pit 8 (where T-8 was collected) was excavated in the backfill of the Holbrook Trench recovery system. Because T-8 was collected from a trench backfill designed to intercept and impound SPH along an extended area, the analytical results probably do not accurately represent subsurface conditions and should not be utilized to assess SPH migration. The analytical results suggest that SPH is migrating through the dredge sand fill along the inferred alignment of the 27-inch sewer.

In June 2002, 3 monitoring wells were installed in the beach area of the Conoco Phillips property (Figure 6). Well U-10 (4-inch diameter, 25 foot depth) was installed as a pump test well to determine potential infiltration for a recovery system, and wells U-11 and U-12 were installed to determine vertical groundwater flow. No SPH was observed in these wells. A pump test was initiated in U-10; however, after a short period the well was pumped dry.

In August 2002, 5 additional exploratory test pits were excavated parallel to the river at an approximate surface elevation of 15 feet to assess subsurface conditions along the alignment of the proposed wall at the base of the rip rap slope (Figure 5). Petroleum hydrocarbon affected soil and perched groundwater were observed in the dredge sand fill material of the Holbrook Slough along the contact with the native silt, near the base of the Chevron rip rap slope on Conoco Phillips property. To test the feasibility of using a pneumatic belt skimmer to remove SPH, approximately 47 tons of impacted soil was excavated from the area of the former 27-inch sewer outfall (Figure 6). The excavation was backfilled with washed, 1- to 2-inch diameter, rounded drain rock to form a sump. Two temporary 12-inch diameter recovery sumps were installed in the drain rock to intercept SPH infiltration. SPH did not accumulate in the sumps, and the use of removal actions with a belt skimmer were considered unfeasible. Based on these investigations, a sheet pile wall with a top elevation of 16 feet was selected as the remedial option.

2003 to Present

In February 2003, Chevron assigned this project to SAIC. During the spring runoff in April 2003, the river flow stages rose above the top of the Holbrook Trench recovery system. A sheen was observed contained in the boom area in the Willamette River. Stain on the rip rap slope indicated that SPH was seeping at a higher elevation than the top elevation of the proposed sheet pile wall. The proposed design was re-evaluated, and the top elevation of the wall was modified to 20 feet.

The Holbrook Trench recovery system re-started in the summer of 2003 and was operated until December 2003 as a continued effort to mitigate SPH seepage. Since December 2003, SAIC has been performing weekly groundwater monitoring, maintenance of the passive recovery system, and maintaining the absorbent booms in the Willamette River. In February 2004, SAIC installed absorbent socks in the recovery sumps to remove SPH, and has been monitoring this system during the weekly site visits. During these site visits, the absorbent socks are removed from the sumps and are wringed out to recover any SPH that may have accumulated. Typically, about one gallon of SPH and water is recovered from the socks, which is subsequently transferred into a treatment system at the Chevron facility.

Groundwater samples have been collected from select monitoring wells for analysis of benzene, toluene, ethyl-benzene and total xylene (BTEX) by EPA Method 8021, PAH's by EPA Method 8270C SIM and total metals by EPA 6000/7000 Series Methods. A summary of the analytical results are presented in tables 6 through 9. A review of the analytical data and well measurements show that small amounts of SPH have been measured in B-7, and low concentrations of BTEX and PAH's have been detected in B-7, P-2, U-10, U-11 and U-12. Total metals have been detected in all of the wells in the monitoring network, and appear to be at concentrations with normal background levels.

In July 2004, the Holbrook Trench recovery system was re-started, and is operating at an approximate removal rate of 4 gallons per minute.

3.0 PROPOSED PROJECT

The sheet pile wall has been proposed as a remedial measure to eliminate seepage of SPH from the area of the 27-inch sewer outfall and the Holbrook Slough into the Willamette River, enhance recovery of SPH, and to control the flow of dissolved-phase petroleum hydrocarbons in groundwater to the river. Chevron and Conoco Phillips propose to replace the existing recovery system with a new sheet pile wall and SPH recovery system that has been designed to encompass the mouth of the historic Holbrook Slough and for continuous operation that will not be affected by river flow stages.

3.1 New Wall Design

The sheet pile wall was engineered and designed by RSV Engineering Incorporated. The concept of this design is to eliminate SPH migration through the dredge sand fill in the Holbrook Slough by driving the steel sheet piles through the fill and embedding the bottom into the underlying silt ridge. A copy of the design plans are provided in Attachment A, and the design details are discussed below.

The design of the proposed sheet pile wall is presented on 10 sheets in the attached plan set. Sheets 1 and 2 contain general information about the project location and construction details. Additional

Project Notes on Sheet 2 specify acceptable construction materials that may be used, including sheet pile make and model, use of watertight seals, and the gradation of sand backfill in the collection trenches. Sheet 3 illustrates the area of the project Site, showing the location of the Willamette River, surrounding terminals and docks, 60-inch storm sewer, and the approximate location of the 27-inch sewer. Sheet 4 shows the existing site features including the property boundaries, the ordinary high water mark at an elevation of 16 feet, the chevron rip rap slope, and the location of the existing Holbrook Trench recovery system.

Sheets 5 and 6 show the alignment and cross section of the proposed sheet pile wall (Figure 8). The wall would consist of two sections, with one section extending between Bends A and C (northern section), and the other section extending between Bends D and E (southern section). The northern section would be constructed of 25 foot long sheet piles along a 160 foot long alignment. The sheets would be driven from an approximate surface elevation between 14 and 20 feet, through the dredge sand fill, and would be embedded in approximately 15 feet of native silt with a bottom elevation of -5 feet. The top of this section of the wall would be at an elevation of 20 feet , with the sheet piles extending approximately 7 feet above ground surface between Bends A and B, and would gradually match the existing grade between Bends B and C. The southern wall section would be constructed of 20 foot long sheet piles in a 105 foot long alignment. The top of the sheets would be driven to the ground surface at an elevation of 16 feet, through the dredge sand fill and embedded in the native silt that would be encountered at an elevation between 11 and 4, and would have a bottom elevation of -4 feet.

Sheets 7 and 8 show the collection trench details for both sections of the wall, including vaults and sumps, drainage pipes, fill details, and groundwater release conduits. A trench will be excavated on the up gradient side of both wall sections to intercept SPH and impacted groundwater migrating through the dredge sand fill towards the Willamette River. The trenches will be sloped towards a collection sump that will have two 12-inch diameter PVC extraction sumps that will be completed at finished ground surface with 24-inch concrete vaults. A 4-inch diameter perforated pipe will be placed in the bottom of the trench to enhance drainage towards the extraction sumps, and the trenches will be backfilled with sand to two feet below ground surface. Three 4-inch diameter PVC maintenance sumps will be attached to the perforated drainage pipe at various distances from the extraction sumps that will be completed at finished ground surface with 12-inch concrete vaults. Groundwater release conduits will be installed in the collection sumps to provide a drainage pathway that may be opened at some time in the future for post-remediation monitoring. The top of the trenches will be capped with multi-dimensional rip rap to match the surrounding surface. A non-woven geotextile fabric will be placed around the sand fill to prevent sediment flow that may decrease its desired drainage properties. As shown on Sheet 7, the length of the trench in the northern wall section will be 160 feet long, with the bottom of the collection trench at an elevation of 10 feet, and the bottom of the collection sump at an elevation of 3 feet. Because the sheet pile wall will extend up to 7 feet above existing ground surface, the down slope side of the wall will be covered with multi-dimensional rip rap to match the existing surface. Sheet 8 shows the length of the collection trench behind the south wall section to be 105 feet long, with the bottom elevation of the trench at 6 feet and the bottom elevation of the collection sump at 3 feet. Recovery systems would be installed in the extraction sumps remove any SPH or impacted groundwater that collects in the trenches. The recovery systems would be connected to a redundant network of effluent pipelines, that will allow the capability for groundwater treatment at compounds located at either the Chevron terminal or Conoco Phillips terminal.

Sheet 9 illustrates the final grading around the northern wall section. Fill will be placed to match the top elevation of the wall 20 feet, and will cover the existing Chevron rip rap slope to complete it as a flat area. The down slope side of the protruding sheet pile wall will be covered with multi-dimensional rip rap, with the base of this fill section founding on the slope between the base of the wall and the 13 foot elevation contour (Figure 9). Sheet 10 specifies erosion control materials and methods that will be utilized for this project. A silt fence will be properly notched into the ground surface, and will encompass the down slope area of the project site. The base of the silt fence will be at an approximate elevation of 13 feet. The silt fence will wrap around the north side of the project area and to connect with the base of the Chevron rip rap slope, and will wrap around the southern portion of the project area below the Conoco Phillips dock and will extend up-slope to an approximate elevation of 25 feet.

4.0 SCHEDULE

Chevron and Conoco Phillips would like to begin work on this project as soon as possible, in order to have it installed by October 2004.

5.0 CONCLUSION

Chevron and Conoco Phillips are requesting DEQ approval to install a sheet pile wall as a source control measure under DEQ Consent Order WMCSR-NWR-94-06. The installation of this wall will replace the existing Holbrook Trench recovery system and eliminate seepage of SPH from the area of the 27-inch sewer outfall and the Holbrook Slough into the Willamette River, enhance recovery of SPH, and to control the flow of dissolved-phase petroleum hydrocarbons in groundwater to the river. During high river flow events, SPH and dissolved phase petroleum hydrocarbons could migrate into the Willamette River. The proposed sheet pile wall will meet the DEQ requirements for upland source control of contaminants to the Willamette River. In addition, the mitigation of the SPH seeps will help protect, conserve, enhance, and maintain the natural, scenic, historical, economic, and recreational qualities of lands along Portland's rivers and it provides for a more aesthetically pleasing environment along the Willamette River.

6.0 LIMITATIONS

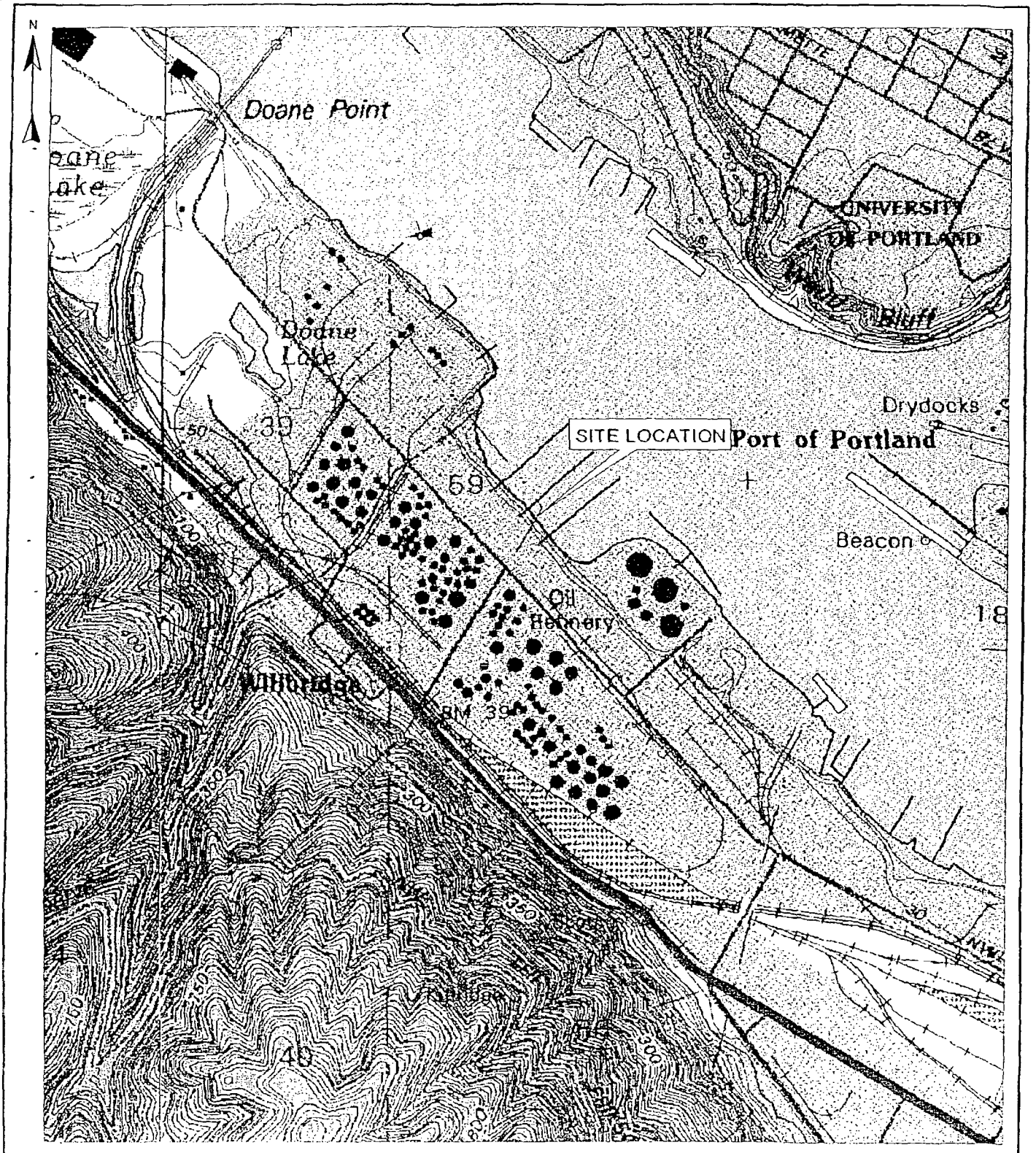
This proposal has been prepared by Science Applications International Corporation (SAIC) for the sole and exclusive use of Chevron. This proposal is not intended for use or reliance by any other party. Any other person or entity obtaining, using, or relying on this proposal hereby acknowledges that they do so at their own risk, and that SAIC shall have no responsibility or liability for the consequences thereof. This proposal is intended to be used in its entirety. Taking or using in any way excerpts from this proposal is not permitted. Excerpts, which are taken out of context, run the risk of being misinterpreted and are, therefore, not representative of the findings of this assessment.

In preparing this proposal, SAIC has relied on verbal and written information provided by secondary sources and interviews. Because the assessment consisted of evaluating a limited supply of information, SAIC may not have identified all potential items of concern and/or discrepancies. SAIC has made no independent investigations concerning the accuracy or completeness of the information relied upon. SAIC cannot and does not guarantee the authenticity or reliability of the information on which conclusions and judgments in this proposal are based. In addition, conclusions and judgments may be formed based on conditions at the time of the assessment not being representative of the manner in which business is conducted, past business practices, and/or

changing conditions since the time of the on-site part of the assessment. To the extent that SAIC has, in whole or in part, based any conclusions or judgments in this proposal on such information, the conclusions and judgments are contingent on the validity of the information provided. A full and complete determination as to whether or not the subject property is free from environmental contamination cannot be made under the scope of this investigation, SAIC is not making such a determination, either expressed or implied, in this proposal and any such reliance by Chevron is at Chevron's own risk.

SAIC warrants only that project activities under this contract have been performed, within the parameters communicated by Chevron, with that degree of skill and judgment normally exercised by recognized professional firms performing services of a similar nature and that SAIC has documented findings in an objective and technically defensible manner. SAIC specifically disclaims and client waives any expressed or implied standards, guarantees, or warranties, including but not limited to warranties of merchantability or fitness for a particular purpose, custom or usage, or otherwise as to any goods or services that are the subject of this contract.

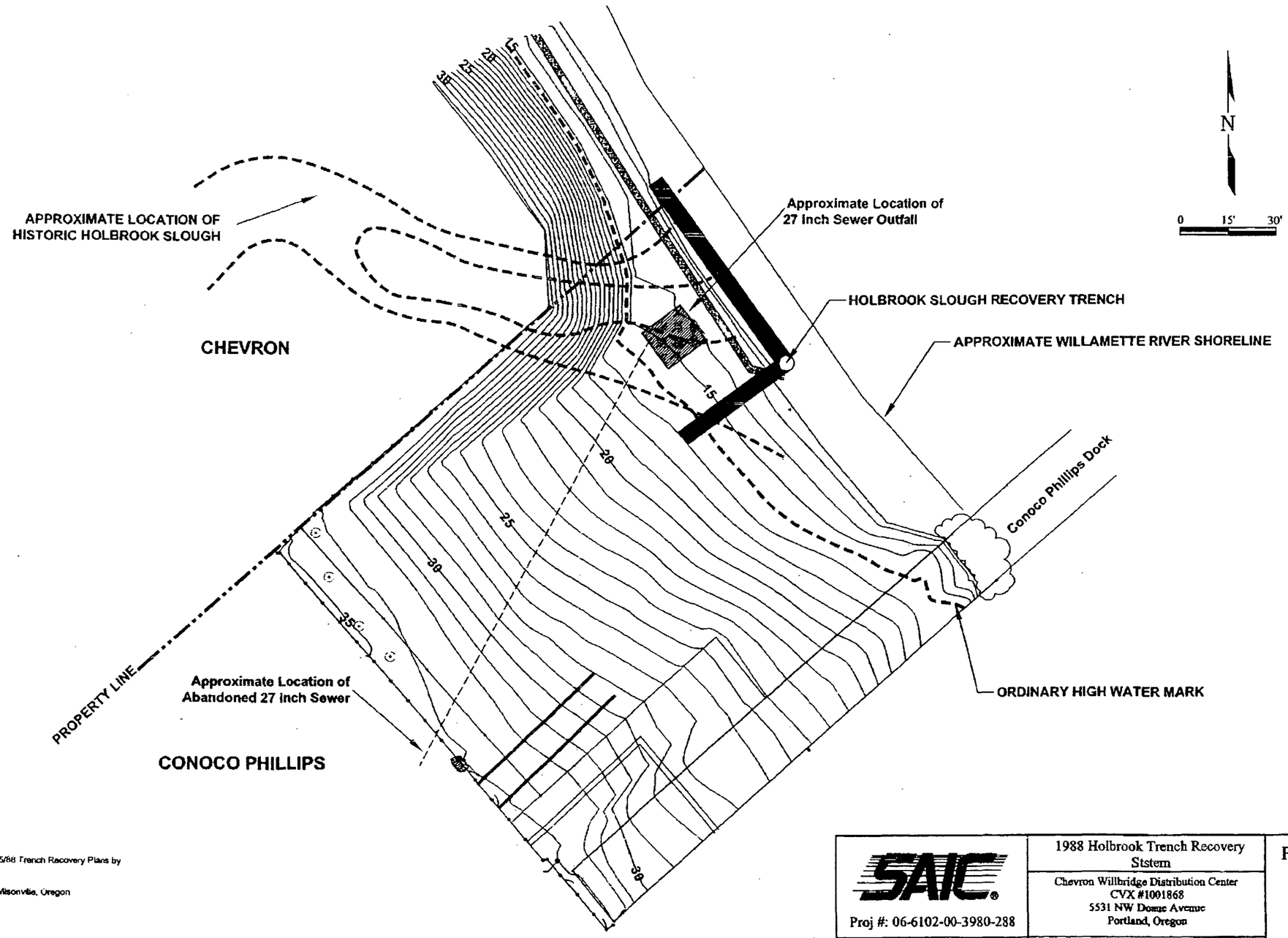
FIGURES



Scale 1:25,000

Reference:
Topographic Map from
Delorme® 3-D Topo Quads - 2002
from USGS Topographic Map
Portland, OR-WA - 1995

SAIC®	SITE LOCATION MAP	FIGURE
	Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon	1
Proj #: 06-6102-00-3980-288		
100-1868figure1.dwg	Date: 8-8-04 Drawn By: IDH	



NOTES

1) Location of Holbrook Slough Inferred from 5/88 Trench Recovery Plans by Riedel Environmental

2) Base Map Provided by RSV Engineering Wilsonville, Oregon

SAIC Proj #: 06-6102-00-3980-288 100-1868HolbrookBaseMap(fig3).dwg	1988 Holbrook Trench Recovery Ststem Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon Date: 07/28/04 Drawn By: EML	FIGURE 3

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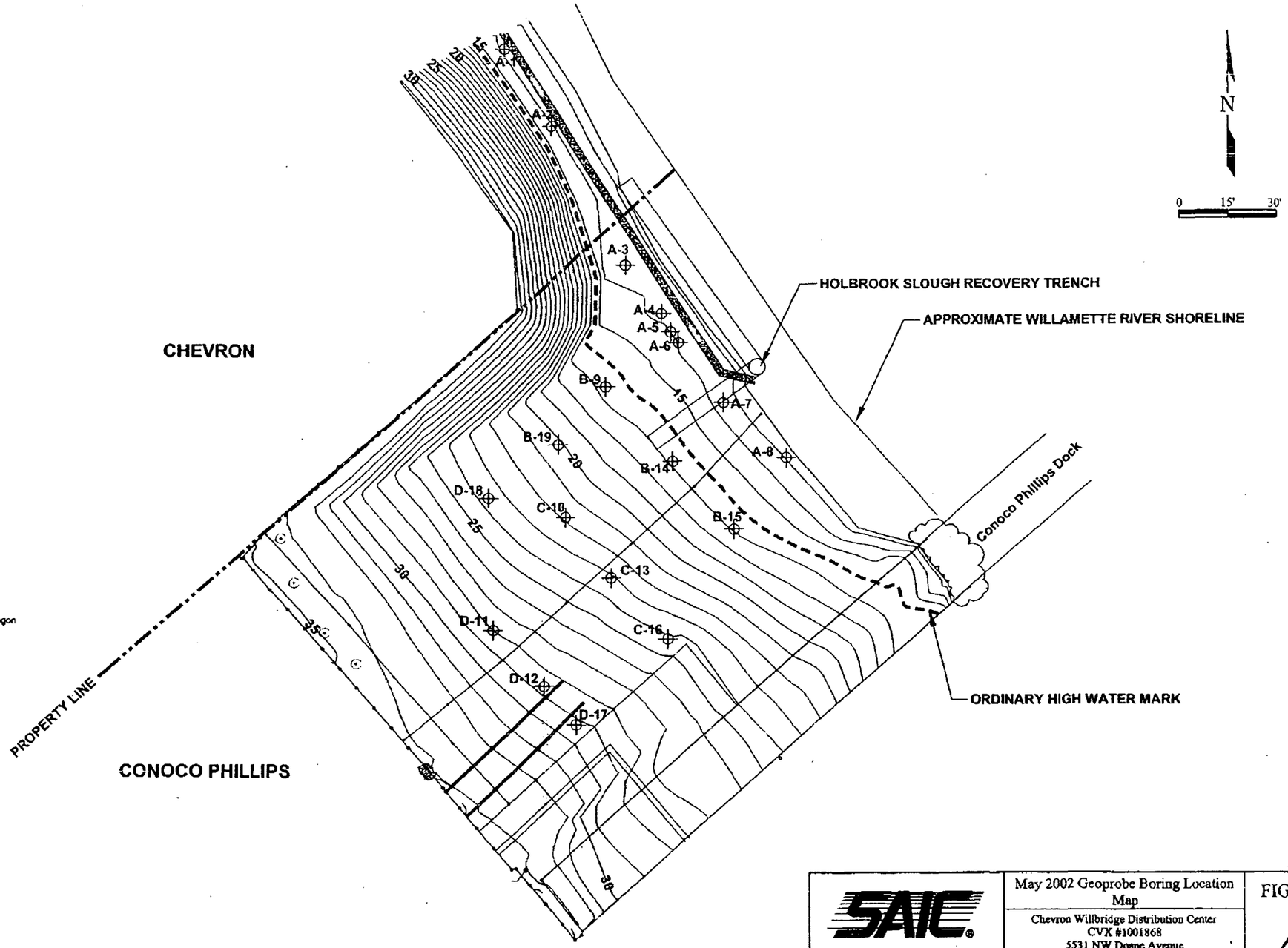

SAIC Proj #: 06-6102-00-3980-288 100-1868HolbrookBaseMap(fig4).dwg	May 2002 Geoprobe Boring Location Map Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon Date: 07/28/04 Drawn By: EML	FIGURE 4

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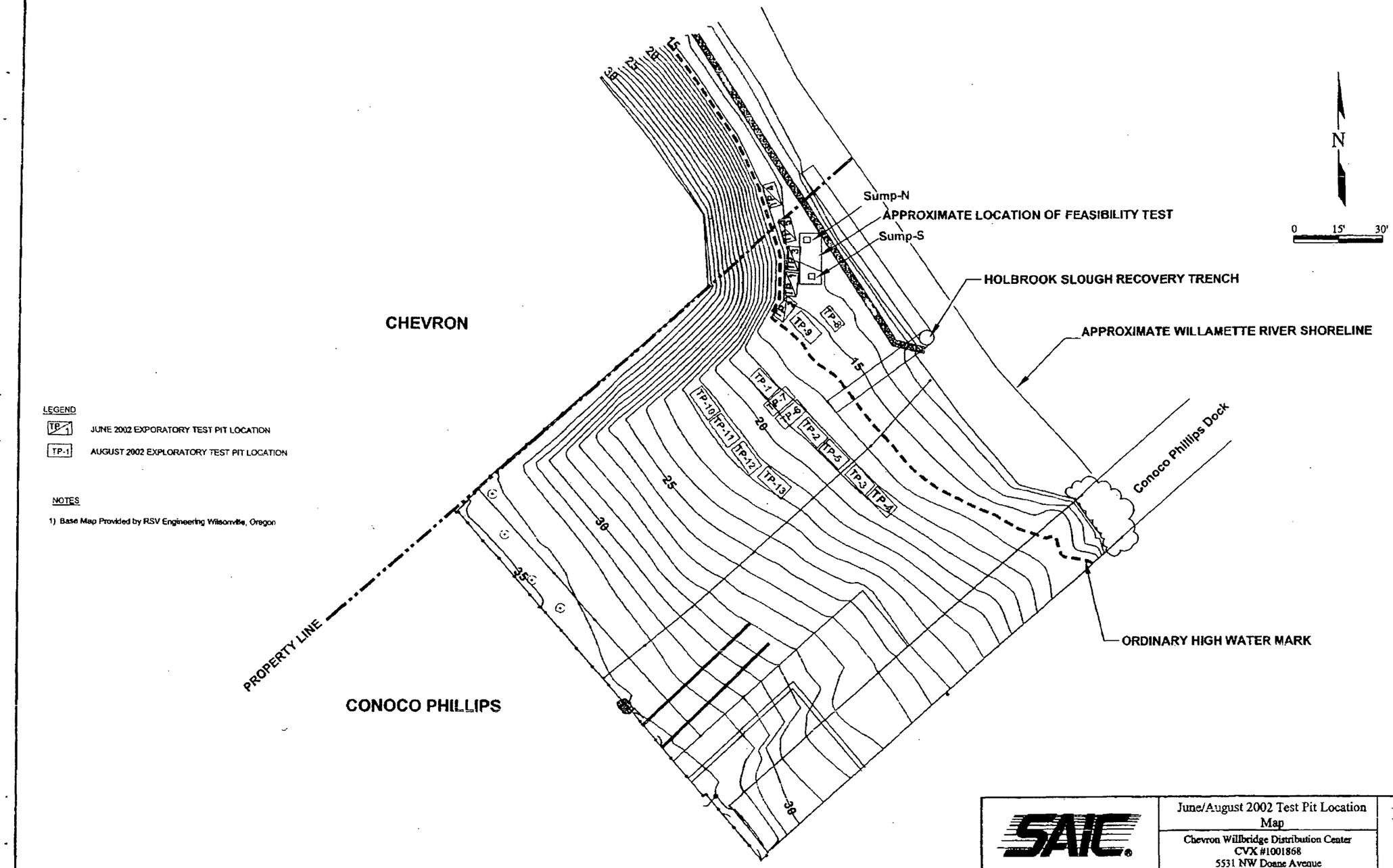

LEGEND

TP-1 JUNE 2002 EXPORATORY TEST PIT LOCATION

TP-1 AUGUST 2002 EXPLORATORY TEST PIT LOCATION

NOTES

1) Base Map Provided by RSV Engineering Wilsonville, Oregon

SAIC Proj #: 06-6102-00-3980-288 100-1868HolbrookBaseMap(fig5).dwg	June/August 2002 Test Pit Location Map Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon Date: 07/28/04 Drawn By: EML	FIGURE 5

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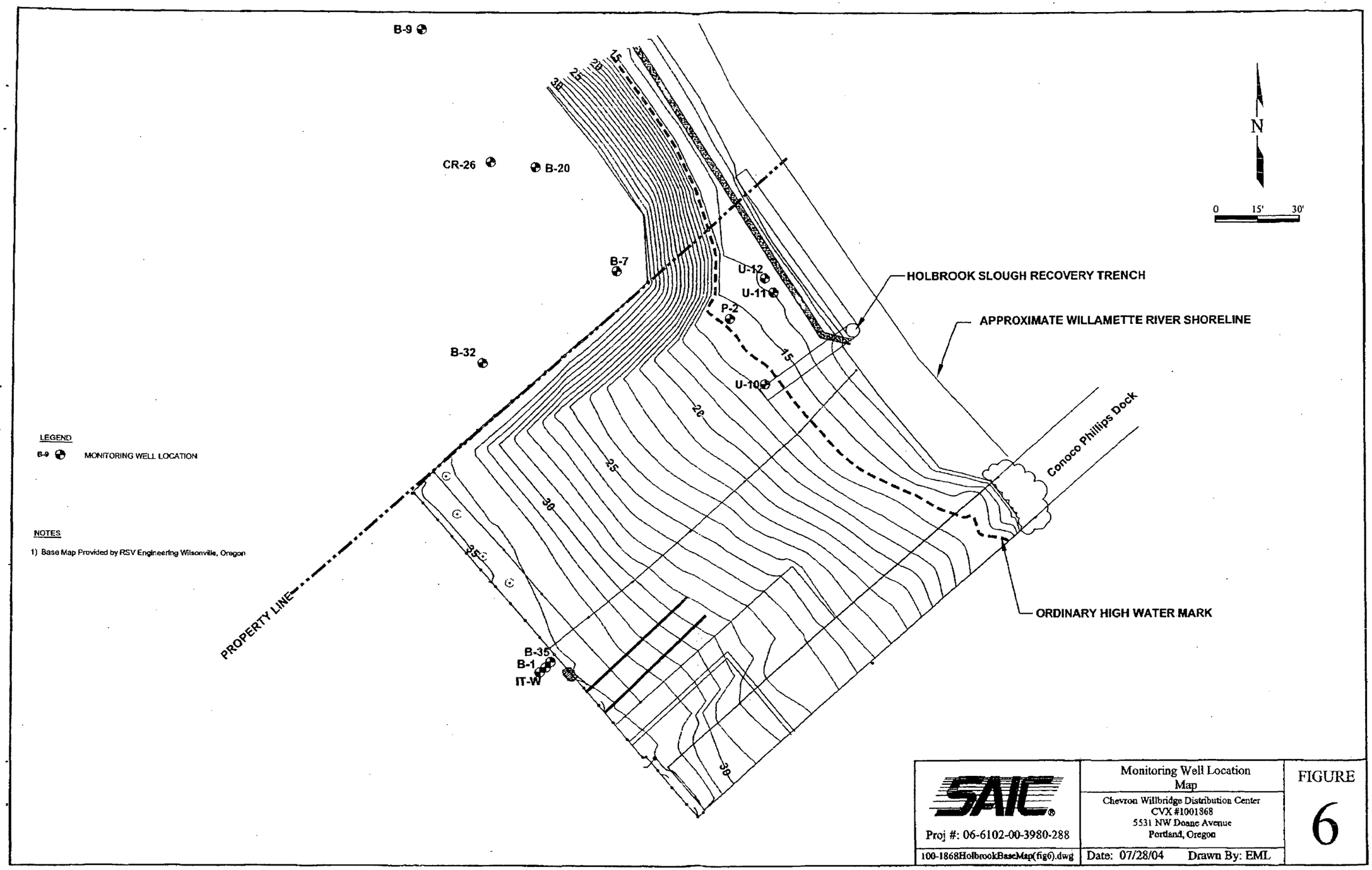

SAIC® Proj #: 06-6102-00-3980-288	Monitoring Well Location Map Chevron Willbridge Distribution Center CVX #1001868 5531 NW Doane Avenue Portland, Oregon	FIGURE 6
100-1868HolbrookBaseMap(fig6).dwg	Date: 07/28/04 Drawn By: EML	

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TABLES

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TABLE 1
SUMMARY OF SOIL ANALYTICAL DATA FROM JUNE 2002 TEST PITS - TPH
Chevron Willbridge Distribution Center
Portland, Oregon

Sample Location (depth in feet)	Sample Date	TPH-G (mg/kg)	TPH-D (mg/kg)	TPH-O (mg/kg)
T-1	6/24/02	<20.0	**6,940**	<100
T-4	6/24/02	<20.0	<50.0	<100
T-5	6/24/02	<20.0	<50.0	<100
T-6	6/24/02	**189**	**941**	<100
T-7	6/24/02	**329**	**2,670**	<100
T-8	6/24/02	<20.0	**20,600**	<100

Notes:
mk/kg = milligrams per kilogram (parts per million)
"<" = Indicates analyte not detected above detection limit shown
TPH-G = Total Petroleum Hydrocarbons as Gasoline by Northwest Method NWTPH-Gx.
TPH-D = Total Petroleum Hydrocarbons as Diesel Fuel by Northwest Method NWTPH-Dx.
TPH-O = Total Petroleum Hydrocarbons as Heavy Oil by Northwest Method NWTPH-Dx.
BOLD = Analyte detected above the method reporting limit

TABLE 2
SUMMARY OF SOIL ANALYTICAL DATA FROM JUNE 2002 TEST PITS - VOCs
Chevron Willbridge Distribution Center
Portland, Oregon

Analyte	T-1 6/24/02 (ug/kg)	T-4 6/24/02 (ug/kg)	T-5 6/24/02 (ug/kg)	T-6 6/24/02 (ug/kg)	T-7 6/24/02 (ug/kg)	T-8 6/24/02 (ug/kg)
Benzene	<500	<100	<100	<100	<100	<100
Toluene	<500	<100	<100	<100	<100	<100
Ethylbenzene	<500	<100	<100	<100	<100	<100
Total Xylenes	<1500	<300	<300	<300	<300	<300
1,2-Dibromoethane	<500	<100	<100	<100	<100	<100
1,2-Dichloroethane	<500	<100	<100	<100	<100	<100
1,2,4-Trimethylbenzene	<500	<100	<100	<100	<100	<100
1,3,5-Trimethylbenzene	<500	<100	<100	<100	<100	<100
Isopropylbenzene	**1140**	<200	<200	**454**	**773**	**494**
MTBE	<500	<100	<100	<100	<100	<100
n-Butylbenzene	**2740**	<500	<500	**1020**	**3060**	**2420**
n-Propylbenzene	**3710**	<100	<100	**1860**	**3630**	**1110**
Naphthalene	<1000	<200	<200	<200	<200	<200
Methylene Chloride	<2500	<500	<500	<500	<500	<500
p-Isopropyltoluene	<1000	<200	<200	<200	**426**	<200
sec-Butylbenzene	**974**	<100	<100	**301**	**819**	**1570**
tert-Butylbenzene	<500	<100	<100	<100	**185**	**205**
Other VOCs	ND	ND	ND	ND	-	ND

Notes:
ug/kg = micrograms per kilogram (parts per billion)
MTBE = Methyl tert-butyl ether
Volatile Organic Compound (VOC) analysis by EPA Method 8260B
- = Not available or not applicable
"<" = Indicates analyte not detected above detection limit shown
BOLD = Analyte detected above the method reporting limit
ND = Not detected above method reporting limits

TABLE 3
SUMMARY OF SOIL ANALYTICAL DATA FROM JUNE 2002 TEST PITS - PAHs
Chevron Willbridge Distribution Center
Portland, Oregon

Analyte	T-1 6/24/02 (ppb)	T-8 6/24/02 (ppb)
Acenaphthene	<670	**1,130**
Acenaphthylene	<670	<670
Anthracene	**469**	**1,060**
Benzo(a)anthracene	<134	<134
Benzo(a)pyrene	<134	<134
Benzo(b)fluoranthene	<134	<134
Benzo(g,h,i)perylene	<134	<134
Benzo(k)fluoranthene	<134	<134
Chrysene	<134	**146**
Dibenzo(a,h)anthracene	<134	<134
Fluoranthene	**143**	<670
Fluorene	**3,370**	**4,530**
Indeno(1,2,3-cd)pyrene	<134	<134
Naphthalene	<1,340	<3,350
Phenanthrene	**4,150**	**5,640**
Pyrene	**142**	**820**

Notes:
ug/kg = micrograms per kilogram
PAH = Polynuclear Aromatic Hydrocarbons by EPA Method 8270M-SIM.
"<" = Indicates analyte not detected above detection limit shown
BOLD = Analyte detected above the method reporting limit

TABLE 4
SUMMARY OF SOIL ANALYTICAL DATA FROM JUNE 2002 TEST PITS - METALS
Chevron Willbridge Distribution Center
Portland, Oregon

Analyte	T-1 6/24/02 (mg/kg)	T-8 6/24/02 (mg/kg)
Arsenic	**2.30**	**2.61**
Barium	**145**	**77.3**
Cadmium	<0.439	<0.424
Chromium	**27.5**	**16.6**
Lead	**12.9**	**12.9**
Mercury	<0.0862	<0.0862
Selenium	<0.439	<0.424
Silver	<0.439	<0.424

Notes:
mk/kg = milligrams per kilogram (parts per million)
ND = Not detected above method reporting limits
"<" = Indicates analyte not detected above detection limit shown
Total Metals analysis by EPA 6000/7000 Series Methods
BOLD = detected above Method Reporting Limit

TABLE 5
SUMMARY OF SOIL ANALYTICAL DATA FROM JUNE 2002 TEST PITS - PCBs
Chevron Willbridge Distribution Center
Portland, Oregon

Analyte	T-1 6/24/02 (ug/kg)	T-8 6/24/02 (ug/kg)
Aroclor 1016	<67.0	<67.0
Aroclor 1221	<134	<134
Aroclor 1232	<67.0	<67.0
Aroclor 1242	<67.0	<67.0
Aroclor 1248	<67.0	<67.0
Aroclor 1254	<67.0	<67.0
Aroclor 1260	<67.0	<67.0

Notes:
ug/kg = micrograms per kilogram (parts per million)
PCB = Polychlorinated Biphenyl by EPA Method 8082
"<" = Indicates analyte not detected above detection limit shown

TABLE 6
SUMMARY OF GROUNDWATER ELEVATION AND SPH RECOVERY DATA
Chevron Willbridge Distribution Center
Portland, Oregon

Well I.D. (TOC)	Date Gauged	Depth to Groundwater	Depth to SPH (feet)	SPH Thickness (feet)	Groundwater Elevation	SPH Recovered* (gallons)
B-1	2/14/2000	16.82	NP	-	17.86	NA
(34.68)	5/22/2000	17.05	NP	-	17.63	NA
	8/22/2000	17.48	NP	-	17.20	NA
	11/27/2000	17.82	NP	-	16.86	NA
	2/20/2001	17.71	NP	-	16.97	NA
	5/15/2001	17.68	NP	-	17.00	NA
	9/18/2001	18.01	NP	-	16.67	NA
	12/20/2001	17.10	NP	-	17.58	NA
	3/13/2002	16.77	NP	-	17.91	NA
	6/24/2002	17.32	NP	-	17.36	NA
	9/26/2002	17.74	NP	-	16.94	NA
	12/20/2002	17.57	NP	-	17.11	NA
	3/17/2003	16.97	NP	-	17.71	NA
	6/26/2003	17.24	NP	-	17.44	NA
B-7	2/14/2000	18.33	NP	-	17.40	0.1
(35.73)	5/22/2000	18.60	NP	-	17.13	NA
	8/22/2000	19.31	19.30	0.01	16.43	0.1
	11/27/2000	19.47	sheen	-	16.26	NA
	2/20/2001	19.37	NP	-	16.36	NA
	5/15/2001	19.36	sheen	-	16.37	NA
	9/19/2001	19.74	NP	-	15.99	NA
	12/20/2001	18.30	NP	-	17.43	NA
	3/15/2002	18.28	NP	-	17.45	NA
	9/23/2002	18.79	18.78	0.01	16.95	NA
	12/19/2002	19.78	19.79	0.01	15.96	NA
	3/19/2003	18.58	18.57	0.01	17.16	NA
B-9	2/14/2000	16.29	16.20	0.09	19.35	0.0
(35.57)	5/22/2000	16.90	NP	-	18.67	NA
	8/22/2000	17.48	NP	-	18.09	NA
	11/27/2000	17.29	NP	-	18.28	NA
	2/20/2001	17.41	NP	-	18.16	NA
	5/15/2001	17.04	NP	-	18.53	NA
	9/19/2001	17.84	NP	-	17.73	NA
	12/20/2001	15.92	NP	-	19.65	NA
	3/5/2002	15.92	NP	-	19.65	NA
	9/23/2002	17.75	NP	-	17.82	NA
	12/19/2002	17.28	NP	-	18.29	NA
	3/19/2003	16.18	NP	-	19.39	NA

TABLE 6
SUMMARY OF GROUNDWATER ELEVATION AND SPH RECOVERY DATA
Chevron Willbridge Distribution Center
Portland, Oregon

Well I.D. (TOC)	Date Gauged	Depth to Groundwater	Depth to SPH (feet)	SPH Thickness (feet)	Groundwater Elevation	SPH Recovered* (gallons)
B-20	2/14/2000	16.62	NP	-	16.70	NA
(33.32)	5/22/2000	16.93	NP	-	16.39	NA
	8/22/2000	17.78	NP	-	15.54	NA
	11/27/2000	17.99	sheen	-	15.33	NA
	2/20/2001	17.79	sheen	-	15.53	NA
	5/15/2001	17.89	NP	-	15.43	NA
	9/19/2001	18.40	NP	-	14.92	NA
	12/20/2001	16.61	NP	-	16.71	NA
	3/15/2002	16.45	NP	-	16.87	NA
	9/23/2002	18.27	NP	-	15.05	NA
	12/19/2002	18.22	NP	-	15.10	NA
	3/19/2003	15.96	NP	-	17.36	NA
B-32	2/14/2000	16.37	NP	-	17.86	NA
(34.23)	5/22/2000	26.84	NP	-	7.39	NA
	8/22/2000	17.65	NP	-	16.58	NA
	11/27/2000	17.93	NP	-	16.30	NA
	2/20/2001	17.71	NP	-	16.52	NA
	5/15/2001	17.74	NP	-	16.49	NA
	9/19/2001	18.17	NP	-	16.06	NA
	12/20/2001	16.74	NP	-	17.49	NA
	3/15/2002	16.55	NP	-	17.68	NA
	9/23/2002	18.32	18.32	Sheen	15.91	NA
	12/19/2002	18.15	NP	-	16.08	NA
	3/19/2003	16.83	NP	-	17.40	NA
B-35	2/14/2000	15.71	NP	-	17.85	NA
(33.56)	5/22/2000	16.00	NP	-	17.56	NA
	8/22/2000	16.36	NP	-	17.20	NA
	11/27/2000	16.71	NP	-	16.85	NA
	2/20/2001	16.65	NP	-	16.91	NA
	5/15/2001	15.56	NP	-	18.00	NA
	9/18/2001	16.90	NP	-	16.66	NA
	12/20/2001	15.95	NP	-	17.61	NA
	3/13/2002	15.70	NP	-	17.86	NA
	6/24/2002	16.22	NP	-	17.34	NA
	9/26/2002	16.64	NP	-	16.92	NA
	12/20/2002	16.48	NP	-	17.08	NA
	3/17/2003	15.91	NP	-	17.65	NA
	6/26/2003	16.13	NP	-	17.43	NA

TABLE 6
SUMMARY OF GROUNDWATER ELEVATION AND SPH RECOVERY DATA
Chevron Willbridge Distribution Center
Portland, Oregon

Well I.D. (TOC)	Date Gauged	Depth to Groundwater	Depth to SPH (feet)	SPH Thickness (feet)	Groundwater Elevation	SPH Recovered* (gallons)
IT-W	2/14/2000	17.46	NP	-	18.53	NA
(35.99)	5/22/2000	17.75	NP	-	18.24	NA
	8/22/2000	18.17	NP	-	17.82	NA
	11/27/2000	18.51	NP	-	17.48	NA
	2/20/2001	18.43	NP	-	17.56	NA
	5/15/2001	18.33	NP	-	17.66	NA
	9/18/2001	18.68	NP	-	17.31	NA
	12/20/2001	17.76	NP	-	18.23	NA
	3/13/2002	17.50	NP	-	18.49	NA
	6/24/2002	17.98	NP	-	18.01	NA
	9/26/2002	18.40	NP	-	17.59	NA
	12/20/2002	18.28	NP	-	17.71	NA
	3/17/2003	17.70	NP	-	18.29	NA
	6/26/2003	17.94	NP	-	18.05	NA
P-2	2/14/2000	4.18	NP	-	13.67	NA
(17.85)	5/22/2000	4.66	NP	-	13.19	NA
	8/22/2000	5.27	NP	-	12.58	NA
	11/27/2000	5.28	NP	-	12.57	NA
	2/20/2001	5.32	NP	-	12.53	NA
	5/15/2001	5.18	NP	-	12.67	NA
	9/18/2001	5.50	NP	-	12.35	NA
	12/20/2001	4.21	NP	-	13.64	NA
	3/13/2002	4.40	NP	-	13.45	NA
	6/24/2002	3.26	NP	-	14.59	NA
	9/26/2002	5.74	NP	-	12.11	NA
	12/20/2002	5.93	NP	-	11.92	NA
	3/17/2003	4.84	NP	-	13.01	NA
	6/26/2003	5.31	NP	-	12.54	NA

NOTES:
NP = No measurable product
NA = Not Applicable
NM = Not Measured
NR = None Recovered
* = SPH Recovered for latest quarter monitored
- = No measurable product thickness
Groundwater elevations for wells with product thicknesses have been corrected using 0.8
GWE = TOC -(DTW - (0.8 x DTP - DTW)) Where 0.8 = The density of the SPH

TABLE 7
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BTEX COMPOUNDS
Chevron Willbridge Distribution Center
Portland, Oregon

Well Identification	Date Sampled	Benzene (µg/l)	Ethylbenzene (µg/l)	Toluene (µg/l)	Xylenes (µg/l)
B-7	02/18/00	ND	ND	20.1	44.8
	05/23/00	ND	1.41	0.678	1.22
dup	05/23/00	ND	1.06	0.691	ND
	08/25/00	NS/F	NS/F	NS/F	NS/F
	11/30/00	NS/S	NS/S	NS/S	NS/S
	02/22/01	0.690	ND	0.736	ND
	05/17/01	ND	ND	0.700	ND
	03/20/03	ND	ND	0.740	ND
	09/29/03	<0.500	<0.500	0.870	1.93
	03/30/04	<0.500	<0.500	0.750	<1.00
B-9	05/23/00	ND	0.737	0.535	ND
	08/25/00	ND	ND	ND	ND
	11/30/00	ND	ND	ND	ND
	02/22/01	ND	ND	ND	ND
	05/17/01	ND	ND	ND	ND
	09/19/01	ND	0.913	ND	ND
	03/21/02	ND	ND	ND	ND
	09/24/02	ND	ND	ND	ND
	03/20/03	ND	ND	ND	ND
	03/30/04	<0.500	<0.500	0.560	<1.00
B-20	03/20/03	ND	ND	ND	ND
	09/29/03	<0.500	<0.500	<0.500	1.38
	03/30/04	<0.500	<0.500	<0.500	<1.00
B-32	03/20/03	ND	ND	ND	ND
	09/29/03	<0.500	0.636	<0.500	<1.00
	03/29/04	<0.500	<0.500	<0.500	<1.00
B-35	02/17/00	31.6	11	13.5	27.4
	05/26/00	194	12.5	16.3	39.8
	08/28/00	287	8.42	15.3	ND
	11/29/00	384	12.0	17.0	30.2
	02/23/01	45.6	12.4	4.87	20.5
	05/17/01	15.2	5.62	4.32	7.99
	09/20/01	58.0	9.78	3.31	15.9
	03/14/02	34.1	2.41	15.8	11.4
	09/26/02	95.8	14.0	11.3	26.3
	03/18/03	8.11	1.42	6.39	3.20
	09/25/03	66.7	3.74	7.41	19.2
	03/30/04	15.1	6.49	1.39	13.0
P-2	03/17/03	ND	ND	0.534	ND
	09/25/03	<0.500	0.823	<0.500	<1.00
	03/30/04	0.540	<0.500	<0.500	<1.00
U-10	03/18/03	ND	ND	ND	ND
	09/25/03	<0.500	<0.500	<0.500	<1.00
	03/30/04	0.680	<0.500	2.08	4.01

TABLE 7

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BTEX COMPOUNDS

Chevron Willbridge Distribution Center

Portland, Oregon

Well Identification	Date Sampled	Benzene (µg/l)	Ethylbenzene (µg/l)	Toluene (µg/l)	Xylenes (µg/l)
U-11	03/18/03	ND	ND	ND	ND
	09/25/03	1.74	1.04	1.37	1.74
	03/30/04	<0.500	<0.500	<0.500	<1.00
dup	03/30/04	0.650	<0.500	1.93	3.26
U-12	03/18/03	5.30	0.642	2.12	3.72
	09/25/03	<0.500	<0.500	0.563	2.00
	03/30/04	<0.500	<0.500	<0.500	<1.00

Notes:

2/00 and 5/00 data from IT Corporation

8/00, 11/00, 2/01 and 5/01 data from KHM Environmental Management, Inc.

NS/F = Not sampled floating product present

NS/S = Not sampled sheen present

µg/l = Micrograms per Liter (parts per billion)

ND = Not detected at or above detection limit

< = Indicates analyte not detected above detection limit shown

BTEX analysis by USEPA Method 8021B

dup* = duplicate for B-30 submitted as blind duplicate labeled as B-50

dup**= duplicate for B-30 submitted as blind duplicate labled as B-31

dup*** = duplicate for B-30 submitted as blind duplicate labeled as B-99

TB-LB = trip blank

TABLE 8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - PAH COMPOUNDS
ChevronTexaco ConocoPhillips Terminals-
Portland, Oregon

Well I.D.	Date Sampled	Acenaphthene (µg/l)	Acenaphthylene (µg/l)	Anthracene (µg/l)	Benzo (a) anthracene (µg/l)	Benzo (a) pyrene (µg/l)	Benzo (b) fluoranthene (µg/l)	Benzo (g,h,i) perylene (µg/l)	Benzo (k) fluoranthene (µg/l)	Chrysene (µg/l)	Dibenzo (a,h) anthracene (µg/l)	Fluoranthene (µg/l)	Fluorene (µg/l)	Indeno (1,2,3-cd) pyrene (µg/l)	Naphthalene (µg/l)	Phenanthrene (µg/l)	Pyrene (µg/l)
B-7	02/18/00	5.22	ND	ND	ND	ND	ND	ND	ND	0.528	ND	7.26	16.3	ND	ND	17.6	0.962
	05/23/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.2	ND	ND	13.6	ND
dup	05/23/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.9	ND	ND	15.8	ND
	08/25/00	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F
	11/30/00	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S
	02/22/01	1.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.64	ND	ND	2.82	ND
	05/17/01	0.934	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.59	ND	ND	0.564	ND
	03/20/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/29/03	2.12	ND	0.287	ND	ND	ND	ND	ND	ND	ND	ND	7.74	ND	ND	6.11	ND
	03/30/04	1.95	<0.200	0.436	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	7.73	<0.200	<1.60	5.95	<0.200
B-9	02/18/00	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F
	05/23/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.43	ND	ND	1.3	ND
	08/25/00	2.60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.40	ND	ND	1.33	ND
	11/30/00	0.700	ND	0.600	0.460	0.240	0.400	ND	ND	ND	ND	ND	6.70	ND	0.780	0.200	0.160
	02/22/01	1.78	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.20	ND	ND	0.528	ND
	05/17/01	1.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.60	ND	ND	0.386	ND
	09/19/01	1.08	0.240	ND	ND	ND	ND	0.120	ND	ND	0.100	ND	4.00	0.100	0.260	0.780	0.100
	03/21/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/24/02	1.40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.09	ND	ND	0.358	ND
	03/20/03	0.242	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.508	ND	ND	ND	ND
	09/30/03	1.29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.38	ND	ND	0.265	ND
	03/30/04	0.964	<0.300	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	3.10	<0.200	<1.50	0.951	0.234
B-20	03/20/03	0.322	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.577	ND	ND	ND	ND
	09/29/03	1.52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.86	ND	ND	4.27	ND
	03/30/04	1.07	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	3.81	<0.200	<1.50	0.988	<0.200

Historic Lab Data

COPPOR0006505

TABLE 8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - PAH COMPOUNDS
ChevronTexaco ConocoPhillips Terminals-
Portland, Oregon

Well I.D.	Date Sampled	Acenaphthene (µg/l)	Acenaphthylene (µg/l)	Anthracene (µg/l)	Benzo (a) anthracene (µg/l)	Benzo (a) pyrene (µg/l)	Benzo (b) fluoranthene (µg/l)	Benzo (g,h,i) perylene (µg/l)	Benzo (k) fluoranthene (µg/l)	Chrysene (µg/l)	Dibenzo (a,h) anthracene (µg/l)	Fluoranthene (µg/l)	Fluorene (µg/l)	Indeno (1,2,3-cd) pyrene (µg/l)	Naphthalene (µg/l)	Phenanthrene (µg/l)	Pyrene (µg/l)
B-32	03/20/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.161	ND	ND	ND	0.108
	09/29/03	ND	ND	ND	0.114	0.112	0.114	ND	0.114	0.188	ND	0.557	1.06	ND	ND	ND	0.498
B-35	02/17/00	11	ND	5.15	1.19	ND	ND	ND	ND	1.1	ND	8.29	30	ND	ND	35.8	4.33
	05/26/00	ND	ND	2.61	ND	ND	ND	ND	ND	ND	ND	2.93	22.5	ND	ND	20.7	1.73
	08/28/00	6.77	ND	0.807	0.123	ND	ND	ND	ND	0.127	ND	1.12	13.7	ND	ND	8.35	0.584
	11/29/00	2.84	0.360	0.520	0.240	ND	ND	ND	ND	0.200	ND	1.46	6.30	ND	1.22	7.16	0.760
	02/23/01	8.44	ND	ND	0.304	ND	0.102	ND	ND	0.330	ND	ND	16.2	ND	ND	17.3	1.15
	05/17/01	4.34	ND	0.493	0.103	ND	ND	ND	ND	0.106	ND	0.692	11.3	ND	ND	5.50	0.425
	09/20/01	2.92	0.360	0.680	0.200	ND	0.120	ND	ND	0.200	ND	1.20	6.74	ND	1.00	10.0	0.700
	03/14/02	3.02	ND	0.620	ND	ND	ND	ND	ND	ND	ND	0.844	7.62	ND	ND	6.78	0.468
	09/26/02	4.76	ND	0.740	0.109	ND	ND	ND	ND	ND	ND	1.00	11.6	ND	ND	9.41	0.570
	03/18/03	3.46	ND	0.493	ND	ND	ND	ND	ND	ND	ND	0.578	14.3	ND	ND	7.51	0.434
	09/25/03	5.36	ND	0.779	ND	ND	ND	ND	ND	ND	ND	0.884	10.2	ND	ND	8.86	0.399
	03/30/04	3.52	<0.200	0.456	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	0.419	7.21	<0.200	<2.10	5.18	0.274
P-2	03/17/03	2.61	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.62	ND	ND	2.05	ND
	9/25/03[2]	1.93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.85	ND	ND	4.23	ND
	03/30/04	1.97	<0.200	<0.300	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	7.66	<0.200	<1.70	3.28	<0.200
U-10	03/18/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.345	ND	ND
	09/25/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	03/30/04	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0302	<0.0200	<0.0200
U-11	03/18/03	0.711	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.44	ND	ND	0.951	ND
	09/25/03	1.45	ND	0.229	ND	ND	ND	ND	ND	ND	ND	0.391	4.69	ND	ND	3.25	0.396
	03/30/04	1.73	<0.200	0.395	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	0.610	5.29	<0.200	<2.60	4.32	0.821

Historic Lab Data

COPPOR0006506

TABLE 8
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - PAH COMPOUNDS
ChevronTexaco ConocoPhillips Terminals-
Portland, Oregon

Well I.D.	Date Sampled	Acenaphthene (µg/l)	Acenaphthylene (µg/l)	Anthracene (µg/l)	Benzo (a) anthracene (µg/l)	Benzo (a) pyrene (µg/l)	Benzo (b) fluoranthene (µg/l)	Benzo (g,h,i) perylene (µg/l)	Benzo (k) fluoranthene (µg/l)	Chrysene (µg/l)	Dibenzo (a,h) anthracene (µg/l)	Fluoranthene (µg/l)	Fluorene (µg/l)	Indeno (1,2,3-cd) pyrene (µg/l)	Naphthalene (µg/l)	Phenanthrene (µg/l)	Pyrene (µg/l)
U-12	03/18/03	1.72	ND	0.308	ND	ND	ND	ND	ND	ND	ND	0.384	7.94	ND	ND	3.91	0.541
	09/25/03	0.277	ND	0.138	ND	ND	ND	ND	ND	ND	ND	ND	1.25	ND	0.231	1.59	ND
	03/30/04	0.151	<0.0400	<0.0600	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	0.621	<0.0400	<0.320	0.238	0.0434

NOTES:
- = Not sampled, not analyzed, not applicable
µg/l = Micrograms per Liter (parts per billion)
ND = Not detected at or above method detection limit
< = Indicates analyte not detected above detection limit shown
2/00 and 5/00 data from IT Corporation
8/00, 11/00, 2/01 and 5/01 data from KHM Environmental Management, Inc.
IT Corp Data recorded as reported in Second Quarter 2000 Report
NS/F = Not sampled floating product present
NS/S = Not sampled sheen present
1 = Sample rerun outside of hold time due to low surrogate recovery reported in the initial sample as a result of an extraction error.
2 = Sample ID was misidentified by the laboratory as D-2
dup* = duplicate for B-30 submitted as blind duplicate labeled as B-50
dup**= duplicate for B-30 submitted as blind duplicate labled as B-31
dup***= duplicate for B-30 submitted as blind duplicate labeled as B-130
PAHs by EPA Method 8270M-SIM

COPPOR0006507

TABLE 9
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - TOTAL METALS
Chevron Willbridge Distribution Center
Portland, Oregon

Well I.D.	Sample Date	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)
B-7	02/18/00	0.028	0.122	0.00107	0.0066	0.0134	0.00425	ND	0.00125	ND	0.0234
	05/23/00	0.0268	0.228	ND	0.0264	0.0441	0.0115	ND	0.00193	ND	0.0863
dup	05/23/00	0.0276	0.259	ND	0.0304	0.051	0.0137	ND	0.00211	ND	0.104
	08/25/00	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F	NS/F
	11/30/00	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S	NS/S
	02/22/01	0.0310	0.0719	ND	ND	0.00311	ND	ND	ND	ND	0.00513
	05/17/01	0.0364	0.0587	ND	ND	0.00157	ND	ND	ND	ND	ND
	03/20/03	0.0275	0.0642	ND	ND	0.0209	ND	ND	ND	ND	ND
	09/29/03	0.0304	0.0815	ND	0.00278	0.00608	0.00121	ND	0.00132	ND	0.00782
	03/30/04	0.0303	0.0869	0.00138	0.00320	0.00647	0.00175	<0.000200	<0.00100	<0.00100	0.0135
B-9	05/23/00	0.0177	0.139	ND	0.0176	0.0286	0.00848	ND	0.00123	ND	0.0616
	08/25/00	0.0116	0.0534	ND	0.00270	0.00750	0.00214	ND	ND	ND	0.0228
	11/30/00	0.0108	0.153	0.00149	0.0159	0.0354	0.0114	ND	0.00125	ND	0.0823
	02/22/01	0.0173	0.0460	ND	ND	0.00213	ND	ND	0.00127	ND	ND
	05/17/01	0.0208	0.0706	ND	0.00444	0.00634	0.00241	ND	ND	ND	0.0161
	09/19/01	0.0161	0.0753	ND	0.00256	0.00993	0.00266	ND	ND	ND	0.0136
	03/21/02	0.0105	0.0488	ND	0.00257	0.00683	0.00398	ND	ND	ND	0.0506
	09/24/02	0.0185	0.0469	ND	ND	ND	ND	ND	ND	ND	ND
	03/20/03	0.00992	0.0401	ND	0.00165	0.00421	0.00317	ND	ND	ND	0.0283
	09/30/03	0.00905	0.137	0.00136	0.00812	0.0285	0.0155	ND	ND	ND	0.0532
	03/30/04	0.0384	0.349	0.00382	0.0395	0.0991	0.0467	<0.000200	0.00147	<0.00100	0.331
B-20	03/20/03	0.0107	0.0459	ND	0.00109	0.00389	ND	ND	ND	ND	0.00501
	09/29/03	0.130	4.35	0.0494	0.808	1.14	0.643	0.000934	0.00840	ND	3.96
	03/30/04	0.00165	0.0417	<0.00100	0.00184	0.00508	0.00121	<0.00200	<0.00100	<0.00100	0.00910
B-32	03/20/03	0.00367	0.0429	ND	0.00110	ND	ND	ND	ND	ND	ND
	09/29/03	0.122	6.84	0.0170	1.04	1.64	1.15	0.000754	0.0190	ND	3.74
	03/29/04	0.00917	0.434	0.00202	0.0615	0.108	0.0387	0.000221	0.0224	<0.00100	0.215
B-35	02/17/00	0.0602	0.480	0.00062	0.0893	0.122	0.0828	ND	0.00164	0.00021	0.311
	05/26/00	0.0102	0.116	ND	0.00786	0.0114	0.00264	ND	0.0013	ND	0.0233
	08/28/00	0.0377	0.128	0.00153	0.00467	0.00612	0.00643	ND	ND	ND	0.0339
	11/29/00	0.0468	0.131	ND	0.00316	0.00691	0.00619	ND	0.00212	ND	0.0208
	02/23/01	0.0347	0.0816	ND	0.00200	0.00380	0.00305	ND	0.00100	ND	0.0308
	05/17/01	0.0504	0.153	ND	0.0107	0.0141	0.0106	ND	ND	ND	0.0511
	09/20/01	0.0344	0.0901	ND	0.00178	0.00420	0.00160	ND	ND	ND	0.00632
	03/14/02	0.0335	0.308	ND	0.0463	0.0534	0.0298	ND	0.00139	0.00145	0.146
	09/26/02	0.0296	0.225	ND	0.0298	0.0314	0.0147	ND	0.00131	ND	0.0816
	03/18/03	0.0387	0.0958	ND	0.00155	0.00422	0.00277	ND	ND	ND	0.00700
	09/25/03	0.0517	0.132	ND	0.00334	0.00631	0.00536	ND	ND	ND	0.0171
	3/30/04	0.0291	0.135	<0.00100	0.0119	0.0149	0.00779	<0.000200	<0.00100	<0.00100	0.0152
P-2	03/17/03	0.0111	0.0783	ND	0.00232	0.00722	0.00288	ND	ND	0.00106	0.00979
	9/25/03[1]	0.00966	0.116	ND	0.00443	0.0116	0.00553	ND	0.00109	ND	0.0137
	03/30/04	0.00805	0.131	<0.00100	0.00187	0.00447	0.00126	<0.000200	<0.00100	<0.00100	0.0123
U-10	03/18/03	0.107	3.39	ND	0.313	0.403	0.176	0.000551	ND	ND	1.22
	09/25/03	0.00975	0.196	ND	0.0132	0.0149	0.00904	ND	ND	ND	0.0493
	03/30/04	0.0316	0.128	<0.00100	0.00481	0.00573	0.0225	<0.000200	<0.00100	<0.00100	0.0288

TABLE 9
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - TOTAL METALS
Chevron Willbridge Distribution Center
Portland, Oregon

Well I.D.	Sample Date	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)
U-11	03/18/03	0.00942	0.372	ND	0.0297	0.0339	0.0336	0.000211	0.00153	ND	0.110
	09/25/03	0.0343	0.0893	ND	0.00220	0.00287	0.00830	ND	0.00101	ND	0.0124
	03/30/04	0.00679	0.363	<0.00100	0.0341	0.312	0.0212	<0.000200	0.00165	<0.00100	0.103
dup	03/30/04	0.0357	0.108	<0.00100	0.00400	0.00594	0.0201	<0.000200	<0.00100	<0.00100	0.0292
U-12	03/18/03	0.0323	0.136	ND	0.00600	0.00711	0.0228	ND	ND	ND	0.0338
	09/25/03	0.0418	1.91	ND	0.362	0.372	0.302	0.000559	0.00480	ND	1.2
	03/30/04	0.00655	0.248	<0.00100	0.0179	0.0233	0.0220	<0.000200	0.00185	<0.00100	0.0728

Notes:
ND - Not detected at laboratory reporting limits
NS/F = Not sampled floating product present
NS/S = Not sampled sheen present
< = Indicates analyte not detected above detection limit shown
mg/l = milligrams per liter (parts per million)
2/00 and 5/00 data from IT Corporation
8/00, 11/00, 2/01 and 5/01 data from KHM Environmental Management, Inc.
Sample locations are shown on Figure 2
Analytical Reports are included in Attachment B
dup* = duplicate for B-30 submitted as blind duplicate labeled as B-50
dup**= duplicate for B-30 submitted as blind duplicate labeled as B-31
dup***= duplicate for B-30 submitted as blind duplicate labeled as B-130
1 = Sample ID was misidentified by the laboratory as D-2
Total Metals Analysis by EPA 6000/7000 Series Methods

COPPOR00006509

APPENDIX A

APPENDIX A
SUMMARY OF HISTORIC BORING AND TEST PIT LOGS
Chevron Willbridge Distribution Center
Portland, Oregon

Exploratory Boring or Test Pit ID	Date	Depth (feet)	Soil Description	Photo-Ionization Detector Reading (ppm)	Sample Collection
A1	05/02	0-4	Silty gravel with sand	NA	NA
		4-8	Silt, odor and sheen	NA	NA
			Total Depth = 8 feet below grade surface		
			Moist soil encountered at ~4 feet below grade surface; no groundwater.		
A2	05/02	0-0.5	Gravel cover	NA	NA
		0.5-3	Silty gravel with sand	NA	NA
		3-4	Silt, odor and sheen	NA	NA
			Total Depth = 4 feet below grade surface		
			Groundwater not encountered		
A3	05/02	0-0.5	Gravel cover	NA	NA
		0.5-3.5	Silty gravel with sand (refusal)	NA	NA
			Boring continued 5 feet south due to refusal		
		3.5-4.5	Silty sand, odor	NA	NA
		4.5-8	Silt, no odor, moist		
			Total Depth = 8 feet below grade surface	NA	NA
			Moist soil encountered at ~4.5 feet below		
			grade surface, groundwater not encountered.		
A4	05/02	0-0.5	Gravel cover	NA	NA
		0.5-3	Silty gravel with sand	NA	NA
		3-7	Sand (med-grained) trace fines, odor, sheen	NA	NA
		7-8	Sand, some silt, wet	NA	NA
		8-12	No recovery	NA	NA
			Total Depth = 12 feet below grade surface		
			Wet soil encountered at ~7 feet below grade		
			surface, groundwater not encountered.		
A5	05/02	0-6.5	No soils collected, refusal at 6.5 feet below	NA	NA
			grade surface, groundwater not encountered.		
			Total Depth = 6.5 feet below grade surface		
A6	05/02	0-1.5	Gravel cover with some silty sand	NA	NA
		1.5-12	Sand, odor, wet at 7 feet	NA	NA
		12-16	Silt, no odor	NA	NA
			Total Depth = 16 feet below grade surface		
			Wet soil encountered at 7 feet below grade		
			surface, groundwater encountered at ~14 feet below grade surface.		
A7	05/02	0-0.5	Gravel cover	NA	NA
		0.5-1.5	Silty gravel with sand	NA	NA
		1.5-4	Sand no odor, no sheen, damp	NA	NA
		4-8	Sand (med-grained), low recovery	NA	NA
		8-12	Silt, no odor, no sheen, moist	NA	NA
			Total Depth = 12 feet below grade surface		
			Moist soil encountered at ~8 feet below grade		
			surface, groundwater not encountered.		

COPPOR00006511

APPENDIX A
SUMMARY OF HISTORIC BORING AND TEST PIT LOGS
Chevron Willbridge Distribution Center
Portland, Oregon

Exploratory Boring or Test Pit ID	Date	Depth (feet)	Soil Description	Photo-Ionization Detector Reading (ppm)	Sample Collection
B-9	05/02	0-0.5	Gravel cover	NA	NA
		0.5-3.5	Sand (med-grained) no odor, no sheen	NA	NA
		3.5-4.5	Silt, no odor, no sheen	NA	NA
		4.5-7	Sand, no odor, no sheen	NA	NA
		7-12	Silt, odor, 6" sand zone, slough	NA	NA
			Total Depth = 12 feet below grade surface		
			Goundwater not encountered.		
B-15	05/02	0-0.5	Gravel cover	NA	NA
		0.5-5	Sand (med-grained) no odor, no sheen	NA	NA
		5-8	Silt, odor, no sheen, wet	NA	NA
			Total Depth = 8 feet below grade surface		
			Wet soil encountered at ~5 feet below grade		
			surface, groundwater not encountered.		
B-19	05/02	0-0.5	Gravel cover	NA	NA
		0.5-7.5	Sand (med-grained), no odor, no sheen, damp	NA	NA
		7.5-8.5	Sand (med-grained), with some silt, odor	NA	NA
		8.5-12	Silt, odor, moist	NA	NA
		12-16	No recovery	NA	NA
			Total Depth = 16 feet below grade surface		
			Moist soil encountered at ~8.5 feet below grade		
			surface, groundwater not encountered.		
C-10	05/02	0-0.5	Gravel cover	NA	NA
		0.5-8.5	Sand (med-grained), no odor, no sheen	NA	NA
		8.5-12	Silt, odor, very moist	NA	NA
			Total Depth = 12 feet below grade surface		
			Very moist soil encountered at ~8.5 feet below		
			grade surface, groundwater not encountered.		
C-13	05/02	0-0.5	Gravel cover	NA	NA
		0.5-10	Sand (med-grained), no odor, no sheen, damp	NA	NA
		10-24	Sand (med-grained) odor, sheen, wet at 11.5	NA	NA
		24-28	Sand (med-grained) no odor, no sheen	NA	NA
			Total Depth = 28 feet below grade surface		
			Groundwater encountered at ~11.5 feet below		
			grade surface.		
C-16	05/02	0-0.5	Gravel cover	NA	NA
		0.5-14	Sand (med-grained), no odor, no sheen, damp	NA	NA
		14-16	Silt, odor, moist	NA	NA
			Total Depth = 16 feet below grade surface		
			Moist soil encountered at ~14 feet below		
			grade surface, groundwater not encountered.		

COPPOR00006512

APPENDIX A
SUMMARY OF HISTORIC BORING AND TEST PIT LOGS
Chevron Willbridge Distribution Center
Portland, Oregon

Exploratory Boring or Test Pit ID	Date	Depth (feet)	Soil Description	Photo-Ionization Detector Reading (ppm)	Sample Collection
D-11	05/02	0-0.5	Gravel cover	NA	NA
		0.5-9.5	Sand (med-grained) no odor, no sheen, damp	NA	NA
		9.5-10	Wood	NA	NA
		10-11	Sand (med-grained) no odor, no sheen	NA	NA
		11-12	Silt, odor, moist	NA	NA
			Total Depth = 12 feet below grade surface		
			Moist soil encountered at ~11 feet below		
			grade surface, groundwater not encountered.		
D-12	05/02	0-0.5	Gravel cover	NA	NA
		0.5-15	Sand (med-grained) no odor, no sheen, damp	NA	NA
		15-16	Sand (med-grained) odor, wet at ~15	NA	NA
		16-24	Sand (med-grained) no odor, no sheen, very moist	NA	NA
			Total Depth = 24 feet below grade surface		
			Groundwater encountered at ~15 feet below		
			grade surface.		
D-17	05/02	0-1	Sand, damp	NA	NA
		1-2	Gravel cover, no odor, no sheen	NA	NA
		2-15	Sand (med-grained) no odor, no sheen	NA	NA
		15-17	Sand (med-grained) odor, wet at ~15	NA	NA
		17-20	Silt, odor, very moist	NA	NA
			Total Depth = 20 feet below grade surface		
			Groundwater encountered at ~15 feet below		
			grade surface.		
D-18	05/02	0-0.5	Gravel cover	NA	NA
		0.5-9	Sand (med-grained) no, odor, no sheen, damp	NA	NA
		9-12	Silt, odor, moist	NA	NA
			Total Depth = 12 feet below grade surface		
			Moist soil encountered at ~9 feet below		
			grade surface, groundwater not encountered.		
TP-1	06/02	0-1	Gravel/rock		Submitted at sand/silt contact.
		1-5	Brown sand		
		5-6	Gray sandy silt	136	
			Total Depth = 6 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. Sheen on groundwater.		
TP-2	06/02	0-1	Rock, gravel, sand, geotextile from Holbrook Trench recovery system	NA	NA
			Total Depth = 1 feet below grade surface		
			Groundwater not encountered.		
TP-3	06/02	0-1.5	Rock, brown sand, electrical conduit for Holbrook	NA	NA
			Slough recovery system		
			Total Depth = 1.5 feet below grade surface		
			Groundwater not encountered.		

COPPOR00006513

APPENDIX A
SUMMARY OF HISTORIC BORING AND TEST PIT LOGS
Chevron Willbridge Distribution Center
Portland, Oregon

Exploratory Boring or Test Pit ID	Date	Depth (feet)	Soil Description	Photo-Ionization Detector Reading (ppm)	Sample Collection
TP-4	06/02	0-1	Gravel/rock		Submitted at sand/silt contact.
		1-4.9	Brown sand		
		4.9-5.5	Green/gray silt	0	
			Total Depth = 5.5 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. No sheen on groundwater.		
TP-5	06/02	0-1	Gravel/rock		Submitted at sand/silt contact.
		1-5.6	Brown sand		
		5.6-6	Green/gray silt	0	
			Total Depth = 6 feet below grade surface		
			Groundwater encountered at ~5.6 feet below grade		
			surface. No sheen on groundwater.		
TP-6	06/02	0-1	Gravel/rock		Submitted at sand/silt contact.
		1-5.5	Brown sand		
		5.5-6	Green/gray silt	250	
			Total Depth = 6 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. Slight sheen on groundwater.		
TP-7	06/02	0-1	Gravel/rock		Submitted at sand/silt contact.
		1-5.5	Brown sand		
		5.5-6	Green/gray silt	182	
			Total Depth = 6 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. Sheen on groundwater.		
TP-8	06/02	0-1	Gravel/rock		Submitted from impacted sand.
		1-7	Coarse, dark gray sand and gravel	55	
			Total Depth = 7 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. Sheen on groundwater, good recharge.		
			Wood in pit.		
TP-9	06/02	0-1	Gravel/rock		NA
		1-6	Gray sand and gravel	15	
			Total Depth = 6 feet below grade surface		
			Groundwater encountered at ~5.5 feet below grade		
			surface. Sheen on groundwater, good recharge.		
			Broken pieces of clay sewer pipe in pit.		
TP-10	06/02	0-1	Gravel/rock		NA
		1-3.5	Brown sand		
		3.5-6	Green/gray silt	125	
			Total Depth = 6 feet below grade surface		
			Groundwater not encountered.		

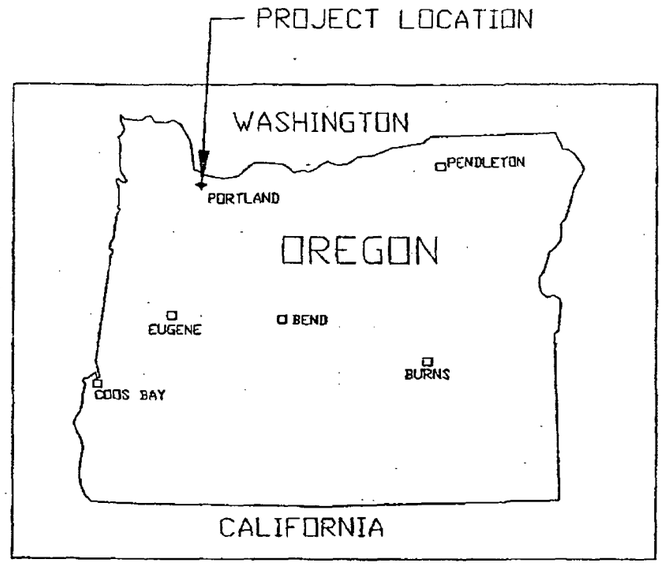
COPPOR00006514

APPENDIX A
SUMMARY OF HISTORIC BORING AND TEST PIT LOGS
Chevron Willbridge Distribution Center
Portland, Oregon

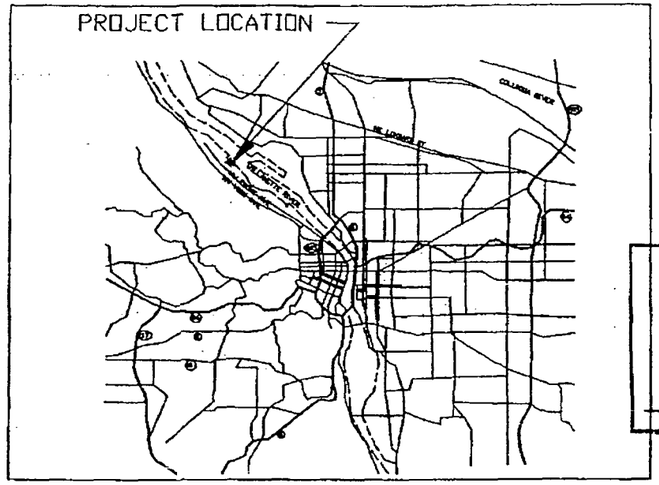
Exploratory Boring or Test Pit ID	Date	Depth (feet)	Soil Description	Photo-Ionization Detector Reading (ppm)	Sample Collection
TP-11	06/02	0-1	Gravel/rock		NA
		1-5	Brown sand		
		5-6	Green/gray silt	140	
			Total Depth = 6 feet below grade surface Groundwater not encountered.		
TP-12	06/02	0-1	Gravel/rock		NA
		1-4	Brown sand		
		4-6	Green/gray silt	166	
			Total Depth = 6 feet below grade surface		
			Groundwater not encountered.		
TP-13	06/02	0-1	Gravel/rock		NA
		1-7	Brown sand		
		7-8	Green/gray silt	13	
			Total Depth = 8 feet below grade surface		
			Groundwater not encountered.		
			Wood in pit in sand at ~5.5 feet, not a sewer pipe,		
			organic odor		

Notes:
*PID = Photo Ionization Detecter
ppm = parts per million
NA = Not available or not applicable
Exploratory test pits or borings completed by either KHM Environmental or Delta Environmental.

COPPOR00006515



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

City of Portland
APPROVED
DEC 2 8 2004
Permit Number

INDEX OF DRAWINGS

DRAWING	SHEET
TITLE SHEET	1
PROJECT NOTES	2
PROJECT LOCATION MAP	3
EXISTING SITE FEATURES	4
SITE PLAN	5
SHEET PILE CROSS-SECTON ALONG ALIGNMENT OF CUTOFF WALL	6
CUTOFF WALL COLLECTION TRENCH DETAILS	7
CUTOFF WALL COLLECTION TRENCH DETAILS	8
GRADING PLAN	9
EROSION CONTROL PLAN	10

CAUTION NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY IN ADVANCE BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.

CONSTRUCTION DRAWINGS FOR

CHEVRON AND CONOCO PHILLIPS WILLBRIDGE TERMINAL GROUNDWATER CUTOFF WALL

PORTLAND, OREGON

DATE	DESCRIPTION	APPD.
[illegible]	Wall design update, February 2003	
	Wall design update, March 2003	
[illegible]	Wall design change, August 2003	
[illegible]	Wall design change, October 2003	

REVISION

XREF(S) USED:
ROTATION ANGLE:
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY CHECKED BY
FINAL MAP DATA

DESIGNED BY	DATE APPD.
BJB	
DRAWN BY	PROGRAM MGR
CCA	
CHECKED BY	CONST. MGR.
DESIGN MGR.	

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
31000 SW CHARBONNEAU DR, SUITE 101
WILSONVILLE, OREGON 97070 (503)694-6000

TITLE SHEET
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue

1/4 SECTION 2423
JOB NO. 02-298
SHEET NO. 1 of 10

COPPOR00006516

GENERAL PROJECT NOTES

1) Contractor shall notify Bureau of Environmental Services at (503) 823-7931 two (2) business days prior to commencement of work.

2) All construction shall conform to City of Portland standard construction specifications, as revised in 1998. Contractor and/or subcontractor shall have a minimum of one set of approved plans and City of Portland standard construction specifications on the job site at all times during construction.

3) Office of Planning and Development Review, Approvals, and Permits required for privately maintained structures constructed. All work approved under OPDR permits shall be privately owned and maintained.

4) Attention Excavators: Oregon law requires you to follow rules adopted by Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of those rules from the Center by calling (503)232-1987. If you have any questions about the rules, you may contact the Center. You must notify the Center at least two (2) business days, but not more than ten (10) business days, before commencing an excavation. Call 503-246-6699.

5) Slope stability evaluation to be completed prior to any disturbance of existing slope on Chevron property.

6) Excavated trench spoil material shall be disposed of at a proper landfill, or applicant shall obtain a fill permit from the Office of Planning and Development Review before being disposed of on-site. A copy of the grading permit and plan should also be provided to the Bureau of Environmental Services for construction inspection.

7) Site erosion plan to be approved and controls in place prior to construction. All work under this permit will require site erosion control in compliance with all provisions of the City Title 10.

ADDITIONAL PROJECT NOTES

SHEET PILE WALL

1) Sheet Piling to be Hoesch H-1700 Steel Sheet Piling or equivalent, as approved by Engineer and Client.

2) Sheet Piling joints to include waterstop seals. Waterstop seals shall be ADEKA ULTRA SEAL A-50 or equivalent as approved by Engineer and Client.

3) Sheet Piling and waterstop seals to be installed consistent with manufacturers' recommendations.

COLLECTION TRENCH

1) Trench sand backfill shall be medium to coarse sand, moderately graded. The sand shall be free of silt, clay, loam, friable or soluble materials, or organic matter, conforming to the following gradation (or other as approved by Engineer and Client):

Sieve Size	Percent Passing
No. 4	100
No. 10	10 to 100
No. 40	0 to 10
No. 200	0

2) Geotextile Fabric separating sand and rip rap shall be non-woven fabric that complies with the following properties (unless otherwise approved by Engineer and Client):

Test	Method	Value
Grab Tensile Strength (N)	ASTM D4632	1155
Burst Strength (KPa)	ASTM D3786 Mod.	3000
Puncture Strength (N)	ASTM D4833 or ASTM D3787 Mod.	490
Apparent Opening Size (uM)	ASTM D4751	212
Ultraviolet Stability	ASTM D4355 @500 hrs	70% Strength retained

2	2/25/03	Wall design update, February 2003	
3		Wall design update, March 2003	
5	8/22/03	Wall design change, August 2003	
6	10/23/03	Wall design change, October 2003	
	DATE	DESCRIPTION	APPD.
		REVISION	

KREP(S) USED: _____
ROTATION ANGLE: _____
CONSTRUCTED BY: _____
PROJECT COMPLETED: _____
MAP CORRECTED BY: _____ CHECKED BY: _____
FINAL MAP DATA

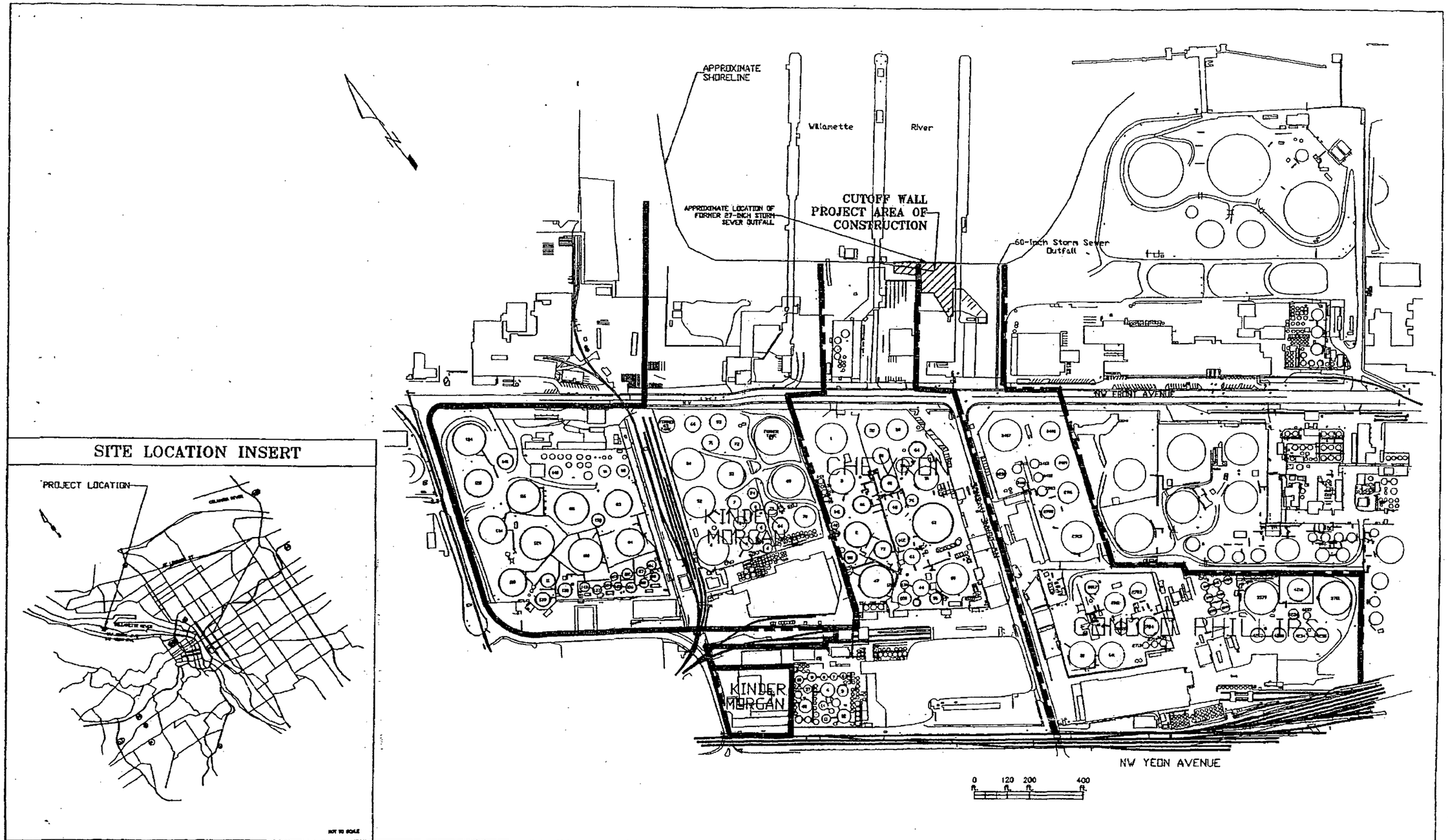
DESIGNED BY BJB	DATE APPD.
DRAWN BY OCA	PROGRAM MGR.
CHECKED BY	CONST. MGR.
DESIGN MGR.	

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
21400 SW CHARBONNEAU DR, SUITE 101
BEAVERVILLE, OREGON 97670 (503)684-0960

PROJECT NOTES
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue

1/4 SECTION 2423
JOB NO. 02-299
SHEET NO.

COPPOR00006517



NO.	DATE	DESCRIPTION	APPD.
2	2/25/03	Wall design update, February, 2003	
3		Wall design update, March 2003	
4	8/22/03	Wall design change, August 2003	
5	10/23/03	Wall design change, October 2003	

REVISION

XREF(S) USED:
ROTATION ANGLE:
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY _____ CHECKED BY _____
FINAL MAP DATA

DESIGNED BY: BJB
DRAWN BY: CCA
CHECKED BY:
DESIGN MGR.
DATE APPD.
PROGRAM MGR.
CONST. MGR.

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
31960 SW CHARBONNEAU DR, SUITE 101
WILSONVILLE, OREGON 97070 (503)694-6900

PROJECT LOCATION MAP
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue

1/4 SECTION 2425
JOB NO. 02-158
SHEET NO. 3 - 10

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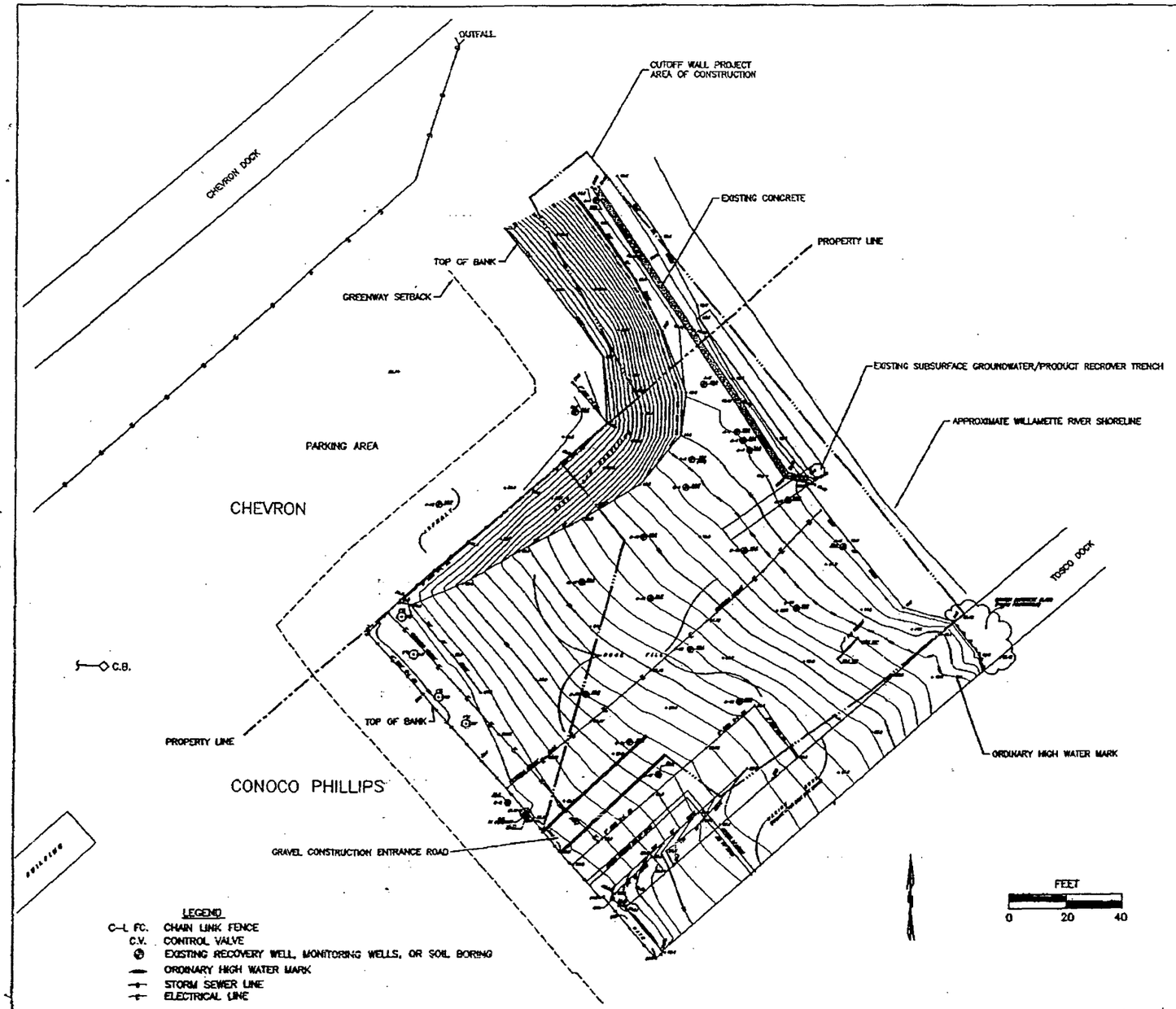


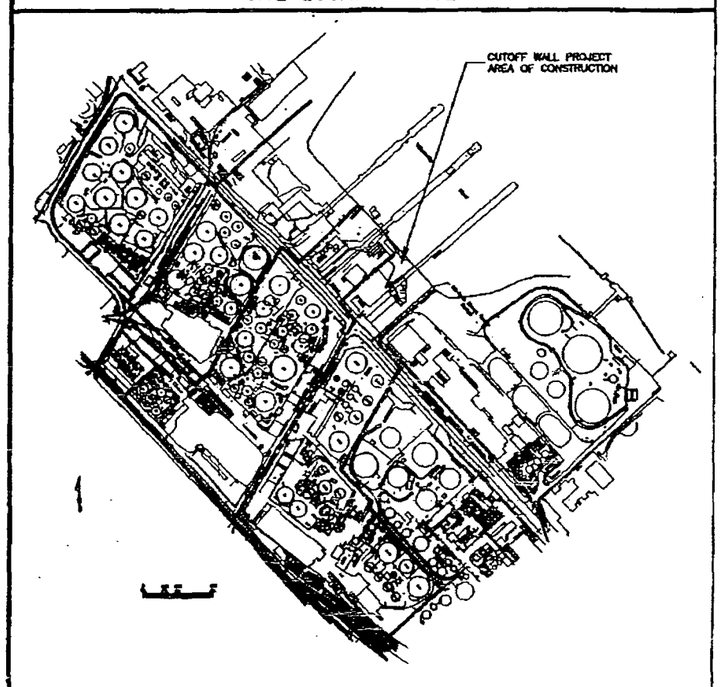
LEGEND

C-L FC. CHAIN LINK FENCE
C.V. CONTROL VALVE
EXISTING RECOVERY WELL, MONITORING WELLS, OR SOIL BORING
ORDINARY HIGH WATER MARK
STORM SEWER LINE
ELECTRICAL LINE

NOTES

1. BENCH MARK: CITY OF PORTLAND B.M. NO 2528. ELEVATION 34.64
2. CONTOURS ARE AT ONE-FOOT INTERVALS AND ARE COMPUTER GENERATED.
3. CONTOURS MAP ADAPTED FROM FIGURE PROVIDED BY CHASE, JONES, AND ASSOCIATES DATED MAY 29, 2002.
4. UNDERGROUND UTILITIES ARE SUBJECT TO ACTUAL FIELD LOCATION.
5. ALL UTILITIES MAY NOT BE SHOWN.
6. 4% OF SITE COVERED BY ROOFED STRUCTURES.
7. NO ACCESSORY BUILDINGS LOCATED ON-SITE.
8. 0% OF SITE CURRENTLY LANDSCAPED.
9. SITE PART OF TOSCO OIL COMPANY SHIPPING / RECEIVING DOCK.
10. ORDINARY HIGH WATER MARK IS 18 FT ABOVE MSL.
11. NO TREES IN AREAS TO BE DISTURBED.

SITE LOCATION INSERT



NO.	DATE	DESCRIPTION	APPD.
2	5/25/03	Well design update, February, 2003	
3		Well design update, March 2003	
4	6/22/03	Well design change, August 2003	
5	10/22/03	Well design change, October 2003	
6	6/22/04	Design change, August 2004	

TRACED USED
ROTATION ANGLE
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY _____ CHECKED BY _____
FINAL MAP DATA

DESIGNED BY: BJB
DRAWN BY: CCA
CHECKED BY
DATE APPD.
PROGRAM NO.
CONST. NO.
REVISION NO.

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
[illegible]

EXISTING SITE FEATURES
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

1/4 SECTION 2423
JOB NO. 02-158
SHEET NO. 4-10

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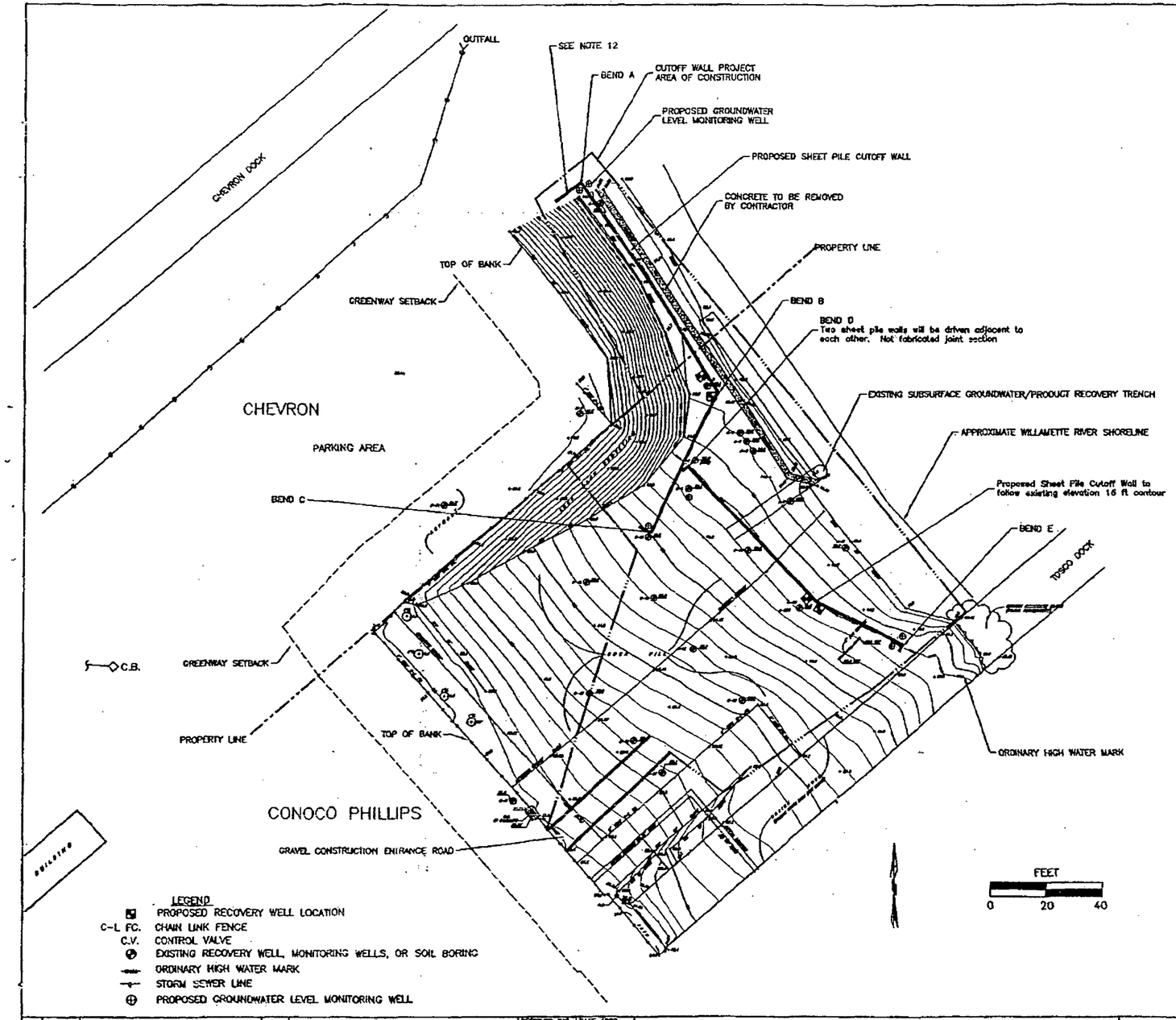
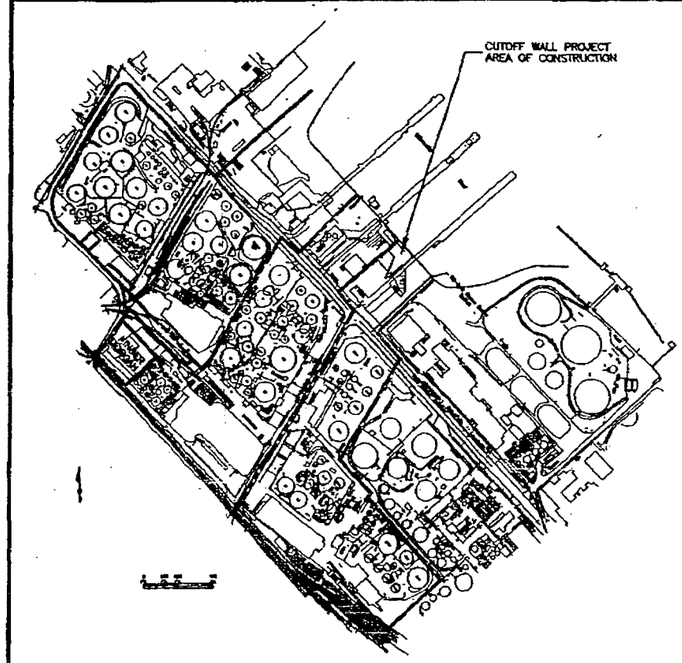


NOTES

1. BENCH MARK: CITY OF PORTLAND B.M. NO 2528. ELEVATION 34.64
2. CONTOURS ARE AT ONE-FOOT INTERVALS AND ARE COMPUTER GENERATED.
3. CONTOURS MAP ADAPTED FROM FIGURE PROVIDED BY CHASE, JONES, AND ASSOCIATES DATED MAY 29, 2002.
4. UNDERGROUND UTILITIES ARE SUBJECT TO ACTUAL FIELD LOCATION.
5. ALL UTILITIES MAY NOT BE SHOWN.
6. 4% OF SITE COVERED BY ROOFED STRUCTURES.
7. NO ACCESSORY BUILDINGS LOCATED ON-SITE.
8. 0% OF SITE CURRENTLY LANDSCAPED.
9. SITE PART OF TOSCO OIL COMPANY SHIPPING / RECEIVING DOCK.
10. ORDINARY HIGH WATER MARK IS 16 FT ABOVE MSL.
11. NO TREES IN AREAS TO BE DISTURBED.
12. SLOPE STABILITY EVALUATION TO BE COMPLETED PRIOR TO ANY DISTURBANCE OF EXISTING SLOPE ON CHEVRON PROPERTY.

SITE LOCATION INSERT



NO.	DATE	DESCRIPTION	APPR.
2	2/25/03	Well design update, February, 2003	
3	"	Well design update, March, 2003	
4	9/22/03	Well design change, August 2003	
5	10/23/03	Well design change, October 2003	
6	8/26/04	Design change, August 2004	

DEVISION

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CONSTRUCTED BY	
PROJECT COMPLETED	
MAP CORRECTED BY ____ CHECKED BY	
FINAL MAP DATA	

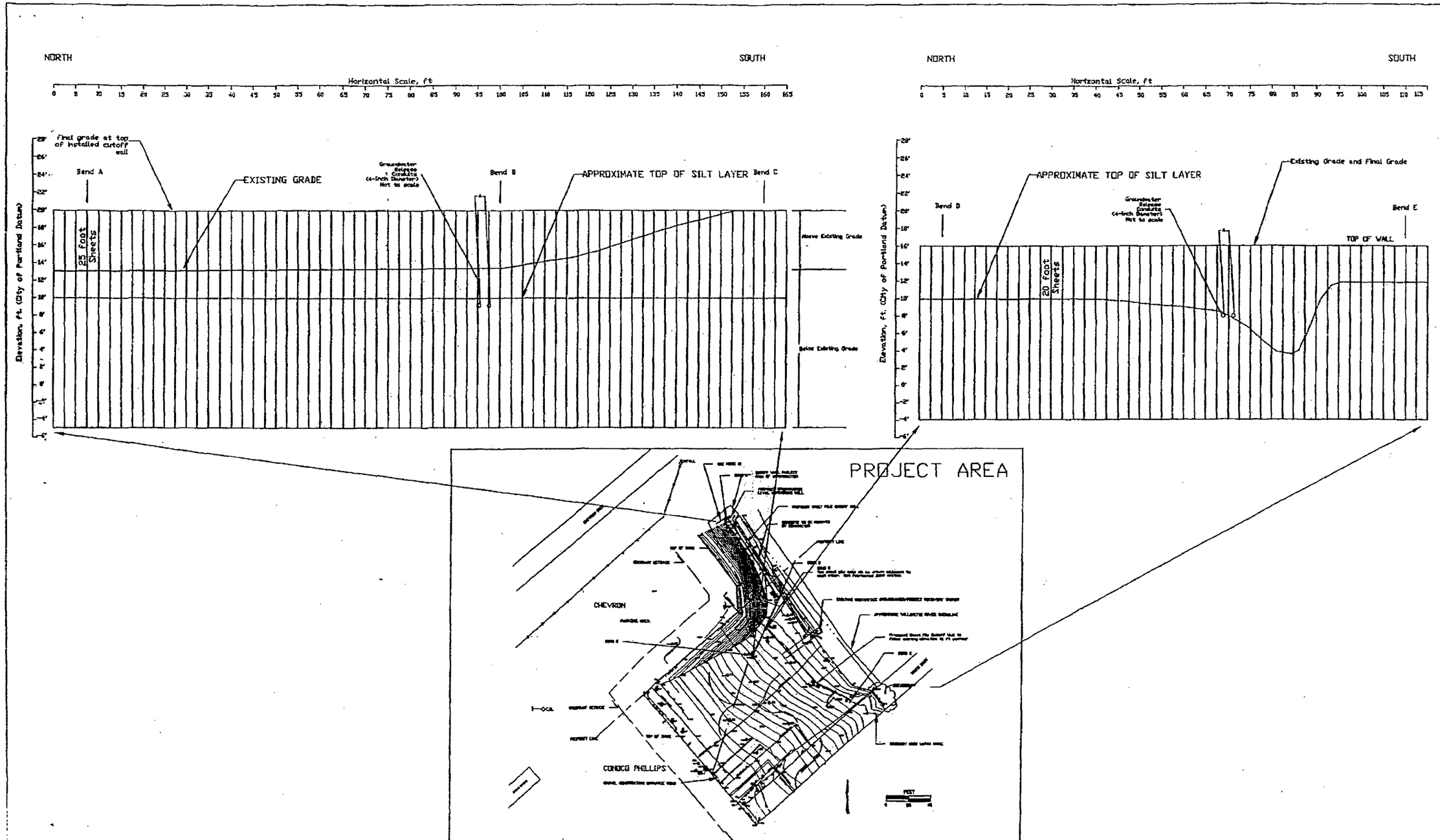
DESIGNED BY	B.JB	DATE APPR.
DRAWN BY	CCA	PROGRAM MGR.
CHECKED BY		CONST. MGR.
DESIGN MGR.		

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
2000 SW CORNELIUS PL. SUITE 101
HILLSBORO, OREGON 97123 (503)614-1254

SITE PLAN
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

1/4 SECTION	2423
JOB NO.	02-158
SHEET NO.	5 of 10

COPPOR00006520



NO.	DATE	DESCRIPTION	APPD.
3	2/25/03	Wall design update, February, 2003	
2		Wall design update, March 2003	
4	8/22/03	Wall design change, August 2003	
5	10/23/03	Wall design change, October 2003	
6	8/26/04	Wall design change, August 2004	

XREF(S) USED:
ROTATION ANGLE:
CONSTRUCTED BY:
PROJECT COMPLETED:
MAP CORRECTED BY: CHECKED BY:
FINAL MAP DATA

DESIGNED BY: BJB	DATE APPD.
DRAWN BY: CCA	PROGRAM MGR.
CHECKED BY	CONST. MGR.
DESIGN MGR.	

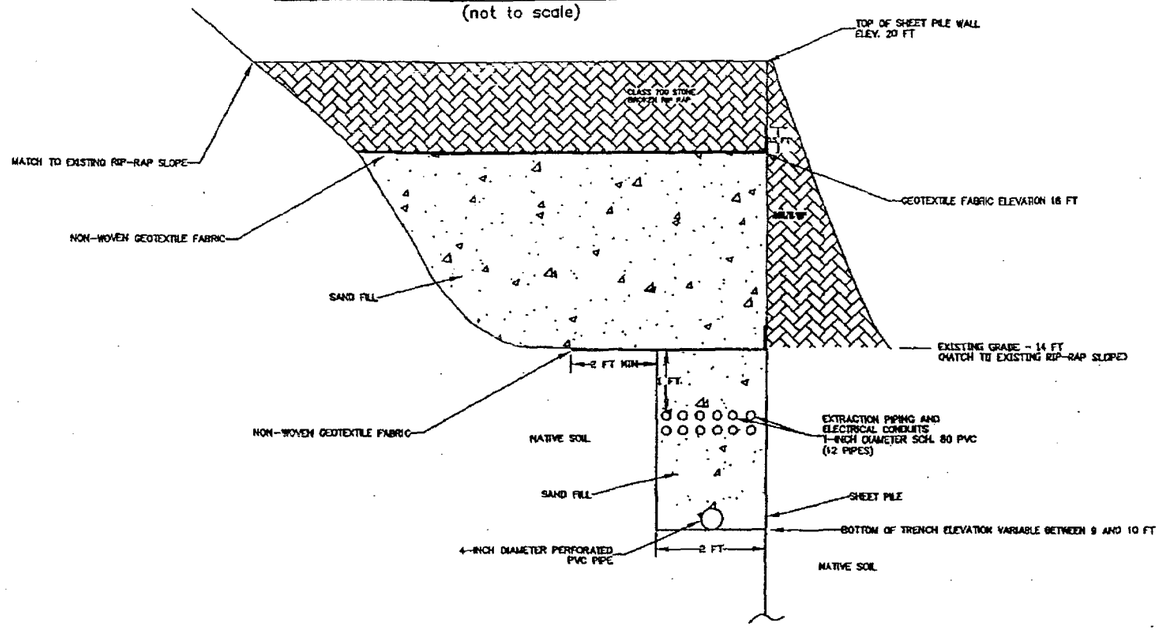
RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
31000 NW CHAMPIONS DR, SUITE 101
WILSONVILLE, OREGON 97070 (503)694-6060

SHEET PILE CROSS SECTION
ALONG ALIGNMENT OF CUTOFF WALL
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA

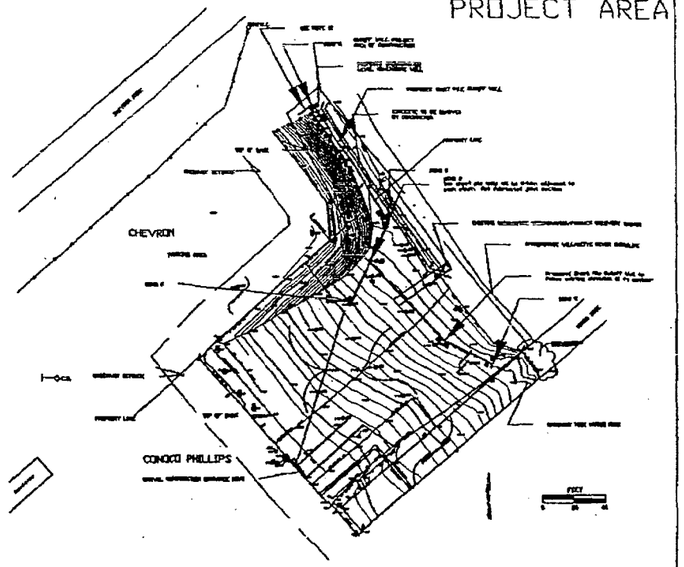
1/4 SECTION 2423
JOB NO. 02-156
SHEET NO.

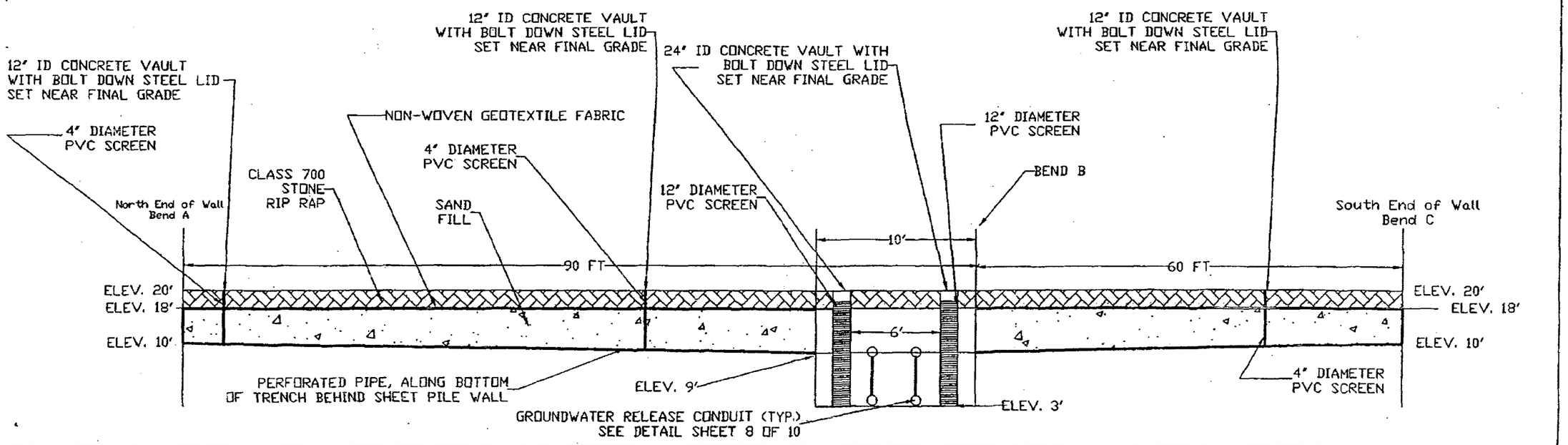
COPPOR00006521

TYPICAL TRENCH CROSS-SECTION DETAIL – NORTH OF BEND B
(not to scale)



PROJECT AREA





NO.	DATE	DESCRIPTION	APPD.
2	3/28/03	Wall design update, February, 2003	
3		Wall design update, March 2003	
4	6/12/03	Wall design change, August 2003	
5	10/29/03	Wall design change, October 2003	
6	05/28/04	Design change, August 2004	

REVISION

DRAFTED BY:
ROTATION ANGLE:
CONSTRUCTED BY:
PROJECT COMPLETED:
MAP CORRECTED BY: CHECKED BY:
FINAL MAP DATA

DESIGNED BY: BJB
DRAWN BY: CCA
CHECKED BY:
DESIGN MGR:

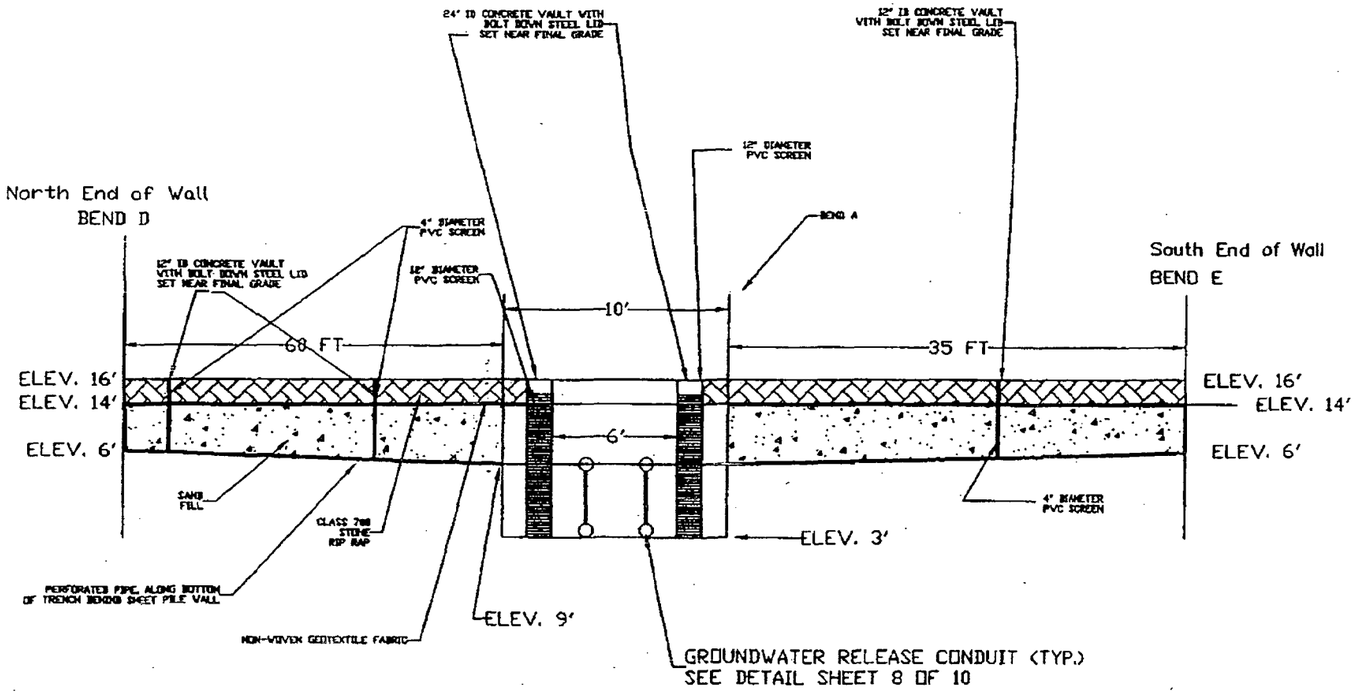
DATE APPD.
PROGRAM MGR.
CONST. MGR.

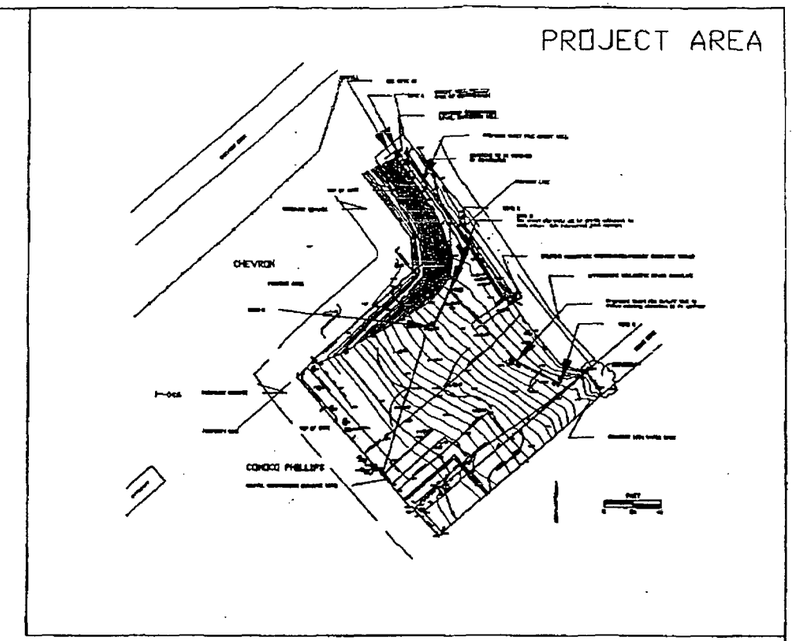
RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
3700 SW CHEMEKETA DR, SUITE 101
WILSONVILLE, OREGON 97070 (503)941-9160

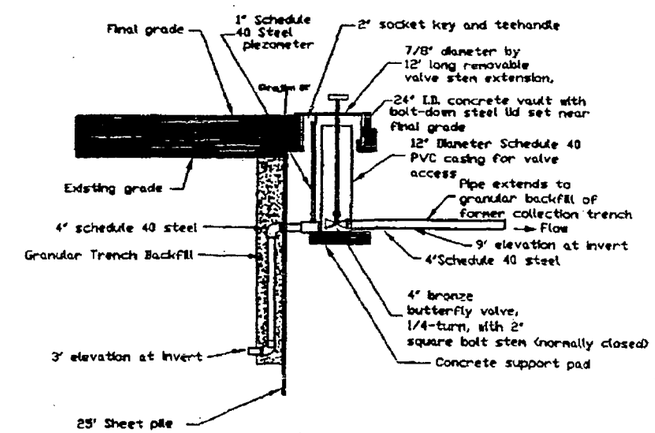
CUTOFF WALL COLLECTION TRENCH DETAILS
WILLBRIDGE FORMER 27-INCH
STORM SEWER AREA
NW Front Ave & NW Doane

1/4 SECTION	2423
JOB NO.	02-158
SHEET NO.	7 of 10

COPPOR0006522







Groundwater Release Conduit A
Wall (not to scale)

NO.	DATE	DESCRIPTION	APPD.
2	1/28/03	Wall design update, February 2003	
3		Wall design update, March 2003	
4	6/28/03	Wall design change, August 2003	
5	1/28/04	Design change, August 2004	

REVISION

NAME(S) USED:
ROTATION ANGLE:
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY _____ CHECKED BY _____
FINAL MAP DATA

DESIGNED BY BJB
DRAWN BY CCA
CHECKED BY
DESIGN MGR.
DATE APPD.
PROGRAM MGR.
CONST. MGR.

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
[illegible]

CUTOFF WALL COLLECTION TRENCH DETAILS
WILLBRIDGE FORMER 27-INCH
STORM SEWER AREA
NW Front Ave & NW Doane

1/4 SECTION 2423
JOB NO. 02-158
SHEET NO. 8 of 10

COPPOR00006523

AREA OF CONSTRUCTION

TOP OF BANK

GREENWAY SETBACK

PROPOSED GRADING AREA

CHEVRON

PARKING AREA

TEMPORARY SEDIMENT FENCE

CONCRETE TO BE REMOVED BY CONTRACTOR

PROPERTY LINE

BEND B

PROPOSED SHEET PILE CUTOFF WALL

BEND D

EXISTING SUBSURFACE GROUNDWATER/PRODUCT RECOVERY TRENCH

APPROXIMATE WILLAMETTE RIVER SHORELINE

GRADING NOTES

1) Contractor to backfill behind sheetpile wall between Elev.=20.0 contour and top-of-wall (Elev.=20.0) at 0% slope with onsite riprap.

2) Beginning at top of sheetpile wall (Elev.=20.0), Contractor to construct 1:1 slope toward river to Elev.=14.0 using onsite riprap.

3) After construction activities are completed, no section of sheet pile wall should be above level of riprap.

LEGEND

- ⊞ PROPOSED RECOVERY WELL LOCATION
- C-L FC. CHAIN LINK FENCE
- C.V. CONTROL VALVE
- EXISTING RECOVERY WELL, MONITORING WELLS, OR SOIL BORING
- ORDINARY HIGH WATER MARK
- STORM SEWER LINE

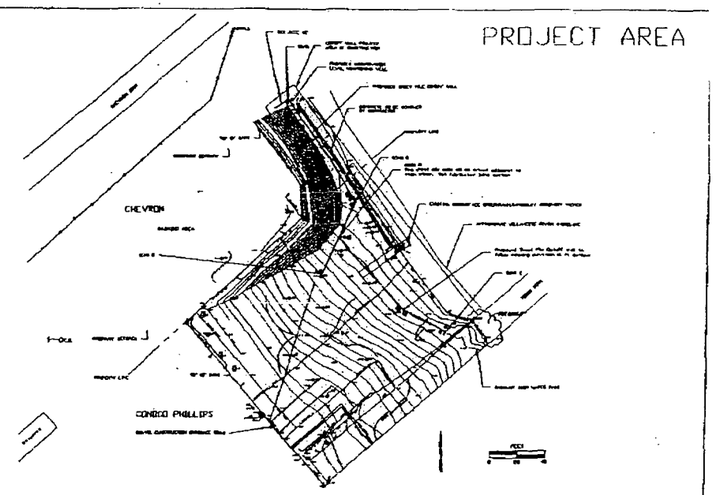
FEET

0 30 60

Prismoidal Volume Results

Original Surface Model:	*Existing*
Final Surface Model:	*Design*
Cut Compaction Factor:	*0.00 %*
Fill Compaction Factor:	*0.00 %*
Raw Cut Volume:	*272.15 cu yd*
Compacted Cut Volume:	*0.00 cu yd*
Total Cut Volume:	*272.15 cu yd*
Raw Fill Volume:	*299.38 cu yd*
Compacted Fill Volume:	*0.00 cu yd*
Total Fill Volume:	*299.38 cu yd*

PROJECT AREA



NO.	DATE	DESCRIPTION	APP'D
E	6/05/03	Well design update, February, 2003	
D	"	Well design update, March 2002	
C	4/25/03	Well design change, August 2003	
B	10/29/03	Well design change, October 2003	
A	08/26/04	Design change, August 2004	
9	09/08/04	Grading Plan modification, September 2004	

XREF(S) USED:

ROTATION ANGLE:

CONSTRUCTED BY:

PROJECT COMPLETED:

MAP CORRECTED BY: _____ CHECKED BY: _____

FINAL MAP DATA

DESIGNED BY	DATE APPR.
BJB	
DRAWN BY	PROGRAM MGR.
CCA	
CHECKED BY	CONST. MGR.
REVISION MGR.	

RSV ENGINEERING, INC.

Engineers • Land Surveyors • Environmental Scientists

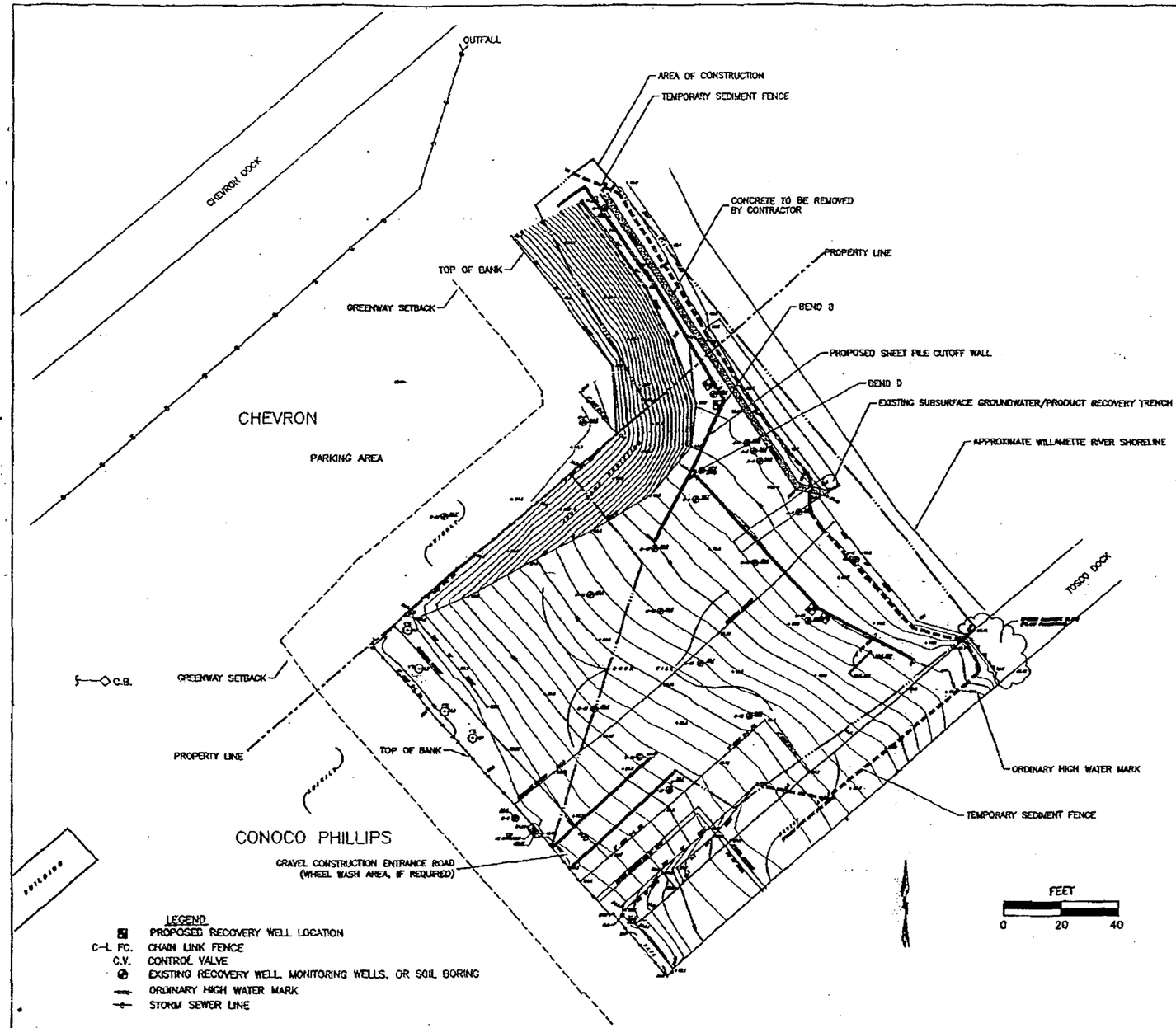
31980 SW CHERRYBROOK DR. SUITE 101

WILSONVILLE, OREGON 97070 (503) 694-6460

GRADING PLAN
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doone
PLAN VIEW

T/R/SECTION	2423
JOB NO.	02-158
SHEET NO.	

COPPOR0006524



STANDARD NOTES FOR EROSION CONTROL PLANS

A. Approval of this erosion, sediment and pollution control plan (ESPCP) does not constitute an approval of permanent road or drainage design (i.e., size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).

B. The implementation of this ESPCP and the construction, maintenance, replacement, and upgrading of these ESPCP facilities is the responsibility of the applicant/contractor until all construction is completed and approved and vegetation/landscaping is established.

C. The boundaries of the clearing limits shown on this plan shall be clearly flagged in the field prior to construction. During the construction period, no disturbance beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the applicant/contractor for the duration of construction.

D. The ESPCP facilities shown on this plan must be constructed in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment and sediment laden water do not enter the drainage system, roadways, or violate applicable water standards.

E. The ESPCP facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, these ESPCP facilities shall be upgraded as needed for unexpected storm events and to ensure that sediment and sediment-laden water do not leave the site.

F. The ESPCP facilities shall be inspected daily by the applicant/contractor and maintained as necessary to ensure their continued functioning.

G. The ESPCP facilities on inactive sites shall be inspected and maintained a minimum of once a month or within the 24 hours following a storm event.

H. Sediment construction entrances shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures may be required to insure that all paved areas are kept clean for the duration of the project.

STANDARD NOTES FOR SEDIMENT FENCES

1. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. Where joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and both ends securely fastened to the post, or overlap 2 inch x 2 inch posts and fasten as above to extend about 2 feet.

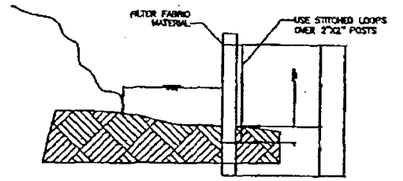
2. The filter fabric fence shall be installed to follow the contours where feasible. The fence posts shall be spaced a maximum of 8 feet apart and driven securely into the ground a minimum of 24 inches.

3. The filter fabric shall form a continuous vertical barrier of 8 inches. All excavated material from filter fabric fence installation, shall be backfilled and compacted, along the entire disturbed area.

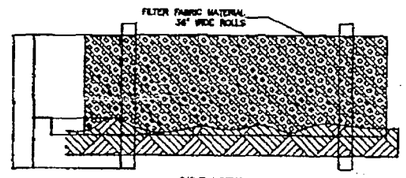
4. Standard or heavy duty filter fabric fence shall have reinforcement standard fence for 2 inch x 2 inch post installation. Reinforcement fence shall be installed on the uphill side of the staked area.

5. Filter fabric fences shall be removed when they have served their intended purpose, but not before the upslope area has been permanently protected and stabilized.

6. Filter fabric fences shall be inspected by applicant/contractor immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.



SIDE VIEW



SIDE VIEW

TEMPORARY SEDIMENT FENCE DETAIL

NO.	DATE	REVISION	APPR.
5	2/25/03	Well design update, February, 2003	
3		Well design update, March 2003	
4	6/30/03	Well design change, August 2003	
5	10/22/03	Well design change, October 2003	
6	08/25/04	Design change, August 2004	

DESIGNED BY	BJB
DRAWN BY	CCA
CHECKED BY	
DESIGN MGR.	
DATE APPR.	
NOGRAM MGR.	
CONST. MGR.	

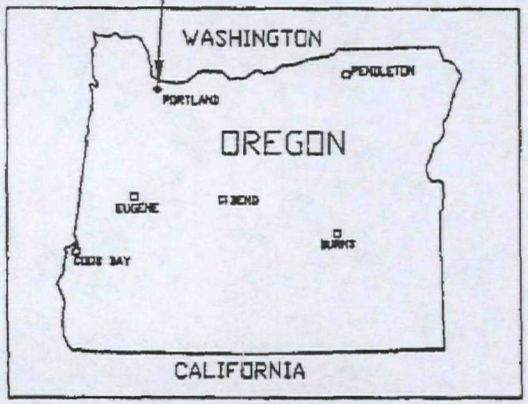
XREFS USED
ROTATION ANGLE
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY ____ CHECKED BY ____
FINAL MAP DATA

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
2215 SW SHERIDAN AV., SUITE 2E
MILWAUKIE, OREGON 97222 (503)653-2313

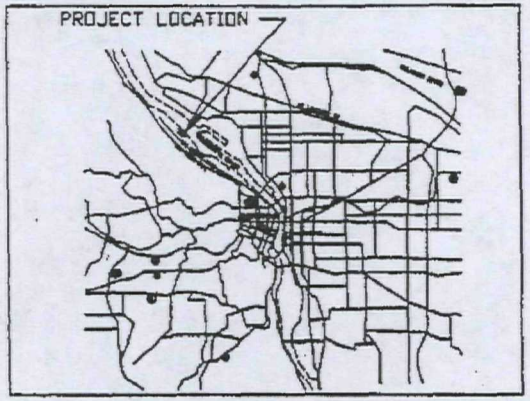
EROSION CONTROL PLAN
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

T/R/S SECTION	2423
JOB NO.	02-158
SHEET NO.	10 of 10

COPPOR0006525



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

INDEX OF DRAWINGS

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EXISTING SITE FEATURES	4
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SHEET PILE CROSS-SECTION ALONG ALIGNMENT OF CUTOFF WALL	6
CUTOFF WALL COLLECTION TRENCH DETAILS	7
CUTOFF WALL COLLECTION TRENCH DETAILS	8
GRADING PLAN	9
EROSION CONTROL PLAN	10

CAUTION NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS MAY NOT BE ACCURATE OR COMPLETE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION AND ELEVATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL UTILITIES AND STRUCTURES SHOWN OR NOT SHOWN ON THE PLANS.

CONSTRUCTION DRAWINGS FOR

CHEVRON AND CONOCO PHILLIPS WILLBRIDGE TERMINAL GROUNDWATER CUTOFF WALL

PORTLAND, OREGON

RSV ENGINEERING INC.

TITLE SHEET
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue

1" = 10'

COPPOR0006526

GENERAL PROJECT NOTES

1) Contractor shall notify Bureau of Environmental Services at (503) 823-7831 two (2) business days prior to commencement of work.

2) All construction shall conform to City of Portland standard construction specifications, as revised in 1998. Contractor and/or subcontractor shall have a minimum of one set of approved plans and City of Portland standard construction specifications on the job site at all times during construction.

3) Office of Planning and Development Review, Approvals, and Permits required for privately maintained structures constructed. All work approved under OPDR permits shall be privately owned and maintained.

4) Attention Excavators: Oregon law requires you to follow rules adopted by Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of those rules from the Center by calling (503)232-1987. If you have any questions about the rules, you may contact the Center. You must notify the Center at least two (2) business days, but not more than ten (10) business days, before commencing an excavation. Call 503-246-6699.

5) Slope stability evaluation to be completed prior to any disturbance of existing slope on Chevron property.

6) Excavated trench spoil material shall be disposed of at a proper landfill, or applicant shall obtain a fill permit from the Office of Planning and Development Review before being disposed of on-site. A copy of the grading permit and plan should also be provided to the Bureau of Environmental Services for construction inspection.

7) Site erosion plan to be approved and controls in place prior to construction. All work under this permit will require site erosion control in compliance with all provisions of the City Title 10.

ADDITIONAL PROJECT NOTES

SHEET PILE WALL

1) Sheet Piling to be Hoesch H-1700 Steel Sheet Piling or equivalent, as approved by Engineer and Client.

2) Sheet Piling joints to include waterstop seals. Waterstop seals shall be ADEKA ULTRA SEAL A-50 or equivalent as approved by Engineer and Client.

3) Sheet Piling and waterstop seals to be installed consistent with manufacturers' recommendations.

COLLECTION TRENCH

1) Trench sand backfill shall be medium to coarse sand, moderately graded. The sand shall be free of silt, clay, loam, friable or soluble materials, or organic matter, conforming to the following gradation (or other as approved by Engineer and Client):

Sieve Size	Percent Passing
No. 4	100
No. 10	10 to 100
No. 40	0 to 10
No. 200	0

2) Geotextile Fabric separating sand and rip rap shall be non-woven fabric that complies with the following properties (unless otherwise approved by Engineer and Client):

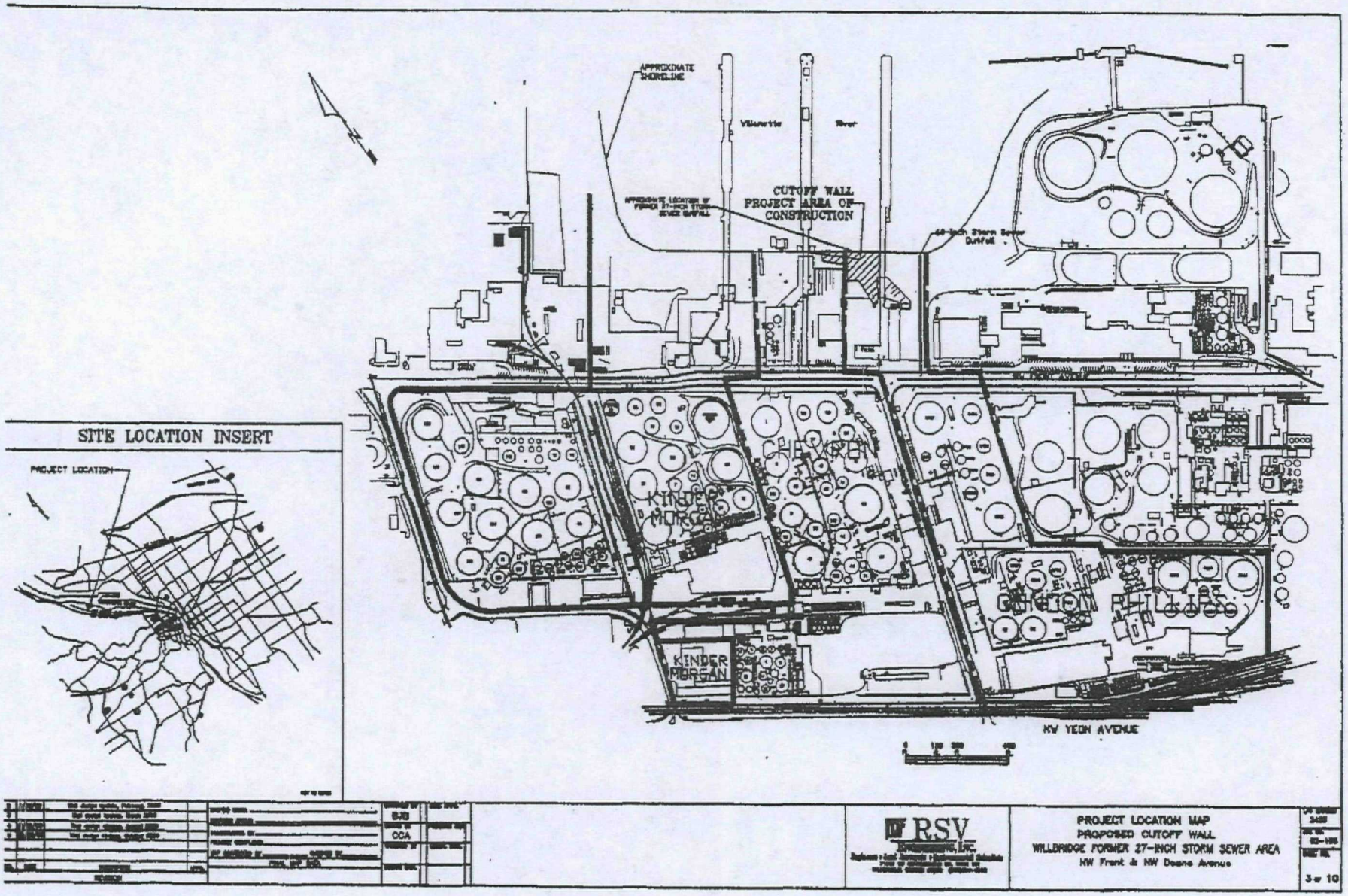
Test	Method	Value
Grab Tensile Strength (N)	ASTM D4632	1155
Burst Strength (KPa)	ASTM D3786 Mod.	3000
Puncture Strength (N)	ASTM D4833 or ASTM D3787 Mod.	490
Apparent Opening Size (uM)	ASTM D4751	212
Ultraviolet Stability	ASTM D4355 @500 hrs	70% Strength retained

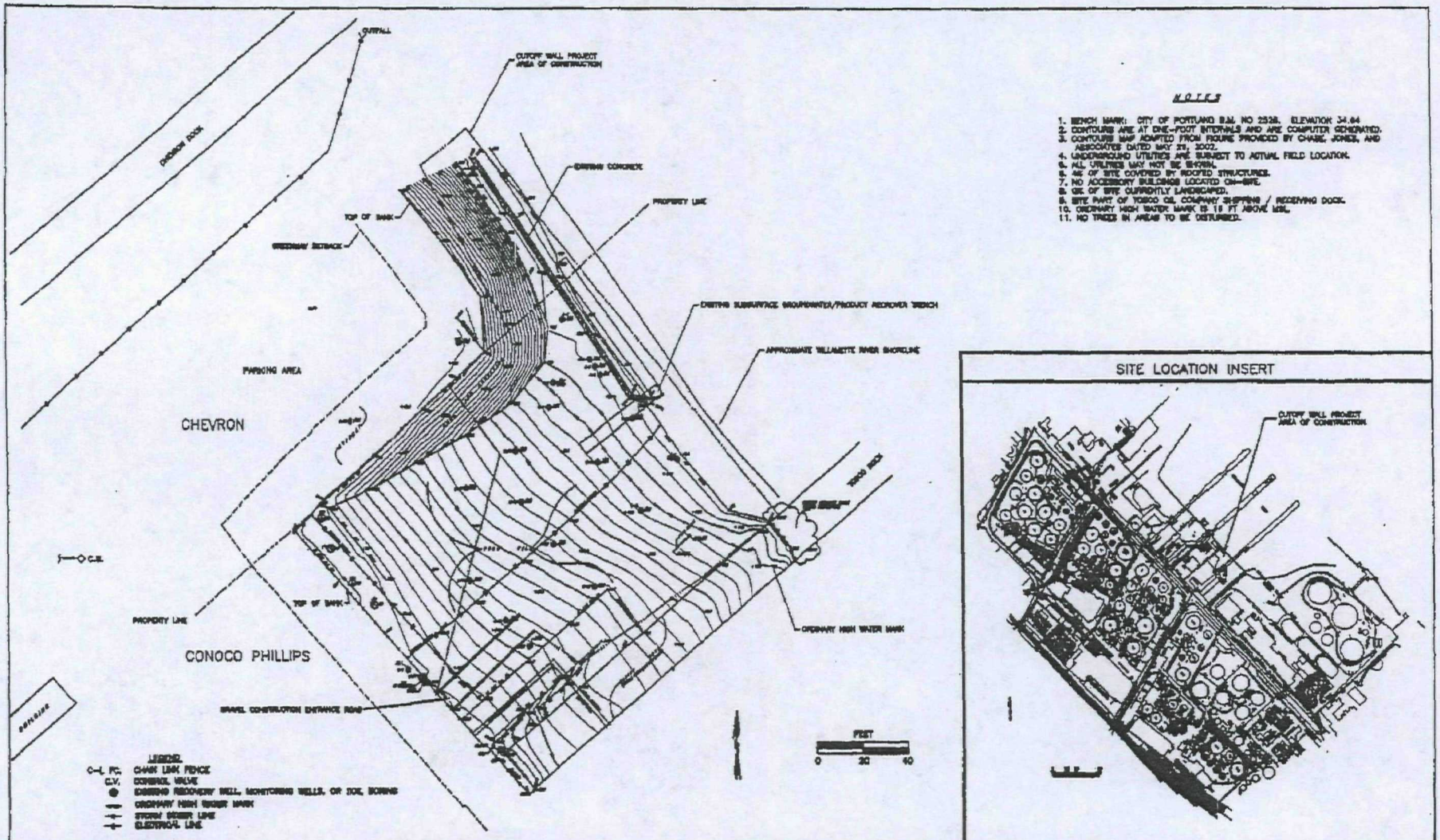
RSV Engineering, Inc.

PROJECT NOTES
PROPOSED CUTOFF WALL
MILLSBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue

2 of 10

COPPOR0006527


APPROXIMATE SHORELINE
Willamette River
CUTOFF WALL PROJECT AREA OF CONSTRUCTION
60-Inch Storm Sewer Outfall
NW FRONT AVENUE
CHEVRON
KINDER MORGAN
CONDON PHILLIPS
NW YEON AVENUE
SITE LOCATION INSERT
PROJECT LOCATION
RSV
PROJECT LOCATION MAP
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front & NW Doane Avenue
3 of 10



NOTES

1. BENCH MARK: CITY OF PORTLAND B.M. NO 2528. ELEVATION 34.84
2. CONTOURS ARE AT ONE-FOOT INTERVALS AND ARE COMPUTER GENERATED.
3. CONTOURS MAP ADAPTED FROM FIGURE PROVIDED BY CHASE, JONES, AND ASSOCIATES DATED MAY 29, 2002.
4. UNDERGROUND UTILITIES ARE SUBJECT TO ACTUAL FIELD LOCATION.
5. ALL UTILITIES MAY NOT BE SHOWN.
6. AS OF SITE COVERED BY ROOFED STRUCTURES.
7. NO ACCESSORY BUILDINGS LOCATED ON-SITE.
8. 0% OF SITE CURRENTLY LANDSCAPED.
9. SITE PART OF TOSCO OIL COMPANY SHIPPING / RECEIVING DOCK.
10. ORDINARY HIGH WATER MARK IS 18 FT ABOVE MSL.
11. NO TREES IN AREAS TO BE DISTURBED.

SITE LOCATION INSERT

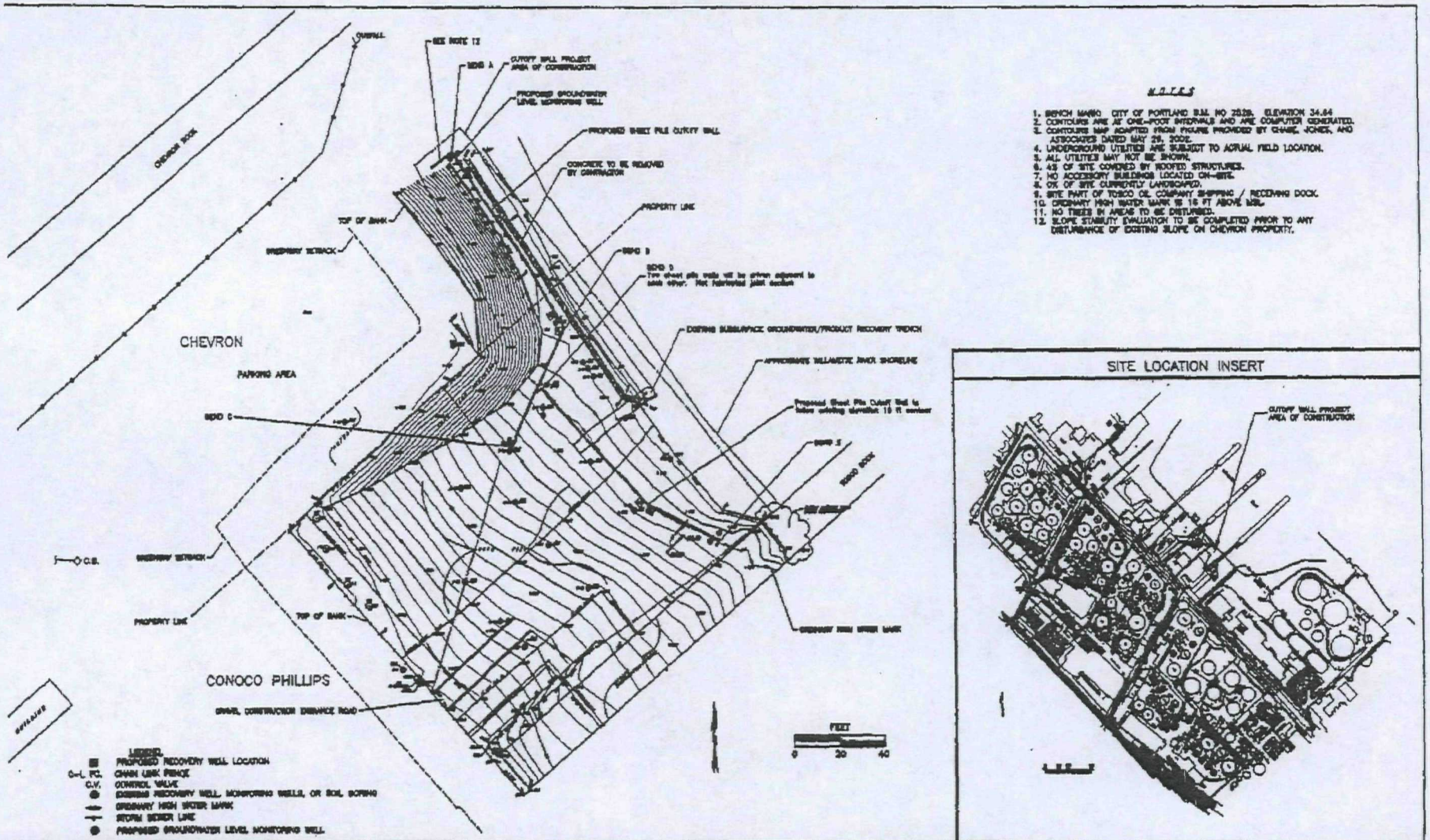
1	2/25/03	Well design update, February 2003		DESIGNED BY: BJB	DWG. NO'S:
2	5/15/03	Well design update, May 2003		DRAWN BY: CCA	PROJECT NO:
3	8/15/03	Well design update, August 2003		CHECKED BY:	DWG. NO:
4	12/15/03	Well design update, December 2003			
5	2/15/04	Design change, August 2004			
6					
NO.	DATE	REVISION	BY		

RSV ENGINEERING, INC.

EXISTING SITE FEATURES
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

DWG NO: 3480
DATE: 10-03
SHEET NO: 4 of 10

COPPOR0006529



NOTES

1. BENCH MARK: CITY OF PORTLAND B.M. NO. 2828, ELEVATION 34.64
2. CONTOURS ARE AT ONE-FOOT INTERVALS AND ARE COMPUTER GENERATED.
3. CONTOURS MAP ADAPTED FROM FIGURE PROVIDED BY CHASE, JONES, AND ASSOCIATES DATED MAY 29, 2002.
4. UNDERGROUND UTILITIES ARE SUBJECT TO ACTUAL FIELD LOCATION.
5. ALL UTILITIES MAY NOT BE SHOWN.
6. 4% OF SITE COVERED BY ROOFED STRUCTURES.
7. NO ACCESSORY BUILDINGS LOCATED ON-SITE.
8. 0% OF SITE CURRENTLY LANDSCAPED.
9. SITE PART OF TOSCO OIL COMPANY SHIPPING / RECEIVING DOCK.
10. ORDINARY HIGH WATER MARK IS 16 FT ABOVE MSL.
11. NO TREES IN AREAS TO BE DISTURBED.
12. SLOPE STABILITY EVALUATION TO BE COMPLETED PRIOR TO ANY DISTURBANCE OF EXISTING SLOPE ON CHEVRON PROPERTY.

SITE LOCATION INSERT

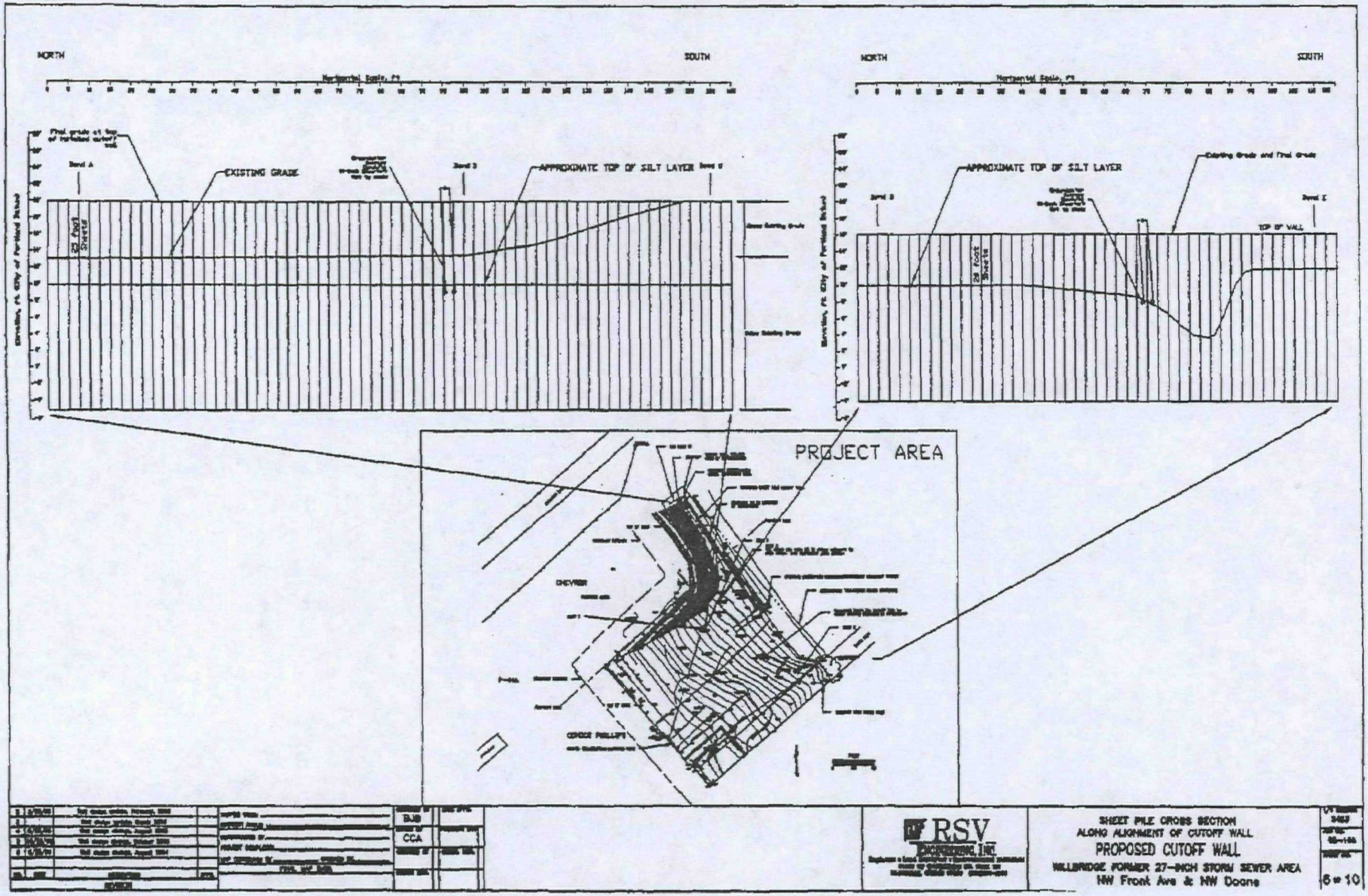
NO.	DATE	REVISION	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
1	6/20/03	Wall design update, marked, date	S.B.	CCA		
2		Wall design update, date				
3	6/30/03	Wall design update, depth, date				
4	8/29/03	Wall design update, thickness, date				
5	9/29/03	Design update, thickness, date				

RSV ENGINEERING, INC.

SITE PLAN
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

DWG NUMBER 2403
JOB NO. 99-139
SHEET NO. 5 of 10

COPPOR0006530



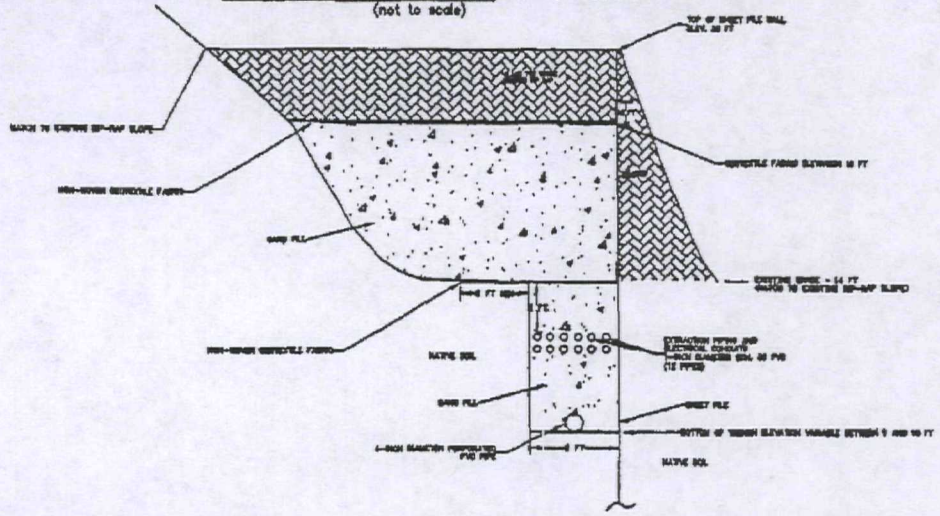
RSV ENGINEERING, INC.

SHEET PILE CROSS SECTION
ALONG ALIGNMENT OF CUTOFF WALL
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane

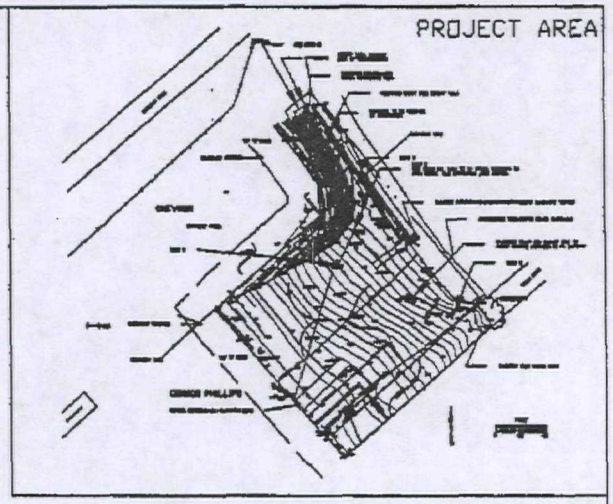
6 of 10

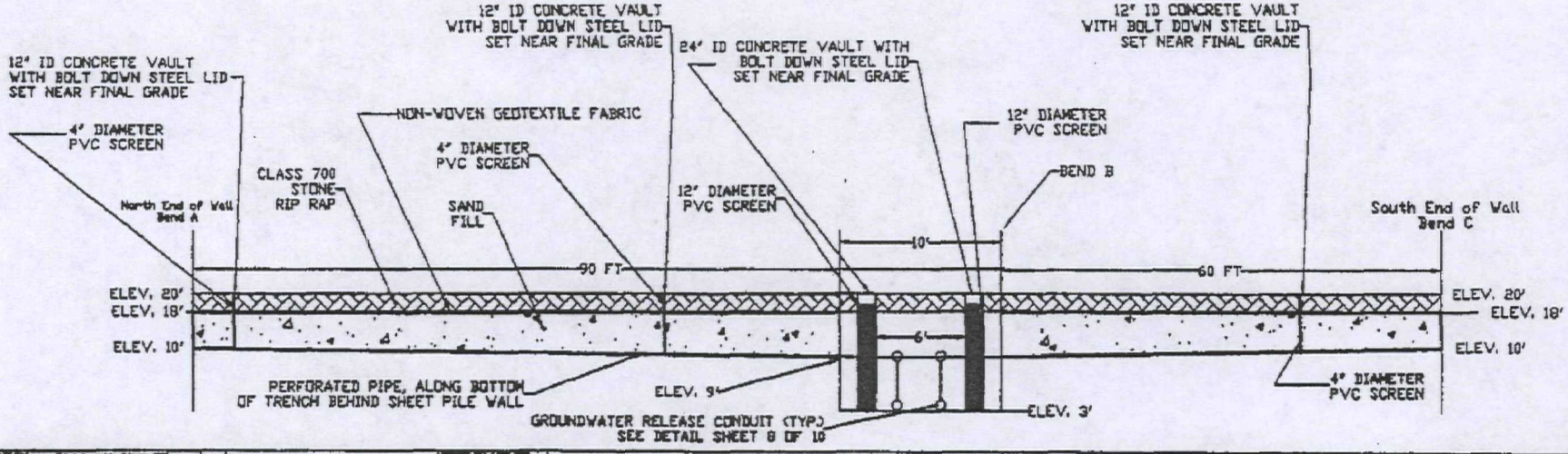
COPPOR0006531

TYPICAL TRENCH CROSS-SECTION DETAIL – NORTH OF BEND B
(not to scale)



PROJECT AREA





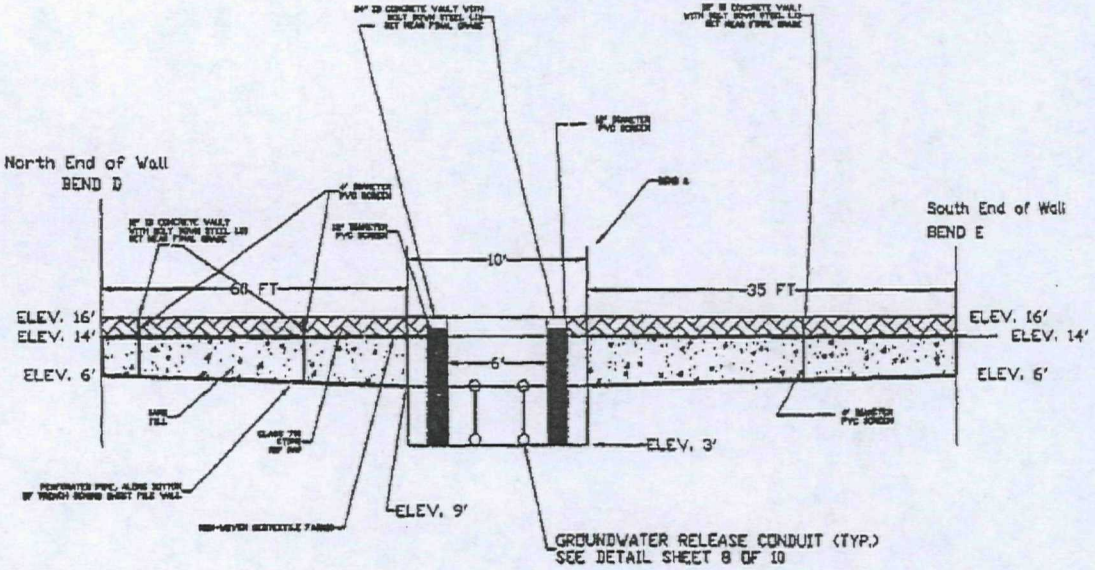
			DESIGNED BY: BJB		
			DRAWN BY: OCA		
			CHECKED BY:		
			APPROVED BY:		

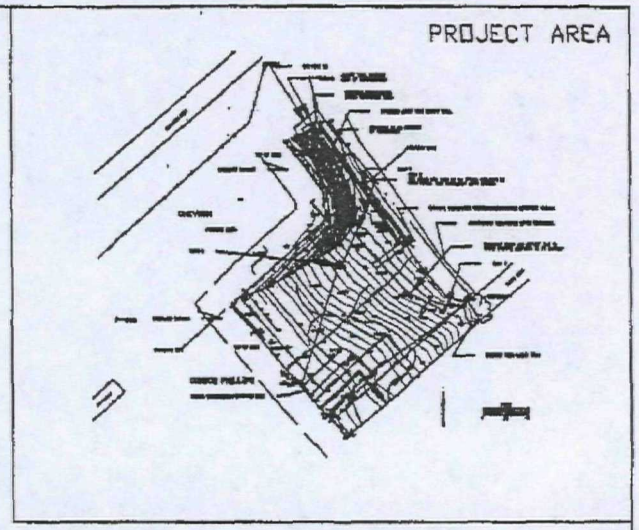
RSV ENGINEERING, INC.

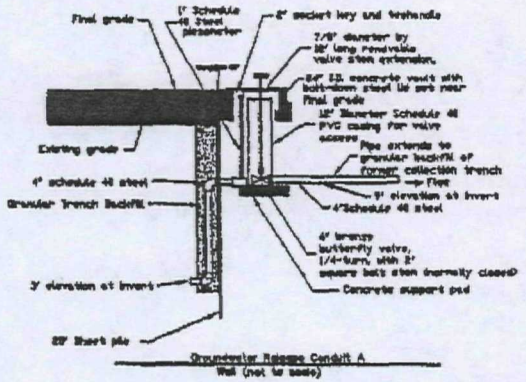
CUTOFF WALL COLLECTION TRENCH DETAILS
WILLBRIDGE FORMER 27-INCH
STORM SEWER AREA
NW Front Ave & NW Doane

7 of 10

COPPOR0006532







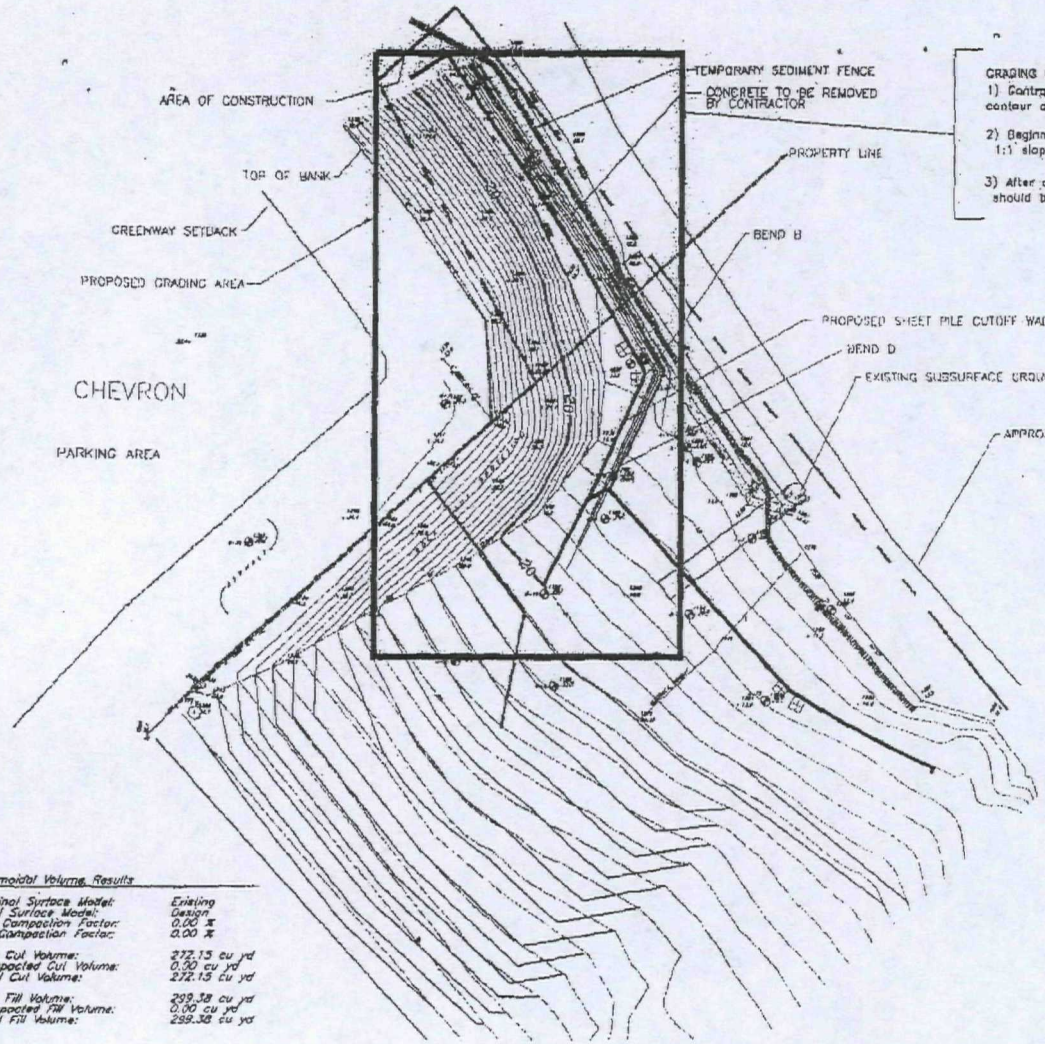
		BJB		
		CCA		

RSV Engineering, Inc.

CUTOFF WALL COLLECTION TRENCH DETAILS
WILLBRIDGE FORMER 27-INCH
STORM SEWER AREA
NW Front Ave & NW Doane

8 of 10

COPPOR00006533



GRADING NOTES

1) Contractor to backfill behind sheetpile wall between Elev.=20.0 contour and top-of-wall (Elev.=20.0) at 0% slope with onsite riprap.

2) Beginning at top of sheetpile wall (Elev.=20.0), Contractor to construct 1:1 slope toward river to Elev.=14.0 using onsite riprap.

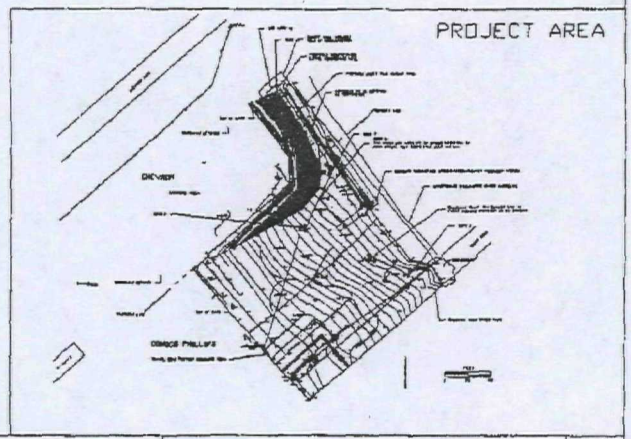
3) After construction activities are completed, no section of sheet pile wall should be above level of riprap.

LEGEND

- PROPOSED RECOVERY WELL LOCATION
- C-L FC. CHAIN LINK FENCE
- C.V. CONTROL VALVE
- EXISTING RECOVERY WELL, MONITORING WELLS, OR SOIL BORING
- ORDINARY HIGH WATER MARK
- STORM SEWER LINE

FEET

0 30 60



Prismoidal Volume Results

Original Surface Model:	*Existing*
Final Surface Model:	*Design*
Cut Compaction Factor:	*0.00 %*
Fill Compaction Factor:	*0.00 %*
Raw Cut Volume:	*272.15 cu yd*
Compacted Cut Volume:	*0.00 cu yd*
Total Cut Volume:	*272.15 cu yd*
Raw Fill Volume:	*299.38 cu yd*
Compacted Fill Volume:	*0.00 cu yd*
Total Fill Volume:	*299.38 cu yd*

NO.	DATE	DESCRIPTION	APPD.
2	2/15/03	Well design update, February 2003	
3		Well design update, March 2003	
4	6/26/03	Well design change, August 2003	
5	10/23/03	Well design change, October 2003	
6	08/06/04	Design change, August 2004	
7	09/08/04	Grading Plan modification, September 2004	

REVISION

PROJECT USER
ROTATION ANGLE
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY _____ CHECKED BY _____
FINAL MAP DATA

DESIGNED BY: BJB
DRAWN BY: CCA
CHECKED BY
DESIGN NO.
DATE APPD.
PROGRAM MGR.
CONST. MGR.

RSV ENGINEERING, INC.
Engineers • Land Surveyors • Environmental Scientists
31560 SW CHAMPAGNEAU DR. SUITE 101
WILSONVILLE, OREGON 97070 (503)694-6400

GRADING PLAN
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

F/4 SECTION: 8423
JOB NO.: 02-158
SHEET NO.: 9 of 10

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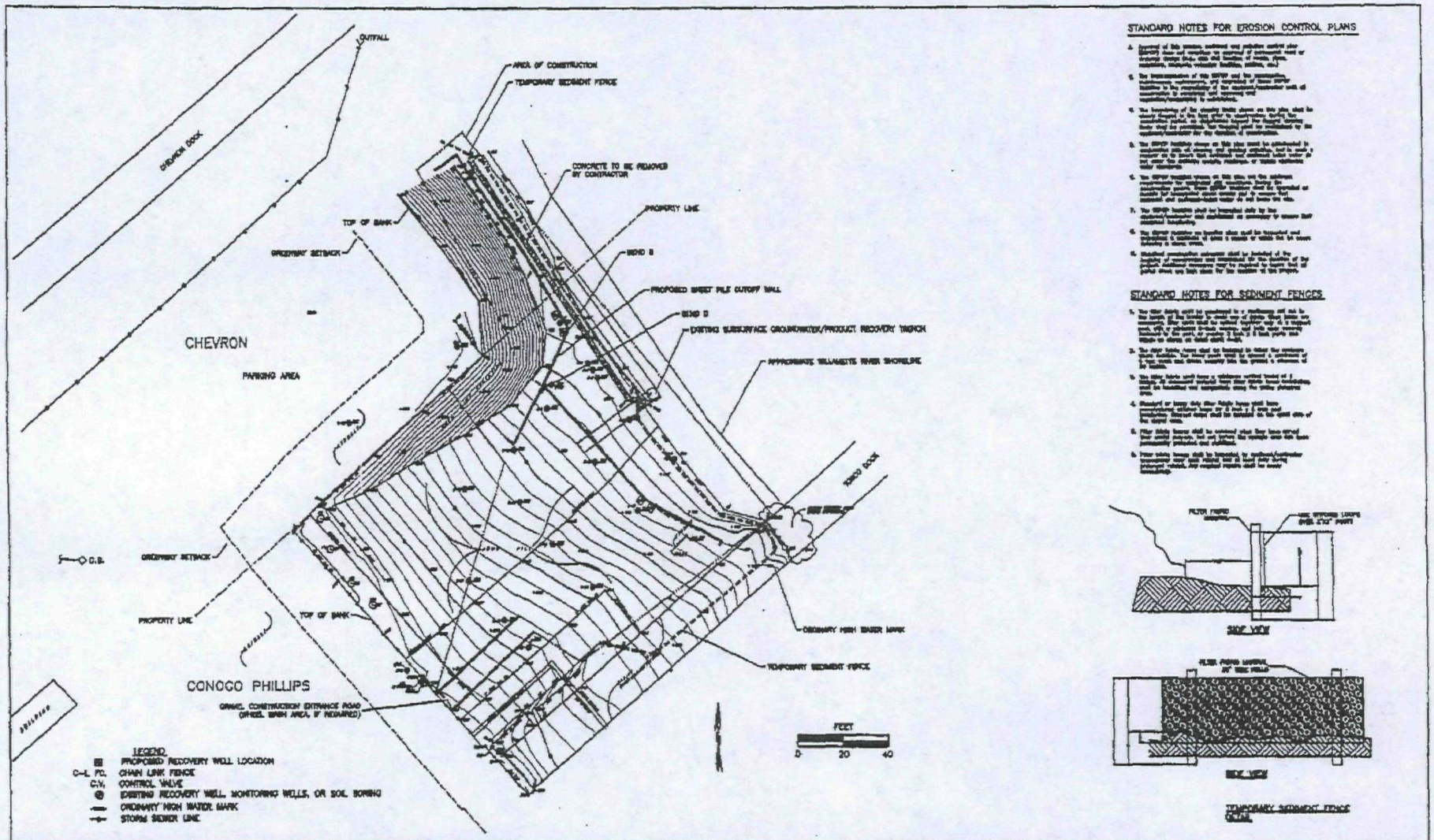

STANDARD NOTES FOR EROSION CONTROL PLANS

A. [illegible]

B. [illegible]

C. [illegible]

D. [illegible]

E. [illegible]

F. [illegible]

G. [illegible]

H. [illegible]

STANDARD NOTES FOR SEDIMENT FENCES

1. [illegible]

2. [illegible]

3. [illegible]

4. [illegible]

5. [illegible]

6. [illegible]

TEMPORARY SEDIMENT FENCE DETAIL

NO.	DATE	REVISION	BY
5	5/15/15	Web design updates (formerly 10)	
4		Web design updates (10)	
3	4/15/15	Web design changes, August 2014	
2	10/15/14	Web design changes, October 2014	
1	08/15/14	Design changes, August 2014	

DESIGNED BY: S.J.B
DRAWN BY: CCA
CHECKED BY:
FINAL MAP DATA

RSV ENGINEERING, INC.

EROSION CONTROL PLAN
PROPOSED CUTOFF WALL
WILLBRIDGE FORMER 27-INCH STORM SEWER AREA
NW Front Ave & NW Doane
PLAN VIEW

10 of 10

COPPOR0006535