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LANDAU ASSOCIATES

December 6, 2002

Mr. Kevin Murphy
Time Oil Co.
2737 Commodore Way
Seattle, WA 98199

RE: SCOPE AND BUDGET UPDATE - 2003
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

Dear Kevin:

This letter presents Landau Associates' scope and budget update for the Phases I/II Remedial Investigation/Feasibility Study (RI/FS) tasks under our contract with Time Oil Co. for the Northwest Terminal project in Portland, Oregon. This letter provides the status of expenditures and budget coverage for the year 2002 and requests an increase to our existing budget for future expected expenditures for planned Phase II activities not covered by previous authorizations for the year 2003. The status of each of the project tasks currently underway is provided below with a summary of foreseeable activities for each task over the next year. Lists of tasks completed since the previous authorization for this project (Time Oil Work Order No. 03-610-LANDAU2002A), which covers costs through December 31, 2002, were included with the monthly invoices. As requested by Time Oil, future budget estimates assume that all subcontractor costs (e.g., analytical laboratory, remediation contractor, and licensed surveyor) will be paid directly by Time Oil.

This scope and budget update requests an additional budget amount of $302,900. As shown in Table 1, this amount covers costs not covered by previous authorizations for expected future tasks to be performed by Landau Associates during 2003. As with previous scope and budget update requests, this amount also includes a 10 percent contingency ($30,290) to cover unforeseen additional tasks during 2003. Also as shown in Table 1, Landau Associates' expenditures in 2003 are expected to be about $396,190. This amount includes $63,000 for budget brought forward from previous authorizations for risk assessment tasks not conducted in 2002.

The costs estimated in this letter are based on Landau Associates' labor rates, which continue to include a discount to Time Oil in recognition of our longstanding business relationship. Because of this relationship, Landau Associates will not increase the already discounted 2002 labor rates for labor conducted in 2003. Also, consistent with last year, for any sole source work provided to Landau Associates by Time Oil where expenditures exceed $500,000 within the calendar year, labor rates will be discounted an additional 1 percent. As in the past, this work will be provided on a time and materials basis under our existing contract.

The following sections provide a summary of the basis for the cost estimates for expected activities in 2003. Table 1 provides a summary of the additional budget requests. Table 2 summarizes tasks, project expenditures (through November 2, 2002), and authorizations by Time Oil to date, and provides our proposal for transfer of funds from existing tasks to cover completed additional scope items and for authorization of new funds. Additional scope items completed under verbal authorization from Time Oil for activities since the last scope and budget update (from January through October 2002) are listed in Table 3. Budget assumptions included in the estimation of costs herein are listed in Table 4.

2002 Expenditures and Future Activities

Approximately $2.2 million has been spent on the project through October 2002. As you verbally approved, the 10 percent contingency amount authorized in the previous change order ($54,290) was applied to additional scope items incurred by the project since January 2002. A list of completed additional scope items completed from January through October 2002 is provided in Table 3.

Because we were able to achieve savings in some previously scoped and budgeted tasks in 2002, we propose to transfer funds from certain tasks completed under budget or not completed within 2002 to cover additional scope items. A transfer of $16,405 is proposed from the soil stockpile characterization task (Task 150) to cover a portion of the costs for oversight of the soil stockpile removal and *in situ* soil excavation and to cover report preparation costs for these activities under task 170 through December 2002. The remainder of the costs for this task will be covered by the contingency budget because this work was not anticipated in the scope for the last authorization.

A description of the scope of services expected for 2003 is provided below.

2003 Future Activities

The status of each of the project tasks currently underway (with a summary of foreseeable activities for each task in 2003 and definition of new project tasks) is provided below. As stated earlier, budget estimates included in this letter assume that Time Oil will maintain subcontracting responsibilities for the project. New task number 120 has been added for the *in situ* chemical oxidation (ISCO) activities that are expected for 2003. Tasks 110 (Groundwater Interim Action), 130 (Phase I/II Remedial Investigation), 140 (Risk Assessment), 150 (Feasibility Study), 170 (Remedial Design/Remedial Action) and 180 (Terminal Support) remain active. Task 160, established for conversion of the Time Oil data into the GIS\Key database has been completed, except for the annual software maintenance fee (see additional discussion on this task below). The status of each of the active project tasks and expected scope for new tasks is provided in the following sections.

Task 110 – Groundwater Interim Action

The groundwater interim action is currently ongoing with the continuous pumping of RW-2 for hydraulic capture of groundwater contamination in the lower zone. At the end of October 2002, approximately $24,200 remained of the previously authorized budget for this task. This budget is expected to be expended by the end of 2002 for continuing operation of groundwater recovery, operation and maintenance of the groundwater interim action system, evaluation of the ISCO pilot test study data, internal review of the ISOTEC-prepared ISCO pilot test report, and preparation of a cover letter for the report for submittal to DEQ. Any remaining budget in this task will be transferred to Task 170 to cover costs for implementation and report preparation for the soil removal actions of the soil stockpile and *in situ* excavation in the former PCP mixing area.

During 2003, additional budget is required to perform the following activities for the groundwater interim action:

- Resolve the issues with effective operation of HRW-1
- Continue groundwater recovery at RW-2 and reinitiate groundwater recovery in HRW-1.

As discussed in several previous monthly status reports included with the invoices in 2002, groundwater recovery in the upper zone using horizontal well HRW-1 was initiated, but discontinued due to apparent biofouling of the well screen and discharge line. The well was redeveloped, and the discharge line was replaced. It is expected that resumption of groundwater recovery at HRW-1 will be possible following resolution of the biofouling issues.

As shown in Table 1, a budget increase of $21,400 is required for groundwater interim action activities to be conducted by Landau Associates in 2003.

Task 120: ISCO Activities

Pending the preparation of the ISCO pilot test report, full-scale implementation of the ISCO technology for remediation of upper zone groundwater and soil within the zone of groundwater fluctuation is expected in early 2003 within and downgradient of the PCP mixing area source area. As described above, a new task (Task 120) was established for ISCO activities. For completion of this task, the following activities are required:

- Three ISCO injection events within the source area and downgradient of the source area
- ISCO groundwater monitoring, including one pre-injection and two post-injection events
- Soil vapor extraction (SVE) system installation, implementation and operation
- Two Soil sampling events, including one pre-injection and one post-injection

- Installation of three monitoring wells within the source area to replace those abandoned in this area prior to soil excavation
- Quarterly ISCO progress reports.

As shown in Table 1, a budget of $95,600 is required to complete the ISCO activities to be conducted by Landau Associates in 2003.

Task 130 – Phase I/II Remedial Investigation

Phase II remedial investigation activities expected to occur during 2003 include the following:

- Four quarterly groundwater sampling events
- Four quarterly groundwater monitoring and interim action status reports, and
- Project management.

Brief descriptions of each of the ongoing activities under Task 130 are provided below.

Quarterly Groundwater Sampling Events. As shown in Table 1, a budget increase of $133,700 is required to complete the quarterly groundwater sampling and reporting to be conducted by Landau Associates during 2003. The quarterly sampling events in 2003 are expected to be comparable to costs for the 2002 quarterly events, with the following exceptions: 1) as requested by Time Oil, the information contained in the quarterly groundwater interim action status reports will be combined with the groundwater monitoring data into a single report at a cost savings to Time Oil; 2) three of the five monitoring wells that were abandoned as part of the *in situ* soil excavation removal action will be replaced, and the four monitoring wells on the east property will be abandoned, reducing the total amount of Phase II wells by six wells, and 3) new monitoring wells (18) will be installed as part of the Phase III RI. Sampling of the new Phase III monitoring wells will be conducted in conjunction with the Phase II quarterly events; however, the costs to oversee drilling and well installation, to sample the Phase III wells, and to process and validate the data will be separated from the Phase II costs and charged to the Phase III project (Landau Associates project number 231009) for cost allocation purposes. Reporting activities for all wells will be combined into the Phase II costs.

Anticipated activities associated with the quarterly 2002 groundwater events include the following:

- Groundwater sampling/field activities for four quarterly sampling events
- Validation/processing of the analytical data
- Preparation of four quarterly groundwater monitoring and interim action status reports for submittal to client for review and to DEQ.

Project Management. Project management activities are ongoing and include: 1) preparation of monthly progress reports for submittal to DEQ (in conjunction with Phase III RI and east property reports); 2) meetings with Time Oil, DEQ, and Landau Associates staff; 3) communications with Time Oil and their counsel on various project activities and strategies; 4) planning/scheduling of project activities with internal staff and Time Oil; 5) preparation/update of a schedule for Phase II activities in Microsoft Project for submittal to Time Oil and DEQ; 6) weekly budget tracking; invoice preparation (including backup labor documentation, monthly status reports, and project cost spreadsheet updates requested by Time Oil); 7) project filing; and preparation of annual scope and budget update requests and documentation. We assume that the project manager and other key Landau Associates personnel will prepare for and attend six 2-hour meetings with Time Oil locally, and two 4-hour meetings with Time Oil and DEQ in Portland. Travel costs for room and subsistence in Portland are not included, under the assumption that Time Oil will pay these costs directly. Also, airfare between Seattle and Portland for meeting attendance is not included, under the assumption that carpooling of Landau Associates personnel with Time Oil personnel is possible.

Based on average monthly costs for this project in 2002, a budget increase of $42,000 is requested for Landau Associates' project management costs from January through December 2003 (12 months). These costs, shown in Table 1, include project management for currently defined Phase II tasks in 2003. The required budget reflects the level of effort that has been necessary in the past to maintain project communications at the level required by Time Oil, to adjust the project schedule and work efforts to the relatively fluid nature of project requirements, to respond to requests for information from Time Oil and DEQ in an expedient manner, and to maintain project efficiency.

Task 140 - Risk Assessment

Significant risk assessment efforts may begin in 2003 following completion of the Phase III RI. If initiated, risk assessment activities in 2003 are expected to include: development and preparation of a terminal-wide risk assessment work plan for submittal to Time Oil and DEQ, and response to client and DEQ comments on the work plan. Costs provided herein also include preparation of an updated constituents of potential concern (COPC)/constituent of potential ecological concern (CPEC) screening report, which will incorporate information obtained during the Phase III RI and possibly from the Portland Harbor Superfund Project for use in the terminal-wide risk assessment. Completion of this activity within 2003 will be dependent on the actual completion schedule for the Phase III RI and client and DEQ review periods for the risk assessment work plan. This work was originally authorized in 2002, but was not conducted. As shown in Table 2, a budget of $63,000 will be brought forward from the 2002 authorization for risk assessment work activities in 2003.

Task 150 - Feasibility Study

Future activities for a terminal-wide feasibility study are not expected to be conducted in 2003. Therefore, at this time, no budget is requested for FS support in 2003. However, if FS activities are expanded before the end of the year, we will request additional funds by separate letter.

Task 160 - GIS

As indicated above, the activities planned for conversion of the Time Oil database into GIS\Key format has been completed. Time required to input data into the GIS\Key database in 2003 has been incorporated into each task. An invoice from GIS\Solutions of about $2,200 is outstanding; however, we will not pay this invoice until we receive backup documentation on the actual work completed and the dates completed. We have retained adequate budget from the 2002 authorization for this task if we determine that payment of their invoice is justified in the future.

As you may recall, the first year of technical support from GIS\Solutions was included in the cost of the GIS\Key software. Beginning in January 2003, we will be required to purchase additional technical support for $3,280 per year per license. Similar to our agreement with Time Oil for purchase of the GIS/Key software, Landau Associates will split the GIS\Solutions costs with Time Oil for this support, at a reduced cost to Time Oil. Additional Landau Associates costs are added to cover sales tax (8.9 percent B&O tax required for software purchases and upgrades) and our standard handling charge (10 percent). As shown in Table 1, a budget of $1,900 is required to cover this cost.

Task 170 – Remedial Design/Remedial Action

Removal of the soil stockpile and soil from the *in situ* excavation in the former PCP mixing area was completed in mid-November 2002. Currently, Landau Associates has begun preparation of the removal action completion report for both these areas. It is anticipated that there will be adequate budget remaining from the 2002 authorization (following the transfers from other tasks; see earlier discussion) to cover costs through December 2002 for preparation of this report. Any remaining budget from the 2002 authorization will be carried forward for 2003 costs. As shown in Table 1, we are requesting an additional $30,000 to complete the report in early 2003 for submittal to DEQ and for responding to comments from Time Oil, Time Oil's counsel, Beazer East, Inc., and DEQ.

Task 180 – Terminal Support

Landau Associates will continue to provide support in the oversight and operation of the onsite wastewater treatment and stormwater treatment systems at the Northwest Terminal. For 2003, this task will include: 1) evaluation of current operating conditions, 2) recommendation of necessary modifications

to the system, 3) review and update of applicable permit requirements, and 4) consultation with onsite Time Oil personnel on system operations. For this budget request, we have assumed that oversight of day-to-day operations and periodic sampling of discharge water from the treatment system will be performed by Time Oil personnel. A budget increase of $20,300 is requested for terminal support tasks to be conducted by Landau Associates in 2003. Additional budget may be required if the scope of this task broadens within 2003.

BUDGET

Accrued project charges through week ending November 2, 2002 are provided in Table 2. A breakdown of budget for work expected in 2003 is provided in Table 1. These costs include Landau Associates' labor and associated nonlabor expenses. Subcontractor and laboratory expenses are included, for your information only, because we understand that Time Oil will be contracting directly with these companies. Budget assumptions are included in Table 4.

As described above and shown on Table 1, the estimated total budget increase for future work to be conducted by Landau Associates through December 2003 is $302,900. Also, as in the past, a 10 percent contingency amount of $30,290 for unexpected project costs throughout this time period has been applied to the budget, for a total budget request amount for 2003 of $333,190.

* * * * * * *

Together, our accomplishments have been huge this year. As always, it is a pleasure to work with you and Time Oil on this project and we thank you for the continuing opportunity. If you have any questions or comments regarding the information presented herein, please call me.

LANDAU ASSOCIATES, INC.
By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
Attachments

cc: Mike Tischuk, Beazer East

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TABLE 1
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS
BUDGET REQUEST - 2003

		2003 Budget Requests			Carry Forward Budget from 2002	Total Projected Expenditures - 2003
		Estimated Landau Costs	Estimated Subcontractor Costs (a)	Estimated Analytical Costs (a)	Estimated Landau Costs	
Phase I/II RI/FS:						
Task 110.	*Groundwater Interim Action System Activities*					
	HRW-1 Problem Resolution	$10,300	$8,000			$18,300
	Groundwater Recovery	$11,100		$5,000		$16,100
	Subtotal - Task 110	$21,400	$8,000	$5,000		$34,400
Task 120	*ISCO Activities*					
	ISCO Injection Events (3 events)	$29,100	$188,000			$217,100
	ISCO Groundwater Monitoring	$19,000		$10,000		$29,000
	SVE System Implementation & Operation	$14,400	$25,000	$5,000		$44,400
	Soil Sampling Events (2 events)	$7,500	$6,000	$5,000		$18,500
	Installation of Replacement Monitoring Wells (3 wells)	$6,700	$20,400	$7,000		$34,100
	ISCO Progress Reports	$18,900	$4,000			$22,900
	Subtotal - Task 120	$95,600	$243,400	$27,000		$366,000
Task 130:	*Quarterly Groundwater Monitoring*					
	Groundwater Sampling Events (4 events) (b)	$37,300		$56,500		$93,800
	Groundwater Monitoring/Interim Action Quarterly Reports (4)(c)	$54,400				$54,400
	Project Management (12 months)	$42,000				$42,000
	Subtotal - Task 130	$133,700	$0	$56,500		$190,200
Task 140.	*Risk Assessment*					
	Risk Assessment Work Plan				$36,500	$36,500
	COPC/CPEC Screening Report				$26,500	$26,500
	Subtotal - Task 140				$63,000	$63,000
Task 160:	*GIS*					
	Annual GIS\Key Software Maintenance Fee (d)	$1,900				$1,900
	Subtotal - Task 160	$1,900				$1,900
Task 170:	*Remedial Design/Remedial Action*					
	Stockpile and Warehouse Demolition/In Situ Soil Excavation Removal Action Completion Report	$30,000				$30,000
	Subtotal - Task 170	$30,000				$30,000
Task 180:	*Terminal Support (e)*					
	WWTP Operation	$14,400	$10,000	$5,000		$29,400
	Maintain Stormwater Treatment Compliance and Reporting	$5,900		$5,000		$10,900
	Subtotal - Task 180	$20,300	$10,000	$10,000		$40,300
	Phase I/II RI/FS Subtotal:	**$302,900**	**$261,400**	**$98,500**	**$63,000**	**$725,800**

TOTAL Estimated Landau Additional Budget for 2003	**$302,900**
10% Contingency	**$30,290**
TOTAL 2003 BUDGET REQUEST	**$333,190**
TOTAL Estimated Landau Expenditures for 2003 (f)	**$396,190**
TOTAL Estimated Project Expenditures for 2003 (f)(g)	**$756,090**

Notes:

(a) Assumes Time Oil will contract directly with subcontractors (e.g., drillers, remediation contractors (ISOTEC, Terra Hydr, etc.) and laboratories

(b) Does not include sampling of ISCO monitoring wells or wells to be installed as part of Phase III.

(c) Reports will be prepared in conjunction with Phase I/II reporting, but will be billed separately, for purposes of cost allocation

(d) Annual software maintenance fee split between Time Oil and Landau Associates. Total cost includes sales tax (8.9% required for software upgrades) and handling charge (10%).

(e) Assumes Time Oil personnel will be responsible for daily O&M of onsite WWTP and groundwater interim action system and compliance monitoring

(f) Includes budget brought forward from 2002 and estimated additional budget for 2003.

(g) Includes budget for Landau labor and expenses, subcontractors, and laboratories

TABLE 2
PROJECT EXPENDITURES
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

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TASK NO.	Subtask No.	Task Description	TOTAL Authorized Budget	Total Expenditures Thru Oct-02	Total Budget Remaining
	111	Evaluation Report	$10,073	$10,073	($0)
	112	Well Installation	$32,266	$32,266	($0)
	113	Design and Construction	$38,949	$38,949	($0)
	114	Completion Report	$9,387	$9,387	($0)
	115	Startup Monitoring	$58,900	$38,874	$20,026
	116	Interim Action O&M	$5,300	$6,269	($969)
	117	Interim Action Progress Reports	$16,700	$15,023	$1,677
	118	Upper Zone Pilot Study/Remediation	$50,000	$46,563	$3,437
110		**GROUNDWATER INTERIM ACTION Subtotal**	**$221,575**	**$197,406**	**$24,169**
120		**Reserved**	$0	$0	**$0**
130		REMEDIAL INVESTIGATION			
	131	Quarterly Groundwater Events	$156,800	$142,666	$14,134
	132	Addt'l Sampling Events	$22,800	$15,219	$7,581
	133	GIS	$11,000	$10,977	$23
	134	Phase II RI Report	$9,470	$9,470	$0
	135	Project Management	$98,900	$87,962	$10,938
	139	Out of Scope (Contingency)	$62,245	$50,762	$11,483
130		**REMEDIAL INVESTIGATION Subtotal**	**$361,215**	**$317,054**	**$44,161**
140		RISK ASSESSMENT			
	141	Sensitivity Analyses	$3,832	$3,832	($0)
	142	General Risk Support	$0	$0	$0
	143	Risk Assessment Work Plan	$36,500	$0	$36,500
	144	COPC/CPEC Screening/Report	$27,100	$531	$26,569
140		***RISK ASSESSMENT Subtotal***	**$67,432**	**$4,363**	**$63,069**
150		FEASIBILITY STUDY			
	151	Soil Stockpile FS/RAP	$94,089	$77,684	$16,405
	152	General FS Support	$440	$440	$0
150		**FEASIBILITY STUDY Subtotal**	**$94,529**	**$78,124**	**$16,405**
160		GIS	$0		
	161	GIS Scoping	$5,700	$4,065	$1,635
	162	GIS Database Construction	$25,600	$34,647	($9,047)
	163	System Integration and User Interface	$20,300	$19,836	$464
	164	Other GIS Data Source Investigation	$3,500	$2,464	$1,036
	165	Training and Technical Support Services	$24,800	$16,367	$8,433
	166	Other GIS Data Integration		$0	$0
160		**GIS Subtotal**	**$79,900**	**$77,378**	**$2,522**
170		REMEDIAL DESIGN/REMEDIAL ACTION			
	171	Phase I - Soil Stockpile	$80,700	$22,192	$58,508
	179	Out of Scope (Contingency)	$27,145	$93,768	($66,623)
170		**REMEDIAL DESIGN/REMEDIAL ACTION Subtotal**	**$107,845**	**$115,960**	**($8,115)**
180		TERMINAL SUPPORT			
	181	Remediation System	$22,700	$27,728	($5,028)
	182	Sampling	$7,300	$0	$7,300
180		**TERMINAL SUPPORT Subtotal**	**$30,000**	**$27,728**	**$2,272**
		TOTAL PROJECT	**$2,346,555**	**$2,202,070**	**$144,485**

Landau Associates

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TABLE 3
NEW SCOPE ITEMS COMPLETED UNDER VERBAL AUTHORIZATION
JANUARY 2002 THROUGH OCTOBER 2002
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

Task 110: Groundwater Interim Action

- Conducted internal review of a work plan for conducting a pilot test for remediation of upper zone groundwater using *in situ* chemical oxidation techniques and provided to client.
- Began preparation for installation of piezometers to assess HRW-1 performance.
- Prepared a plan for conducting a dye tracer study to assess the performance of HRW-1 and the discharge of upper zone groundwater to the storm drain and provided to client.
- Completed response to DEQ's comments on the work plan for conducting a pilot test for remediation of upper zone groundwater using *in situ* chemical oxidation (ISCO) techniques and provided to client, incorporated client comments, and provided to DEQ. Received approval from DEQ to conduct the ISCO pilot test (new scope item).
- Resampled two wells for dioxin/furan analyses because of exceedance of temperature limitations by the laboratory (Pace Analytical).
- Received and began processing and evaluation of ISCO baseline groundwater data.
- Submitted UIC application to DEQ for injection wells to be used for the ISCO pilot test.
- Coordinated with ISOTEC on performance of the ISCO bench-scale study and reviewed preliminary results.
- Received approval of the UIC application submitted to DEQ for the injection wells to be used for the ISCO pilot test.
- Received and reviewed the ISCO bench-scale study results prepared by ISOTEC.
- Prepared a cover letter describing the results of the ISCO bench-scale study performed by ISOTEC, attached to the ISOTEC report, and submitted to DEQ.
- Received and validated ISCO pilot study soil and groundwater samples collected in June 2002 for baseline conditions.
- Set up and provided oversight to ISOTEC for implementation of the *in situ* chemical oxidation (ISCO) pilot test study for groundwater remediation, including blocking off stormdrain manhole SDM-1. Sampled ISCO observation wells.

- Conducted data validation of ISCO soil and groundwater samples.

- Set up and provided oversight to ISOTEC for implementation of the *in situ* chemical oxidation (ISCO) pilot test study for groundwater remediation, including blocking off stormdrain manhole SDM-1. Sampled ISCO observation wells.

- Conducted data validation of ISCO soil and groundwater samples.

Task 130: Phase I/II Remedial Investigation

- Provided P. Dost information by email on the stormwater sample results.

- Modified PCP-contaminated soil volume calculations to determine the volume of contaminated soil at and above the water table (assuming an average groundwater table elevation of 17 ft MSL or about 12.5 ft below ground surface) and to determine the volume of uncontaminated overburden within the former PCP mixing area.

- Requested reporting limits from Specialty Analytical Laboratory for groundwater analyses and compared to current reporting limits.

- Conducted QA of PCP-contaminated soil volume calculations and recalculated the soil volumes, contour maps and cross sections based on the data corrections.

- Provided stormwater sample results to client and DEQ.

- Prepared a package of groundwater data, including: previous quarterly sampling events, geologic cross-sections, PCP concentration contour maps (historical and current), PCP concentration trend graphs, and a description of contaminant trends for submittal to URS (Jim Mueller).

- Further evaluated PCP results at the east property wells to determine the possibility of false hits or laboratory cross-contamination.

- Collected groundwater samples from the east property wells to confirm prior PCP concentrations.

- Transmitted Northwest Terminal documents electronically (by CD) to C. Robinson.

- Conducted evaluation of soil concentrations and soil volume calculations in the former Crosby & Overton area to assess soil disposal options.

- Evaluated conducting a surface (6-inch) soil scrape within the former Crosby & Overton tank area to remove PCB and PAH-impacted soil with subsequent treatment/disposal at a thermal desorption facility (TPS Technologies, Tacoma, WA) in conjunction with other soil removal activities at the terminal.

- Reviewed and commented on DEQ's draft press releases regarding the RAP and the ISCO pilot project.

- Continued oversight to Envirocon during soil removal within the former Crosby & Overton tank area to depths ranging from 0.5 to 2.0 ft below ground surface to remove visibly-impacted soil in areas around the footprints of the former tanks or areas where soil verification samples within the excavation areas exceeded 1000 µg/kg for individual polycyclic aromatic hydrocarbons (PAHs) or 1 mg/kg for PCBs. Collected additional soil verification samples within the extended excavation areas.

- Conducted inquiries to the analytical laboratory and to Federal Express regarding cooler temperature issues and delay of shipment of groundwater samples.

- Obtained a cost estimate from Cascade Drilling for replacement of monitoring well LW-104S that was damaged during remediation activities on the east property. Prepared a cost estimate including Landau Associates labor costs and subcontractor costs and submitted to Time Oil and Envirocon.

Task 160: GIS

- Participated in conference call with GIS\Solutions to discuss issues with the Time Oil GIS\Key database. Prepared email documenting the issues.

- Conducted QA check of approximately 10 percent of GIS\Key database. Identified issues to GIS\Solutions during a conference call and by email. Provided input and assistance to GIS\Solutions for resolution of issues

- Addressed issues with GIS\Key database, including correcting rounding errors, reinstallation of the system and project files after corrections of initial version of database by GIS\Solutions and testing of the corrected database. (GIS\Solutions time not charged to correct the issues.)

- Continued loading analytical data and coordinates into GIS\Key for historical site locations.

- Performed database correction for groundwater elevation contour maps for quarterly reports.

Task 170: Remedial Design /Remedial Action

- Evaluated methods to cut off or divert groundwater discharge from the upper zone into the storm drain. Met with K. Murphy to discuss methods (Brooks, Ninteman, Powers).

- Developed a hydrograph of river stage versus pumping level at HRW-1 to assess the potential influence of high river stage on varying pumping rate.

- Calculated estimates for leachate concentrations in groundwater based on soil concentrations for PCP and dioxins/furans using EPA soil screening level methods and compared to applicable surface water quality criteria.

- Prepared a letter agreeing to the conditions provided in DEQ's comments on the removal action plan (RAP) for warehouse demolition and *in situ* soil excavation and provided to DEQ. Received approval from DEQ to proceed with the RAP, contingent on EPA and Environment Canada approval.

- Reviewed Envirocon's health and safety plan for remediation activities at the terminal.

- Coordinated with Time Oil and Envirocon on obtaining permits for the remediation activities at the terminal and on the schedule for the field activities.

- Provided oversight to Envirocon during site preparation and mobilization activities for the soil removal actions for the stockpile and the former PCP mixing areas, including decontamination area setup for the stockpile.

- Provided oversight to Cascade Drilling during abandonment of wells F, LW-2S, LW-12D1, LW-12D2, and RW-3 in preparation for soil removal in the former PCP mixing area.

- Provided oversight to Envirocon during initial decontamination of metal siding, wood timbers, and concrete floor within the former PCP warehouse and of the concrete wall located on the east side of the former PCP mixing area. Collected wipe samples from the metal siding and wood or concrete core samples to verify decontamination procedure.

- Validated pre-removal investigation data, evaluated results, and provided a summary of the results to client.

- Prepared an itemized contractor scope of work for warehouse demolition/*in situ* soil excavation within the former PCP mixing area, incorporated client comments and provided to client for submittal to contractor.

- Obtained historical photographs of remedial activities within the former PCP mixing area and of the stockpile, created *pdf files, and provided to contractor.

- Prepared and conducted internal review of a removal action plan (RAP) for demolition of the former PCP warehouse and excavation of *in situ* soil within the former PCP mixing area and submitted to client.

- Reviewed HAZCO's contract for soil removal/transport to disposal facility and provided comments to client.

- Met with DEQ to present and discuss the scope for the warehouse demolition and *in situ* soil RAP. Submitted the RAP to DEQ.

- Participated in a conference call with DEQ to receive their comments on the RAP. Received approval from DEQ for the removal action, in addition to disposal of the soil stockpile, under the conditions provided in its July 24, 2002 comment letter.

- Prepared letter to DEQ providing notice and describing upcoming additional sampling events that were beyond the scope of plans previously reviewed by DEQ.

- Conducted two rounds of soil sampling for the pre-removal investigation in the former PCP mixing area using the direct-push technique. Set up project for conducting dioxin/furan analyses with

Columbia Analytical Services, at a cost savings to Time Oil. Coordinated with laboratories on conducting SPLP analyses.

- Reviewed initial pre-removal investigation soil results, discussed with Time Oil, and determined locations for additional samples.

- Prepared a cover letter outlining responsibility of Time Oil's contractor for demolition work associated with the soil removal action within the former PCP mixing area, incorporated client comments, and provided to selected contractor (Envirocon) with the RAP. Also, provided Envirocon with electronic base map of terminal.

- Conducted a site walk with Envirocon and Time Oil (M. Powers).

- Revised schedule for stockpile soil removal/*in situ* soil excavation/removal based on negotiation of contract with HAZCO and receipt of agency approval for the soil treatment/disposal facility; provided to Time Oil and Envirocon.

- Reviewed HAZCO's response to Environment Canada's comments on the application for treatment and disposal of soil from the terminal at the Swan Hills facility.

- Provided a table to Time Oil containing preliminary results from the pre-removal investigation (PRI) conducted within the former PCP mixing area. Conducted validation of the PRI data.

- Submitted a technical memorandum to DEQ providing the results of the PRI and the approach to be used to conduct soil excavation within this area, including revision of the limits of soil excavation based on the PRI data. Received approval of the approach from DEQ in its letter, dated September 30, 2002.

- Conducted oversight to Envirocon during the second decontamination of metal siding, wood timbers, and concrete floor within the former PCP warehouse using hot water pressure washing after the results from initial confirmation samples showed PCP concentrations exceeding 1 ppm. Re-collected wipe samples from the metal siding and wood and concrete core samples to verify decontamination procedure.

- Prepared documentation of the warehouse decontamination procedures and provided to P. Dost to include with the laboratory results and a request to DEQ to determine that the debris had been properly decontaminated and no longer contained hazardous waste. Received approval of the request in a letter from DEQ, dated September 18, 2002.

- Provided oversight to Envirocon during site preparation activities for the removal action in the former PCP mixing area, including warehouse demolition and pipeline, aboveground tank, and concrete wall removal.

- Determined coordinates for the limits of excavation for the "clean fill" and impacted soil, provided to field personnel, and marked the limits in the field using GPS.

- Redetermined the limits of the *in situ* soil excavation assuming the soil cleanup action level was 2.5 mg/kg PCP and provided to Time Oil.

- Began oversight to Envirocon during *in situ* soil excavation in the former PCP mixing area. Removal and segregation of the "clean fill" was conducted first, followed by removal of the PCP-impacted soil.

- Provided a table to Time Oil containing preliminary results from the PRI conducted within the former PCP mixing area. Conducted validation of the PRI data.

- Submitted a technical memorandum to DEQ providing the results of the PRI and the approach to be used to conduct soil excavation within this area, including revision of the limits of soil excavation based on the PRI data. Received approval of the approach from DEQ in its letter, dated September 30, 2002.

Task 180: Terminal Support

- Began design of a spill containment and sump for the onsite wastewater treatment system.

- Evaluated requirements from the City of Portland and prepared accidental spill prevention plan.

- Reviewed existing stormwater pollution control plan (SWPCP) for the Northwest Terminal and prepared an updated SWPCP for submittal to the city of Portland.

- Revised the stormwater pollution control plan (SWPCP) for the terminal and provided to Time Oil. Incorporated Time Oil's comments.

- Reviewed existing SWPCP for the Northwest Terminal and prepared an updated SWPCP for submittal to the City of Portland.

- Provided the SWPCP for the terminal to the City of Portland.

- Completed a design for a stormwater intercept system to keep upper zone groundwater from entering the storm drain system. Inspected storm drain manholes to provide information needed for design.

- Submitted a self-monitoring report to the City of Portland for the groundwater treatment system based on samples collected from the system discharge on August 20, 2002. Based on analytical data, the system was in compliance with the discharge permit.

TABLE 4
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

General

1. Billing rates are those agreed upon between Time Oil and Landau Associates in our letter, dated December 12, 2001. All other underlying rates (equipment rental, etc.) are in year 2003 dollars.

2. A 10 percent contingency is provided to cover additional scope items requested by Time Oil or identified as necessary by Landau Associates to meet the objectives of the RI/FS that are not explicitly authorized under previous purchase orders.

3. Travel rates will assume travel for field activities originates from the Portland office. When travel from the Edmonds office is necessary to complete the task (e.g., transport of field equipment or sample bottles to site, specific Landau Associates' personnel required to conduct task), travel rates are reduced, per Time Oil's contract requirements, and include 2 hours per round trip per person to the Northwest Terminal, Portland.

4. A handling charge of 10 percent is applied to subconsultant costs and a handling charge of 12 percent is applied to reimbursables.

5. Time Oil will subcontract directly with all subcontractor/subconsultants.

6. Cost estimates do not include activities beyond December 31, 2003 for the Phase I/II RI/FS.

7. Cost estimates for 2003 cover activities for a 12-month period (January 2003 through December 2003). If the actual schedule exceeds this amount of time or initiation of project work is significantly delayed, costs may increase.

8. Additional budget assumptions are included in the text of the scope and budget update letter.

Field Activities

1. The analytical laboratory will be Analytical Resources, Inc. (Seattle, WA) for quarterly groundwater samples and Specialty Analytical Laboratory (Tualatin, OR) for all other types of sampling events, unless otherwise decided by Time Oil.

2. Utility locate services will be conducted by Locates Down Under (Portland, OR) at a cost of $55/hr with a 2- hour minimum. Costs include travel to/from terminal.

3. Land surveyor for location and elevation information for new monitoring wells will be ZTec Engineering (Portland, OR).

4. 10- to 12-hour field work days for Landau Associates' personnel.

5. Use of gas-operated equipment is permitted in all areas where field activities are planned.

TABLE 4
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

6. Level D health and safety protection is adequate at least 90 percent of the time during field activities, with upgrades to Level C occasionally necessary.

7. Time Oil will supply all 55-gallon drums and/or tanks needed to contain investigation-derived wastes. Drums are $45 each if not supplied by Time Oil.

8. Purge water will be collected into 55-gallon drums and transported to a temporary storage tank located onsite for subsequent treatment and disposal by the onsite wastewater treatment system, as appropriate.

9. Field costs do not include data evaluation.

Data Evaluation and Reporting

1. Data validation will be conducted by Landau Associates. Data validation reports will be provided to DEQ with submittal of the laboratory reports.

Groundwater Interim Action

1. Landau Associates will provide monthly O&M support, as necessary, to maintain operation of the groundwater interim action system.

2. Discharge will be treated using Time Oil's onsite wastewater treatment system. Sampling of discharge will occur in accordance with the terminal's permit requirements.

3. Additional recovery wells in the upper zone will not be required.

Remedial Investigation

1. Four quarterly groundwater monitoring events will be conducted in 2003. Reporting for the groundwater events and for the groundwater interim action will be combined into a single report for each quarterly event.

Remedial Design/Remedial Action

1. The remedial action completion reports for removal of the soil stockpile and excavation and removal of *in situ* soil within the former PCP mixing area will be combined into a single report.

Terminal Support

1. Time Oil will provide the direct day-to-day oversight of the onsite wastewater treatment system.

2. Time Oil will conduct the routine sampling required by the wastewater discharge permit and will directly pay the laboratory costs for these samples.

SCHWABE, WILLIAMSON & WYATT, P.C.

ATTORNEYS AT LAW

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February 1, 2002

VIA FEDERAL EXPRESS

Anthony G. Hopp
Attorney at Law
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, IL 60606

Re: Time Oil Co./NW Terminal

Dear Tony:

As we discussed briefly by phone, our clients have worked together over the last several months to identify disposal options for the pentachlorophenol-contaminated soil currently stockpiled at Time Oil's NW Terminal. At your client's urging, Time Oil has sought and received preliminary approvals for transport of the soil to Richmond, British Columbia for treatment and disposal. I am enclosing for your use a copy of a proposal by Envirocon, Inc. for the work, together with approvals received from Canada, EPA and the Oregon Department of Environmental Quality.

Time Oil remains concerned about landfilling this soil. Although the treatment proposed by Envirocon should effectively reduce pentachlorophenol concentrations, the soil will remain contaminated with dioxin at levels significantly above those that would be acceptable at any facility in the United States or, for that matter, in any Canadian facility other than the Richmond landfill. Further, the Richmond landfill intends to use the soil as cover material. Use of the soil for cover could result in worker exposure to dioxin levels that are orders of magnitude higher than, for example, EPA Region 9 preliminary remediation goals. Accordingly, the export of the soil to Richmond is not without controversy; I am enclosing a January 24, 2002 article from the Canada Globe and Mail newspaper concerning the shipment.

Time Oil would much prefer a remedy that resulted in permanent destruction of dioxin, as well as pentachlorophenol. Time Oil remains, however, committed to the working relationship it has established with Beazer subsequent to the March 2000 Interim Cost Sharing Agreement. Therefore, Time Oil is willing to proceed with transport of the soil to Richmond for disposal as proposed by Beazer, if Beazer will share the cost of transport and disposal as the parties have been sharing costs under the Interim Agreement (i.e. Time Oil pays 60%, Beazer pays 40%) and if Beazer will assume all future risk associated with the disposal of dioxin-containing material at the Richmond landfill.

Treatment and disposal of the stockpile at the Richmond landfill is a final remedy outside the scope of the Interim Agreement, so we will need to prepare an amendment or separate agreement. Please give me a call and let me know how you would like to proceed.

Sincerely,

Patricia Dost

PMD:
Enclosures
cc: Richard Gordon
Kevin Murphy

CC: M. Tischuk

Landau Associates
Environmental and Geotechnical Services

CONFIDENTIAL PRIVILEGED COMMUNICATION
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February 1, 2002

REC'D FEB 0 5 2002

Mr. Kevin Murphy
Time Oil Co.
2737 Commodore Way
Seattle, WA 98199

RE: SCOPE AND BUDGET UPDATE
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

Dear Kevin:

This letter presents Landau Associates' scope and budget update for the Phases I/II Remedial Investigation/Feasibility Study (RI/FS) tasks under our contract with Time Oil Co. for the Northwest Terminal project in Portland, Oregon. This letter provides the status of expenditures and budget coverage for the year 2001 and requests an increase to our existing budget for future expected expenditures for the year 2002 for planned Phase I and Phase II activities not covered by previous authorizations. The status of each of the project tasks currently underway is provided below with a summary of foreseeable activities for each task over the next year. Lists of tasks completed since the previous authorization for this project (Time Oil Work Order No. 03-610-LANDAU11), which covered costs through June 30, 2001, were included with the monthly invoices. As requested by Time Oil, future budget estimates assume that all subcontractor costs [e.g., analytical laboratory, remediation contractor, and licensed surveyor) will be paid directly by Time Oil with the exception of the GIS subconsultant, unless otherwise authorized by Time Oil. The GIS subconsultant will be contracted by and invoiced through Landau Associates.

This scope and budget update requests an additional budget amount of $501,000. As shown in Tables 1 and 2, this amount covers costs for completed additional scope items performed in 2001 that were verbally authorized by Time Oil since the last formal budget authorization but not covered in the contingency budget and expected future tasks to be performed during 2002. As requested by Time Oil, this budget update also revises and incorporates the budget amount requested in our scope and budget letter dated July 27, 2001. As with previous scope and budget update requests, this amount also includes a 10 percent contingency ($45,600) to cover unforeseen additional tasks during this period.

The costs estimated in this letter are based on Landau Associates' labor rates, which continue to include a discount to Time Oil in recognition of our longstanding business relationship. Tasks completed in 2001 are based on reduced 2001 labor rates; those conducted in 2002 are based on reduced 2002 labor rates, as documented in Landau Associates' letter to Time Oil, dated December 12, 2001. As in the past, this work will be provided on a time and materials basis under our existing contract.

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The following sections provide a summary of the basis for the cost estimates for work conducted in 2001 and expected activities in 2002. Table 1 provides a summary of the additional budget requests. Table 2 summarizes tasks, project expenditures (through December 29, 2001), and authorizations by Time Oil to date, and provides our proposal for transfer of funds from existing tasks to cover completed additional scope items and for authorization of new funds. Additional scope items completed under verbal authorization from Time Oil for activities since the last scope and budget update (from July 2000 through December 2001) are listed in Table 3. Budget assumptions included in the estimation of costs herein are listed in Table 4.

2001 Expenditures and Future Activities

Approximately 1.78 million has been spent on the project through December 2001. As you verbally approved, the 10 percent contingency amount authorized in the previous change order ($25,600) was applied to additional scope items incurred by the project since July 2000. A list of completed additional scope items completed from July 2000 through December 2001 is provided in Table 3.

Because we were able to achieve savings in some previously scoped and budgeted tasks in 2001, we propose to transfer funds from certain tasks completed under budget or not completed within 2001 to cover additional scope items. A transfer of approximately $15,500 is proposed to cover a portion of the costs for activities required to complete the soil stockpile characterization and remedial alternatives evaluation, as shown in Table 2 under task 150. This transfer includes approximately $5,400 from the groundwater interim action task (task 110), approximately $5,600 from the risk assessment task (task 140), and about $4,600 from the general FS support subtask (subtask 152). Additionally, a transfer of $4,470 from the risk assessment task (task 140) is proposed to cover additional costs for preparation and production of the final Phase II RI report. As stated previously in the July 27, 2001 scope and budget update request letter, additional scope items for the Phase II RI report included: incorporation of data for recovery well RW-3; incorporation of third and fourth quarter 1999 groundwater data into the text, tables, figures, and appendices of the report; preparation of an additional geologic cross section along the storm drain line; preparation of two additional pentachlorophenol concentration figures; incorporation of comments from two draft report reviews from Time Oil and Time Oil's counsel, and from one DEQ draft report review into a final report; and production of final report copies for distribution. As discussed with you previously and also included in the July 2001 letter, a portion of the previously authorized risk assessment budget specified for the sensitivity analyses ($6,545) was used to zero out the budget for the currently inactive risk assessment task (Task 40; inadvertently omitted from the previous request letter). The sensitivity analyses was removed from the scope for the project.

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For completed additional scope items not covered by transfers from completed tasks or for expected future tasks to be completed in 2001, an additional budget of $87,700 is required. The completed additional scope items through December 2001 are included in Table 3. Please note that we were able to extend the previous budget that was authorized for project management costs through June 2001 to cover most project management costs through November 2001, but additional budget ($4,500) is required for costs incurred during part of November and in December 2001.

A description of the scope of services expected for 2002 is provided below.

2002 Future Activities

The status of each of the project tasks currently underway with a summary of foreseeable activities for each task in 2002 and definition of new project tasks is provided below. As stated earlier, Time Oil will maintain subcontracting responsibilities for the project, with one exception. Landau Associates will contract with and be invoiced by the GIS subconsultant and these subconsultant costs plus a 10 percent handling charge are included in the tasks totals.

As discussed with you by telephone, the scope of the project is expected to increase over the next year. In anticipation of these scope increases, new task numbers have been established, as follows:

160 GIS

170 Remedial Design/Remedial Action

180 Terminal Support.

Tasks 110 (Groundwater Interim Action), 130 (Phase I/II Remedial Investigation), 140 (Risk Assessment), and 150 (Feasibility Study) remain active. The status of each of the active project tasks and expected scope for new tasks is provided in the following sections.

Task 110 – Groundwater Interim Action

The groundwater interim action is currently ongoing with the continuous pumping of RW-2 for hydraulic capture of groundwater contamination in the lower zone. Startup of the groundwater interim action in the upper zone will likely occur in 2002 with the seasonal rise in water levels in the upper zone. The previously authorized budgets remaining for startup monitoring and the interim action O&M tasks (subtasks 115 and 116; about $40,000) will be brought forward to cover these costs in 2002; therefore, no additional budget is requested for these tasks. Additional budget is requested to complete the routine quarterly groundwater interim action status reports, as requested by DEQ. As shown in Tables 1 and 2, an amount of $10,600 is required to complete this task for 2002 (subtask 117). As shown in Table 1 and discussed earlier, the unused budgets for the design and construction task ($2,638; subtask 113) and the

completion report task ($2,738; subtask 114) were transferred to cover a portion of the costs for the soil stockpile FS/RAP task (subtask 151). These tasks are now classified as inactive.

Task 130 – Phase I/II Remedial Investigation

Phase II remedial investigation activities expected to occur during 2002 include the following: 1) four quarterly groundwater sampling events, 2) reporting for additional soil and storm drain sampling activities, and 3) project management. For 2001, GIS activities were charged under this task (subtask 133); for future GIS activities, a new task has been established (task 160) and is described in a later section. Reporting for the additional soil and storm drain sampling activities will be covered under the existing budget (subtask 132).

Brief descriptions of each of the ongoing activities under Task 130 are provided below.

Quarterly Groundwater Sampling Events. As shown in Tables 1 and 2, an amount of $98,600 is required to complete the quarterly groundwater sampling and reporting during 2002. The quarterly inclusion of sampling events in 2002 are expected to be comparable 2001 quarterly events with the exception of new monitoring wells installed as part of the Phase III RI. While sampling of the new Phase III monitoring wells will be conducted in conjunction with the Phase II quarterly events, the costs to sample the Phase III wells will be separated from the Phase II costs and charged to the Phase III project (Landau Associates project number 231009). However, reporting activities for all wells will be combined into the Phase II costs. Anticipated activities associated with the quarterly 2002 groundwater events include the following:

- Groundwater sampling/field activities for four quarterly sampling events
- Validation/processing of the analytical data
- Preparation of four quarterly groundwater reports for submittal to client for review and to DEQ.

Additional Sampling Activities. Field activities for the Phase II supplemental sampling, including sampling and analysis of soil associated with the Phase II source areas and of stormwater from the east-west trending storm drain at the terminal, were completed in September 2001. A second round of stormwater samples was collected in November 2001.

Remaining outstanding activities include the following:

- Completion of a technical memorandum documenting the results of the supplemental sampling for submittal to client and DEQ for review
- Response to client and DEQ comments.
- Completion of two additional stormwater sampling events and reporting of the results.

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Approximately $10,800 remains in the previously authorized budget to complete the first two activities. An additional $2,600 is requested for the additional stormwater sampling events in 2002.

Project Management. Project management activities are ongoing and include: preparation of monthly progress reports for submittal to DEQ (in conjunction with Phase III RI and east property reports); meetings with Time Oil, DEQ, and Landau Associates staff; communications with Time Oil and their counsel on various project activities and strategies; planning/scheduling of project activities with internal staff and Time Oil; preparation/update of a schedule for Phase II activities in Microsoft Project for submittal to Time Oil and DEQ; weekly budget tracking; invoice preparation (including backup labor documentation, monthly status reports, and project cost spreadsheet updates requested by Time Oil); project filing; preparation of miscellaneous submittals to Time Oil regarding project progress, and preparation of annual scope and budget update requests and documentation. We assume that the project manager will prepare for and attend six 2-hour meetings with Time Oil locally, and three 4-hour meetings with Time Oil and DEQ in Portland. Travel costs for room and subsistence in Portland are not included, under the assumption that Time Oil will pay these costs directly. Also, airfare between Seattle and Portland for meeting attendance is not included, under the assumption that carpooling of Landau personnel with Time Oil personnel is possible.

Based on average monthly costs for this project in 2001 and anticipating the noted additional costs for subcontractor management, a budget of $46,000 is requested for project management costs from January through December 2002 (12 months). These costs, shown in Tables 1 and 2, include project management for currently defined Phase II tasks in 2002. The additional required budget reflects the level of effort that has been necessary in the past to maintain project communications at the level required by Time Oil, to adjust the project schedule and work efforts to the relatively fluid nature of project requirements, to respond to requests for information from Time Oil and DEQ in an expedient manner, and to maintain project efficiency.

Task 140 - Risk Assessment

We currently anticipate that significant risk assessment efforts will begin in 2002. Risk assessment activities in 2002 are expected to include: consultation with risk personnel in conjunction with development of the scope for the Phase III RI to address coverage of data gaps and applicable exposure pathways, development and preparation of a terminal-wide risk assessment work plan for submittal to Time Oil and DEQ, and response to client and DEQ comments on the work plan. Costs provided herein also include preparation of an updated constituents of potential concern (COPC)/constituent of potential ecological concern (CPEC) screening report, which will incorporate information obtained during the Phase III RI and possibly from the Portland Harbor Superfund Project (or from sediment sampling

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conducted independently by Time Oil) for use in the terminal-wide risk assessment. Completion of this activity within 2002 will be dependent on the actual completion schedule for the Phase III RI and client and DEQ review periods for the risk assessment work plan. As shown in Table 2, a budget of $63,600 is required to cover this activity.

Task 150 - Feasibility Study

Future activities for a terminal-wide feasibility study are not expected to be conducted in 2002. Therefore, at this time, no budget is requested for FS support in 2002. However, if FS activities are expanded before the end of the year, we will request additional funds by separate letter.

Task 160 - GIS

Time Oil and Landau Associates recently selected GIS\Solutions, Inc. (GIS\Solutions) as the subconsultant for application of the project data to a GIS format. As specified in the request for proposal and the response from GIS\Solutions for this work, the scope for this task includes the following activities:

- *GIS Scoping.* Includes preparation and presentation of technical options to Time Oil and Landau Associates by GIS\Solutions for implementation of the application of GIS\Solutions software (GIS\Key) to project data. In addition to attendance of the presentation by GIS\Solutions representatives, our cost estimate includes participation by two Landau Associates personnel.

- *GIS Database Construction.* Includes conversion of the project data in various electronic formats to a GIS format. Soil boring/well logs in AutoCAD and gINT format will require hand entry that will be conducted by GIS\Solutions personnel. Landau Associates data management personnel will assist in the conversion by providing access to all project data files and in the organization of the data once converted.

- *System Integration and User Interface.* GIS\Solutions will install the GIS\Key software at the Landau Associates (Edmonds) and Time Oil (Seattle) offices with one network system at each location. The complete GIS\Key software package will be installed at Landau Associates and the client tools package will be installed at Time Oil. Installation will be conducted by GIS\Solutions with assistance by Landau Associates information technology (IT) personnel, or vice versa. Landau Associates has agreed to share the cost of the GIS\Key software package with Time Oil, with a savings to Time Oil of $7,500.

- *Other GIS Data Source Investigation.* Includes research of public and private sources for applicable GIS data and preparation of a short report by GIS\Solutions personnel, with minor assistance and report review by Landau Associates.

- *Training and Technical Support.* Includes a 3-day basic training seminar and a 2-day project implementation seminar for Landau Associates and Time Oil personnel (up to six people) and a follow-up 3-day training class after about 6 months of software use. Landau Associates has agreed to share the cost of training with Time Oil, with a savings to Time Oil of $5,000. Landau Associates costs for this activity include training of two personnel in both classes and

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training of the project manager in the basic training portion only. Technical support by GIS\Solutions includes call-in technical support and upgrades, and a web-based meeting center with one-on-one support between software users and the GIS\Solutions technical staff. We were able to negotiate including the first year of technical support with the cost of the software, for a savings of $6,400 to Time Oil during the first year.

As shown in Tables 1 and 2, a budget of $79,900 is required for this task. Approximately $52,200 of this amount is allocated to GIS\Solutions. As discussed earlier, $12,500 of the cost for the software and training will be paid by Landau Associates and is not included in the total amount requested.

Task 170 – Remedial Design/Remedial Action

Time Oil recently received approval from the United States Environmental Protection Agency (EPA), Environment Canada, and the British Columbia Ministry of Environment for disposal of the soil stockpile at the Hazco facility in Richmond, British Columbia, Canada. We anticipate that remediation activities for the soil stockpile will occur in the early part of 2002. For cost estimate purposes, this task includes soil removal oversight by a Landau Associates' senior engineer, preparation of the soil removal completion report, and response to DEQ comments. As shown in Tables 1 and 2, a total of $60,700 is required to complete this task. As requested by Time Oil, this amount does not include remediation contractor costs (estimated at about $780,000 for excavation, haul, and disposal of the soil stockpile) because we understand that Time Oil intends to pay those costs directly. Additional budget will be required if the scope of this task broadens to include demolition of the former PCP Warehouse and excavation of contaminated soil in this area. If the scope broadens, we will request additional funds by separate letter.

Task 180 – Terminal Support

Recently, Time Oil requested that Landau Associates provide support in the oversight and operation of the onsite wastewater treatment system at the Northwest Terminal. As currently defined, this task includes: review and organization of background information on the system, evaluation of current operating conditions, recommendation of necessary modifications to the system, review and update of applicable permit requirements, oversight of day-to-day operations, consultation with onsite Time Oil personnel on system operations, and periodic sampling of discharge water, as requested by Time Oil. A total of $30,000 is requested to complete this task. Additional budget may be required if the scope of this task broadens within 2002.

BUDGET

Accrued project charges through week ending December 29, 2001 are provided in Table 2. A breakdown of budget requested for work completed for new scope items in 2001 since the previous authorization and costs for work expected in 2002 are provided in Table 1. The costs include Landau Associates' labor and associated nonlabor expenses and GIS subconsultant costs.

The estimated total budget increase for completed work conducted in 2001 under verbal authorization from Time Oil and for future work to be conducted through December 2002 is $501,100. Also, as in the past, this total includes a 10 percent contingency amount of $45,600 for unexpected project costs throughout this time period. Total project costs, including expenditures to date and estimated additional costs for future work under this request, is estimated at about $1,993,465.

* * * * * * *

We value you as a client and thank you for the continuing opportunity to work with you on this project. If you have any questions or comments regarding the information presented herein, please call me.

LANDAU ASSOCIATES, INC.
By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
Attachments

cc: Mike Tischuk, Beazer East

TABLE 1
SUMMARY OF BUDGET REQUESTS
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

Active Task	Subtask	Description	Requested Budget 2001 (a)	Requested Budget 2002	TOTAL REQUESTED
110		**Groundwater Interim Action**			
	111	Evaluation Report			
	112	Well Installation			
	113	Design and Construction			
	114	Completion Report			
	115	Startup Monitoring			
	116	Interim Action O&M			
	117	Quarterly Progress Reports		$10,600	$10,600
		Subtotal	$0	$10,600	$10,600
130		**Remedial Investigation**			
	131	Quarterly Groundwater Events	$24,200	$74,400	$98,600
	132	Addt'l Sampling Events		$2,600	
	133	GIS	$6,000		$6,000
	134	Phase II RI Report			
	135	Project Management	$4,500	$46,000	$50,500
	139	Out of Scope (Contingency) (b)	$9,500		$9,500
		Subtotal	$44,200	$123,000	$164,600
140		**Risk Assessment**			
	141	Sensitivity Analyses			
	142	General Risk Support			
	143	Risk Assessment Work Plan		$36,500	$36,500
	144	COPC/CPEC Screening/Report		$27,100	$27,100
		Subtotal		$63,600	$63,600
150		**Feasibility Study**			
	151	Soil Stockpile FS/RAP	$43,500	$0	$43,500
	152	General FS Support	$0	$0	
		Subtotal	$43,500	$0	$43,500
160		**GIS**			
	161	GIS Scoping		$5,700	$5,700
	162	GIS Database Construction		$25,600	$25,600
	163	System Integration and User Interface		$20,300	$20,300
	164	Other GIS Data Source Investigation		$3,500	$3,500
	165	Training and Technical Support Services		$24,800	$24,800
	166	Other GIS Data Integration (Optional)			
		Subtotal		$79,900	$79,900
170		**Remedial Design/Remedial Action**			
	171	Phase I - Soil Stockpile		$60,700	$60,700
	179	Out of Scope (Contingency) (b)			
		Subtotal		$60,700	$60,700
180		**Terminal Support**			
	181	Remediation System		$22,700	$22,700
	182	Sampling		$7,300	$7,300
		Subtotal		$30,000	$30,000
		ESTIMATED TOTAL LANDAU COSTS	**$87,700**	**$367,800**	**$455,500**
		Contingency (10%)			$45,600
		TOTAL BUDGET REQUESTED			**$501,100**
		Total Estimated Subcontractor Costs (Time Oil to pay directly) (c)			$852,800
		TOTAL ESTIMATED PROJECT COSTS - 2002 NEW SCOPE			**$1,353,900**

TABLE 1
SUMMARY OF BUDGET REQUESTS
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

(a) Covers costs for additional scope items completed under verbal authorization by Time Oil and estimated future costs through the end of 2001.

(b) Additional contingency budget was required in 2001 for wastewater treatment plant orientation and and evaluation of other options for upper zone interim action. Once approved, the contingency budget for for 2002 will be split between subtasks 139 and 179.

(c) Estimated subcontractor costs include laboratory costs for quarterly groundwater sampling events (estimated at $72,800) and remediation contractor costs for the soil stockpile (estimated at $780,000)

TABLE 2
TOTAL PROJECT EXPENDITURES THROUGH DECEMBER 29, 2001
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

TASK	Subtask	TASKS AS DEFINED Post 5/97	TOTAL Authorized Budget (a)	Total Expenditures Thru 12/01	Total Budget Remaining Thru 12/01	SCOPE AND BUDGET UPDATE DECEMBER 2001: Proposed Transfers Between Tasks (b)	Proposed New Authorization	Proposed TOTAL Adjusted Budget	TOTAL Budget Remaining After Adjustments
110		GROUNDWATER INTERIM ACTION		$0	$0			$0	$0
	111	Evaluation Report	$10,073	$10,073	($0)			$10,073	($0)
	112	Well Installation	$32,266	$32,266	($0)			$32,266	($0)
	113	Design and Construction	$41,587	$38,949	$2,638	($2,638)		$38,949	($0)
	114	Completion Report	$12,125	$9,387	$2,738	($2,738)		$9,387	($0)
	115	Startup Monitoring	$58,900	$24,230	$34,670			$58,900	$34,670
	116	Interim Action O&M	$5,300	$51	$5,249			$5,300	$5,249
	117	Interim Action Progress Reports	$6,100	$5,608	$492		$10,600	$16,700	$11,092
110	**Subtotal**	**GROUNDWATER INTERIM ACTI**	**$166,351**	**$120,565**	**$45,786**	**($5,376)**	**$10,600**	**$171,575**	**$51,010**
120		**Reserved**	**$0**	**$0**	**$0**			**$0**	**$0**
130		REMEDIAL INVESTIGATION	$0	$0	$0			$0	$0
	131	Quarterly Groundwater Events	$58,200	$82,333	($24,133)		$98,600	$156,800	$74,467
	132	Addt'l Sampling Events	$22,800	$11,989	$10,811		$2,600	$25,400	$13,411
	133	GIS	$5,000	$10,977	($5,977)		$6,000	$11,000	$23
	134	Phase II RI Report	$5,000	$9,470	($4,470)	$4,470	$0	$9,470	$0
	135	Project Management	$48,400	$52,902	($4,502)		$50,500	$98,900	$45,998
	139	Out of Scope (Contingency)	$25,600	$35,058	($9,458)		$32,300	$57,900	$22,842
130	**Subtotal**	**REMEDIAL INVESTIGATION**	**$165,000**	**$202,727**	**($37,727)**	**$4,470**	**$190,000**	**$359,470**	**$156,743**
140		RISK ASSESSMENT	$0	$0	$0			$0	$0
	141	Sensitivity Analyses	$15,400	$3,832	$11,568	($11,568)		$3,832	($0)
	142	General Risk Support	$5,000	$0	$5,000	($5,000)		$0	$0
	143	Risk Assessment Work Plan					$36,500	$36,500	$36,500
	144	COPC/CPEC Screening/Report					$27,100	$27,100	$27,100
140	**Subtotal**	**RISK ASSESSMENT**	**$20,400**	**$3,832**	**$10,023**	**($16,568)**	**$63,600**	**$67,432**	**$63,600**
150		FEASIBILITY STUDY	$0						
	151	Soil Stockpile FS/RAP	$15,100	$71,892	($56,792)	$15,489	$43,500	$74,089	$2,197
	152	General FS Support	$5,000	$440	$4,560	($4,560)	$0	$440	$0
150	**Subtotal**	**FEASIBILITY STUDY**	**$20,100**	**$72,331**	**($52,231)**	**$10,929**	**$43,500**	**$74,529**	**$2,198**
160		GIS							
	161	GIS Scoping					$5,700	$5,700	$5,700
	162	GIS Database Construction					$25,600	$25,600	$25,600

TABLE 2
TOTAL PROJECT EXPENDITURES THROUGH DECEMBER 29, 2001
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

TASK	Subtask	TASKS AS DEFINED Post 5/97	TOTAL Authorized Budget (a)	Total Expenditures Thru 12/01	Total Budget Remaining Thru 12/01	SCOPE AND BUDGET UPDATE DECEMBER 2001: Proposed Transfers Between Tasks (b)	Proposed New Authorization	Proposed TOTAL Adjusted Budget	TOTAL Budget Remaining After Adjustments
	163	System Integration and User Interface					$20,300	$20,300	$20,300
	164	Other GIS Data Source Investigation					$3,500	$3,500	$3,500
	165	Training and Technical Support Services					$24,800	$24,800	$24,800
	166	Other GIS Data Integration					$0	$0	$0
160	Subtotal	GIS	$0	$0	$0	$0	$79,900	$79,900	$79,900
170		REMEDIAL DESIGN/REMEDIAL ACTION							
	171	Phase I - Soil Stockpile					$60,700	$60,700	$60,700
	179	Out of Scope (Contingency)					$22,800	$22,800	$22,800
170	Subtotal	REMEDIAL DESIGN/REMEDIAL	$0	$0	$0	$0	$83,500	$83,500	$83,500
180		TERMINAL SUPPORT							
	181	Remediation System					$22,700	$22,700	$22,700
	182	Sampling					$7,300	$7,300	$7,300
180	Subtotal	TERMINAL SUPPORT	$0	$0	$0	$0	$30,000	$30,000	$30,000
TOTAL		Subtotals	$1,749,365	$1,783,515	($34,150)	$0	$501,100	$2,250,465	$466,950
TOTAL PROJECT									

(a) Total authorized budget reflects budget adjustments to individual tasks in June 2000.

(b) Transfers in parentheses indicate subtraction of budget from (transfer from) that task. Transfers without parentheses indicate addition of budget to (transfer to) that task.

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TABLE 4
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

General

1. Billing rates are those agreed upon between Time Oil and Landau Associates in our letter, dated December 12, 2001. All other underlying rates (equipment rental, etc.) are in year 2001 dollars for work to be completed in 2001 and 2002 dollars for work to be completed in 2002.

2. A 10 percent contingency is provided to cover additional scope items requested by Time Oil or identified as necessary by Landau Associates to meet the objectives of the RI/FS that are not explicitly authorized under previous purchase orders.

3 Travel rates will assume travel originates from the Portland office. When travel from the Edmonds office is necessary to complete the task (e.g., transport of field equipment or sample bottles to site, specific Landau Associates' personnel required to conduct task), travel rates are reduced, per Time Oil's contract requirements, and include 2 hours per round trip per person to the Northwest Terminal, Portland.

4. A handling charge of 10 percent is applied to subconsultant costs and a handling charge of 12 percent is applied to reimbursables.

5. Time Oil will subcontract directly with all subcontractor/subconsultants with the exception of GIS/Solutions Inc., unless otherwise authorized by Time Oil.

6. Cost estimates do not include activities beyond December 31, 2002 for the Phase I/II RI/FS.

7. Cost estimates for 2002 cover activities for a 12-month period (January 2002 through December 2002). If the actual schedule exceeds this amount of time or initiation of project work is significantly delayed, costs may increase.

8. Additional budget assumptions are included in the text of the scope and budget update letter.

Field Activities

1. The analytical laboratory will be Analytical Resources, Inc. (Seattle, WA) for quarterly groundwater samples and Specialty Analytical Laboratory (Tualatin, OR) for all other types of sampling events, unless otherwise decided by Time Oil.

2. Utility locate services will be conducted by Locates Down Under (Portland, OR) at a cost of $55/hr with a 2- hour minimum. Costs include travel to/from terminal.

3. Land surveyor for location and elevation information for new monitoring wells will be ZTec Engineering (Portland, OR).

4. 10- to 12-hour field work days for Landau Associates' personnel.

5. Use of gas-operated equipment is permitted in all areas where field activities are planned.

6. Level D health and safety protection is adequate at least 90 percent of the time during field activities, with upgrades to Level C occasionally necessary.

TABLE 4
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

7. Time Oil will supply all 55-gallon drums and/or tanks needed to contain investigation-derived wastes. Drums are $45 each if not supplied by Time Oil

8. Purge water will be collected into 55-gallon drums and transported to a temporary storage tank located onsite for subsequent treatment and disposal by the onsite wastewater treatment system, as appropriate.

9. Field costs do not include any data evaluation.

Data Evaluation and Reporting

1. Data validation will be conducted by Landau Associates. Data validation reports will be provided to DEQ with submittal of the laboratory reports.

Groundwater Interim Action

1. Landau Associates will provide monthly O&M support. Costs for monthly support assume 2 hours at the Associate rate per month and 4 hours at the Project rate per month

2. Groundwater Elevation Monitoring - Startup of HRW-1 will occur in 2002 when the sensor within the well indicates an adequate amount of water exists in the well for pumping. Dataloggers for HRW-1 startup and monitoring will be rented from a third party, although some cost savings could be realized if Time Oil were to purchase the dataloggers.

3. Discharge will be treated using Time Oil's onsite wastewater treatment system. Sampling of discharge will occur in accordance with terminal's permit requirements.

4. Additional recovery wells in the upper zone will not be required.

Remedial Investigation

1. Two additional storm drain events will be required in 2002. (Two events were conducted in 2001.)

Remedial Design/Remedial Action

1. Excavation, removal, and hauling of the soil stockpile requires eighteen 10-hr days of oversight by a Landau Associates senior engineer.

Terminal Support

1 Time Oil will provide the direct day-to-day oversight of the onsite wastewater treatment system.

2. Time Oil will conduct the routine sampling required by the wastewater discharge permit and will directly pay the laboratory costs for these samples.

TABLE 3
NEW SCOPE ITEMS COMPLETED UNDER VERBAL AUTHORIZATION
JULY 2000 THROUGH DECEMBER 2001
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

Task 30:

- Prepared letter to DEQ regarding reduction of the number of monitoring wells to be sampled during routine quarterly groundwater sampling events; provided draft letter to client; incorporated client comments and provided to DEQ.
- Prepared overall project schedule in Microsoft Project and submitted to client.
- Evaluated application of GIS to project data.
- Prepared a cost estimate for the groundwater interim action startup activities.

Task 110:

- Incorporated client comments on the *Groundwater Interim Action Startup Plan* and submitted to DEQ.
- Participated in a conference call with DEQ to discuss comments on the *Groundwater Interim Action Startup Plan*. Plan approved by DEQ without revisions.
- Prepared groundwater interim action system startup and operation procedure.
- Discussed with client and coordinated with electrical contractor regarding requirements for including future monitoring wells into the final design for the groundwater interim action.
- Reviewed Terra Hydr's invoice and identified charges for which Time Oil should not be invoiced.
- Prepared groundwater elevation contour maps for various river stages using interim action baseline data to evaluate impacts on pumping data, and updated PCP concentration contour maps.
- Evaluated the third quarter 2001 groundwater data with regard to performance of the groundwater interim action system and prepared groundwater elevation and PCP concentration contour maps for the upper and lower zones. Prepared the *Third Quarter 2001 Groundwater Interim Action Status Report*.

Task 130:

- Revised the Northwest Terminal base map to include additional utilities on the east property.

- Recovered product from well LW-11S on two occasions during November 2000, nine occasions in December 2000, and collected a sample of the product for analyses. Checked for presence of product on four occasions in January 2001. Evaluated appropriate methods for more aggressive product removal.

- Installed a hydrocarbon passive recovery canister in well LW-11S. Removed and returned the canister to the vendor when product recovery was completed.

- Prepared a summary of product recovery events at well LW-11S for submittal to Time Oil.

- Consolidated the drummed soil cuttings and other material generated during drilling/ installation of horizontal well HRW-1 into a single drum and collected a composite sample. Transferred the remaining drummed material to the internal temporary storage area at the Northwest Terminal.

- Collected a composite soil sample from a temporary stockpile of soil cuttings from drilling of wells LW-17D and LW-18D for analysis.

- Prepared a cost estimate for refurbishment and installation of bladder pumps for use in deep wells at the Northwest Terminal.

- Evaluated the need to retain chlorinated phenol analysis (EPA Method 8040) for future quarterly groundwater sampling events.

- Prepared time versus concentration plots for BTEX at wells LW-8S and B1 and provided to Time Oil.

- Prepared a cost estimate for production of a final Phase II RI report and provided to Time Oil. Received approval from Time Oil to finalize report for submittal to DEQ.

- Incorporated comments from DEQ, Time Oil, and Time Oil's counsel on the draft Phase II RI report into a final report and submitted to DEQ.

- Prepared recommendation to DEQ to reduce types of analyses required during future sampling events, submitted to client, revised based on client comments, and submitted to DEQ. Received approval for recommendation from DEQ.

- Provided Time Oil with a letter confirming our agreement on 2001 billing rates. Assessed budget using revised billing rates, and provided results of assessment to Time Oil.

- Assessed use of EPA Method 8270 SIM (instead of EPA Method 8040) for future analysis of PCP in groundwater. Evaluated groundwater results conducted by both analyses to determine achievable detection limits.

- Prepared a stockpile management documentation letter for activities since 1997, in response to DEQ's response letter on the final Phase II RI report, and submitted to DEQ. Received approval from DEQ on the letter without comment.

- Conducted additional evaluations for validation of first quarter 2001 groundwater results because of laboratory sample contamination and variability in pentachlorophenol results using two analytical methods.

- Prepared a recommendation letter to DEQ for reduction of the frequency of future TPH analyses for quarterly groundwater sampling events, incorporated client comments, and submitted to DEQ. Received approval of the recommendation from DEQ.

- Prepared a budget for conducting stockpile sampling and reporting of results and provided to client. Evaluated and discussed a strategy with client for transferring previously authorized funds from tasks completed under budget or from tasks not expected to occur in totality in 2001 to cover the stockpile sampling/evaluation task.

- Prepared and negotiated a contract with Microbe Inotech Laboratories to conduct biofeasibility analyses of the soil stockpile.

- Collected measurements in selected wells located northwest of the soil stockpile on June 25, 2001, to evaluate whether an aviation gasoline release may have occurred in this area. No measurable product was observed.

- Addressed questions raised by K. Murphy regarding Universal Treatment Standards for dioxins/furan.

- Discussed future data needs for a terminal-wide risk assessment with regard to the groundwater to surface water/sediment pathway with internal staff and K. Murphy.

- Prepared the 2001 Annual Report for Stockpile Management, including review of stormdrain outfall data, conducted internal reviews, and submitted to Time Oil.

- Prepared a pumping test work plan for upper zone vacuum-enhanced groundwater extraction associated with the groundwater interim action, conducted internal review, provided to Time Oil, and incorporated Time Oil's comments (Time Oil submitted to DEQ.)

- Provided supervision of the performance of a portion of the vacuum-enhanced pumping tests at wells HRW-1 and RW-1 and collected discharge groundwater and vapor samples.

- Prepared a data tracking form for use by Time Oil during the vacuum-enhanced pumping test.

- Prepared and conducted internal reviews of a memorandum documenting the results from the vacuum-enhanced pumping tests at wells HRW-1 and RW-1, including modification of the groundwater interim action system drawing to reflect actual construction details, provided to Time Oil, incorporated Time Oil's comments, and submitted to DEQ.

- Prepared for and conducted the third quarter 2001 groundwater sampling event, August 13-17, 2001. Conducted processing and validation of the third quarter 2001 groundwater data, prepared and began internal reviews of the *Third Quarter 2001 Groundwater Report.*

- Contacted potential bidders for receipt of GIS request for proposal (RFP) and submitted to bidders with electronic information from database. Met with and answered questions from potential bidders.

- Reviewed proposals from responding GIS consultants, selected firms to conduct interviews, and conducted the interviews for selected GIS consultants.

- Conducted the fourth quarter 2001 groundwater sampling event, November 27-30, 2001 and began processing and validation of the fourth quarter data.

- Discussed plans and participated in site walk with Time Oil and ATS for assistance in operation of the wastewater treatment system at the Northwest Terminal. Reviewed daily reports for the wastewater treatment system and identified data needs for a review of Time Oil's files.

- Continued to evaluate groundwater interim action options to contain contaminant movement in the upper zone and prepared cost estimates for selected options.

- Coordinated with Time Oil and contractor to reset pump and sensor in horizontal well, HRW-1.

- Selected GIS consultant, prepared and negotiated the subconsultant agreement with GIS\Solutions, and established schedule for database conversion. Discussed cost sharing options for GIS software and training internally and with Time Oil and provided GIS\Solutions cost summary to Time Oil.

- Scheduled and coordinated the GIS scoping meeting for discussion of conversion of the Time Oil project database to a GIS format.

- Began installation and scheduled and coordinated training for GIS\Key software.

- Evaluated additional options to address upper zone contaminant migration, including evaluation of ORC. Obtained cost estimate for installing internal liner in the storm drain.

- Coordinated with ZTec Engineering to conduct survey of stormdrain manhole locations/elevations.

- At Patty Dost's request, copied Appendix B of the *Phase II RI Report* and sent to Striplin Environmental for the Portland Harbor Superfund project.

- Reviewed press release prepared by DEQ for disposal of soil stockpile and provide comments to Time Oil.

- Conducted a internal data management meeting for discussion of data issues specifically related to receipt and quality of data from Specialty Laboratory and the methods to use to resolve problems.

- Compiled information from the Time Oil files (Seattle) for the wastewater treatment system at the Northwest Terminal and reviewed the system and operational data.

- Prepared a historical water quality data table for the Northwest Terminal wastewater treatment system. Entered system tracking information for November 2001.

- Prepared a new operations data tracking spreadsheet for the wastewater treatment system at the Northwest Terminal.

- Prepared a renewal application for the Northwest Terminal NPDES permit (not including the east property).

Task 150:

- Prepared a summary of soil and groundwater cleanup levels and selected remedies from Records of Decisions (RODs) from five sites in Oregon and provided to Time Oil, Beazer East, and Time Oil's counsel.

- Evaluated alternatives for treating/disposing of stockpiled soil. Participated in a conference call with client to discuss alternatives and possible scope for a pilot test.

- Prepared for and participated in a meeting with Time Oil regarding conduct of pilot tests for treatment of stockpiled soil. Developed strategy for schedule and process for conducting pilot tests and focused FS.

- Developed and discussed approaches for conducting soil stockpile sampling with client.

- Discussed biological treatment and soil disposal options with Time Oil, Beazer, and Beazer's consultant; participated in conference call with J. Mueller (URS) regarding bioremediation options/methods and analytical methods for evaluation of biodegradation potential.

- Prepared a work plan for conducting soil characterization sampling of the soil stockpile, submitted to client, and received client's comments.

- Prepared a preliminary schedule for conducting pilot testing of the stockpiled soil.

- Incorporated client comments on the work plan for conducting soil characterization sampling of the soil stockpile and prepared a cover letter describing our evaluation of offsite soil disposal options. Provided the plan and cover letter to DEQ. Received DEQ's comments and approval for implementation.

- Conducted field work for soil characterization sampling of the soil stockpile.

- Evaluated offsite disposal options for stockpiled soil and discussed with client.

- Compared soil stockpile data with Phase II RI soil data to determine any significant differences in constituents of concern and concentrations.

- Discussed change to Universal Treatment Standard values for individual dioxin congeners with client.

- Received, processed, and began validation and evaluation of the analytical results from the soil stockpile characterization sampling conducted in July 2001.

- Evaluated options for possible offsite treatment/disposal of the soil stockpile in the United States and Canada.

- Obtained environmental regulations from the British Columbia and Alberta provinces of Canada and assessed federal and provincial regulatory requirements for offsite soil disposal at applicable facilities.

- Validated soil stockpile characterization data and calculated TEQ values for dioxin/furan data and 95 percent upper confidence limits for contaminants of concern.

- Prepared and conducted internal reviews of *the Soil Stockpile Characterization and Remedial Alternatives Evaluation Report* and submitted to client. At request from Time Oil and Time Oil's counsel, converted the report into the *Phase I - Soil Stockpile Feasibility Study*.

- Prepared and conducted internal reviews of the *Phase I - Soil Stockpile Feasibility Study*, provided to client, incorporated client's comments, and submitted to DEQ. Received approval of the report from DEQ without revision.

- Coordinated with Canadian disposal and treatment facilities in the evaluation of offsite treatment/disposal of the soil stockpile.

- Participated in conference calls with K. Murphy and B. Fisher regarding soil disposal options/facilities and with K. Murphy and P. Dost on strategy for reporting.

- Prepared and conducted internal reviews of an outline for the *Soil Stockpile Remedial Action Plan* and submitted to Time Oil.

Landau Associates
Environmental and Geotechnical Services

TRANSMITTAL

To: Oregon Dept. of Environmental Quality
2020 SW Fourth Ave. Suite 400
Portland, OR 97201-4987

Date: February 11, 2002

Attn: Mr. Tom Roick

Project No.: 231001.117

RE: **TIME OIL NORTHWEST TERMINAL**

Copies	Description
1	Memorandum Re: Groundwater Action Interim Status Report - Third Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon (2/11/02)

Message:

The above-noted groundwater action interim status report is provided for your file.

LANDAU ASSOCIATES, INC.

By:

Terry McAuley

for Rebekah Brooks
Senior Hydrogeologist

RB/tam
2 11 02 S:\WPROC\231\TRANSMIT FAX\Orly\LASRpt 4th.doc
Enclosure

cc: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

130 2nd Avenue S. • Edmonds, WA 98020 • (425) 778-0907 • Fax (425) 778-6409

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Rebekah Brooks

DATE February 11, 2002

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – THIRD QUARTER 2001
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

This memorandum presents a summary of the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon for the third quarter of 2001. System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm third quarter 2001 compliance with lower zone performance criteria, including: 1) continuous pumping from RW-2, except for brief periods of system maintenance, 2) reversal of the lower zone groundwater flow direction at the leading edge of the pentachlorophenol (PCP) plume, 3) chemical confirmation that continued migration downgradient of RW-2 is not occurring, and 4) compliance with the requirements of the existing discharge permit. Figure 1 shows a site plan for the terminal. In addition to the discussion of system performance and status, a brief summary of data collected for the interim action is provided below.

SYSTEM PERFORMANCE AND STATUS

The groundwater interim action system continued to operate throughout the third quarter of 2001; groundwater was extracted from lower zone recovery well RW-2 at an average rate of approximately 10 gpm. The groundwater extraction rate was increased to approximately 15 gpm on August 16, 2001 to increase the hydraulic capture zone of RW-2. During this time period, RW-2 operated for 2,184 hours (approximately 91 days) and extracted approximately 1,360,000 gallons of groundwater. Approximately 630,000 gallons of groundwater were treated at the terminal wastewater treatment facility and discharged to the sanitary sewer under a permit with the City of Portland (Permit No. 400-121) in the third quarter of 2001 through September 7. No water treatment volume data was available between September 7 and the end of September due to a malfunction in the flow meter. An estimated value of 280,000 gallons of treated water from September 7 through the end of September, based on 230 batches of treated water (1,200 gallons per batch), was used for system tracking purposes. The remaining volume of extracted groundwater was contained in storage tank number 16804 at the terminal pending treatment at the end of

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the third quarter. The operational history of the groundwater interim action in the lower zone is summarized in Table 1.

Groundwater extraction and treatment has been restricted to the lower zone at well RW-2 due to the low groundwater level in horizontal well HRW-1. Below normal precipitation during the fall and winter months has resulted in depressed upper zone groundwater levels at the terminal. The low water level alarm in HRW-1 is currently activated and will continue to be monitored daily (on days the terminal is operating) during the fourth quarter of 2001 to identify when the water level is sufficiently high to allow for groundwater extraction from HRW-1.

As described in the Vacuum Enhanced Pumping Test Work Plan (Time Oil Co. 2001), and approved by DEQ (2001), an alternative method for obtaining hydraulic capture in the upper zone would be to use a liquid-ring vacuum pump for extraction of groundwater. This method was tested at wells HRW-1 and RW-1 on August 13, 2001. The results of the pumping test were provided to DEQ in a technical memorandum prepared by Landau Associates, dated October 11, 2001 (Landau Associates 2001a).

DATA COLLECTION AND RESULTS

Quarterly groundwater level measurements were collected on August 16, 2001 to confirm that hydraulic capture of the lower zone PCP plume was maintained by groundwater extraction from RW-2. Discrete water level measurements for the third quarter 2001 event were obtained about 1 to 2.5 hours past a predicted mean river stage over about a 2-hour period, based on predictions for the St. Johns station on the Willamette River. The timing for water level measurements in the area of the interim action was scheduled to estimate a mean water level elevation or elevation minimally influenced by river stage, and to reduce the time-dependent variation between wells screened in the same water-bearing zone. The timing of the water level measurements was based on average time lag calculations presented in the additional groundwater investigation technical memorandum (Landau Associates 1998), aquifer test report (Landau Associates 1999), and previous quarterly measurements.

Groundwater level data for the interim action are summarized in Table 2. As shown on Figure 2, the data indicate that current pumping conditions achieve hydraulic capture to the west near LW-18D and south to well LW-10D. The lower zone PCP plume (the PCP plume has historically been defined as the 1 µg/L PCP concentration contour) appears to have been reduced significantly in the area influenced by the interim action so that no lower zone concentrations exceed 1 µg/L except for a detection of 5 µg/L in RW-2. These results indicate that the interim action in the lower zone has been successful in the containment and extraction of PCP-contaminated groundwater in the lower zone. Groundwater PCP

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concentrations and hydraulic capture in the area of the interim action will continue to be monitored to demonstrate compliance with lower zone performance criteria.

No water samples were collected at the point of discharge from the water treatment system into the sanitary sewer during the third quarter of 2001. Groundwater samples were collected from five interim action wells (LW-13S, LW-14D, LW-17D, LW-18D, and RW-2) on August 13, 2001, during the third quarter 2001 sampling event. PCP was detected at a concentration of 6.9 µg/L in upper zone well LW-13S. As noted earlier, the sample from lower zone recovery well RW-2 contained PCP at a concentration of 5 µg/L. PCP was not detected at a detection limit of 0.25 µg/L in samples collected from wells LW-14D, LW-17D, and LW-18D and downgradient well LW-6D, located near the Willamette River. PCP concentrations in the upper and lower zone groundwater, based on analytical results from the third quarter groundwater monitoring event, are shown on Figures 3 and 4, respectively. Analytical reports and data validation results for these samples are included with the data presented in the *Third Quarter 2001 Groundwater Report* (Landau Associates 2001b).

REFERENCES

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Landau Associates. 2000. *Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon*. July 14.

Landau Associates. 1999. *Aquifer Test Report, Time Oil Northwest Terminal, Portland, Oregon*. December 20.

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Time Oil Co. 2001. *Vacuum Enhanced Pumping Test Work Plan, Time Oil Northwest Terminal, Portland Oregon*. Prepared by Landau Associates, Inc., Edmonds, Washington, for Time Oil Co. August 2.

TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
LOWER WATER-BEARING ZONE
TIME OIL NORTHWEST TERMINAL

Monitoring Period	RW-2 Discharge				Treatment System Discharge			Comments
	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	
Fourth Quarter 2000								
October 2000	439,003			0.35	0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/09/2000	95	0.24	467,478	11/07/2000	ND (a)	
December 2000	348,720	12/20/2000	39	0.11	497,656	12/06/2000	5.69	
						12/20/2000	9.73	
Quarterly Totals	*1,093,324*			*0.70*	*965,134*			
First Quarter 2001								
January 2001	416,140	01/18/2001	38.8	0.13	239,207	01/18/2001	14.3	
February 2001	335,008	02/13/2001	30	0.08	184,192			
March 2001	332,963	03/07/2001	ND (b)	0.03	517,332	03/07/2001	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*	*940,731*			
Second Quarter 2001								
April 2001	377,931			0.04	275,519			
May 2001	344,252	05/22/2001	12.3	0.04	195,522	05/22/2001	5.29	
June 2001	361,846	06/04/2001	0.68	0.04	563,853			
Quarterly Totals	*1,084,029*			*0.11*	*1,034,894*			
Third Quarter 2001								
July 2001	351,509			0.01	559,015			
August 2001	486,123	08/13/2001	5	0.02	66,876			
September 2001	520,704			0.02	280,000			
Quarterly Totals	*1,358,336*			*0.06*	*905,691*			

(a) PCP not detected above the detection limit of 5 µg/L
(b) PCP not detected above the detection limit of 25 µg/L; concentration-dependent calculations based on half the detection limit.

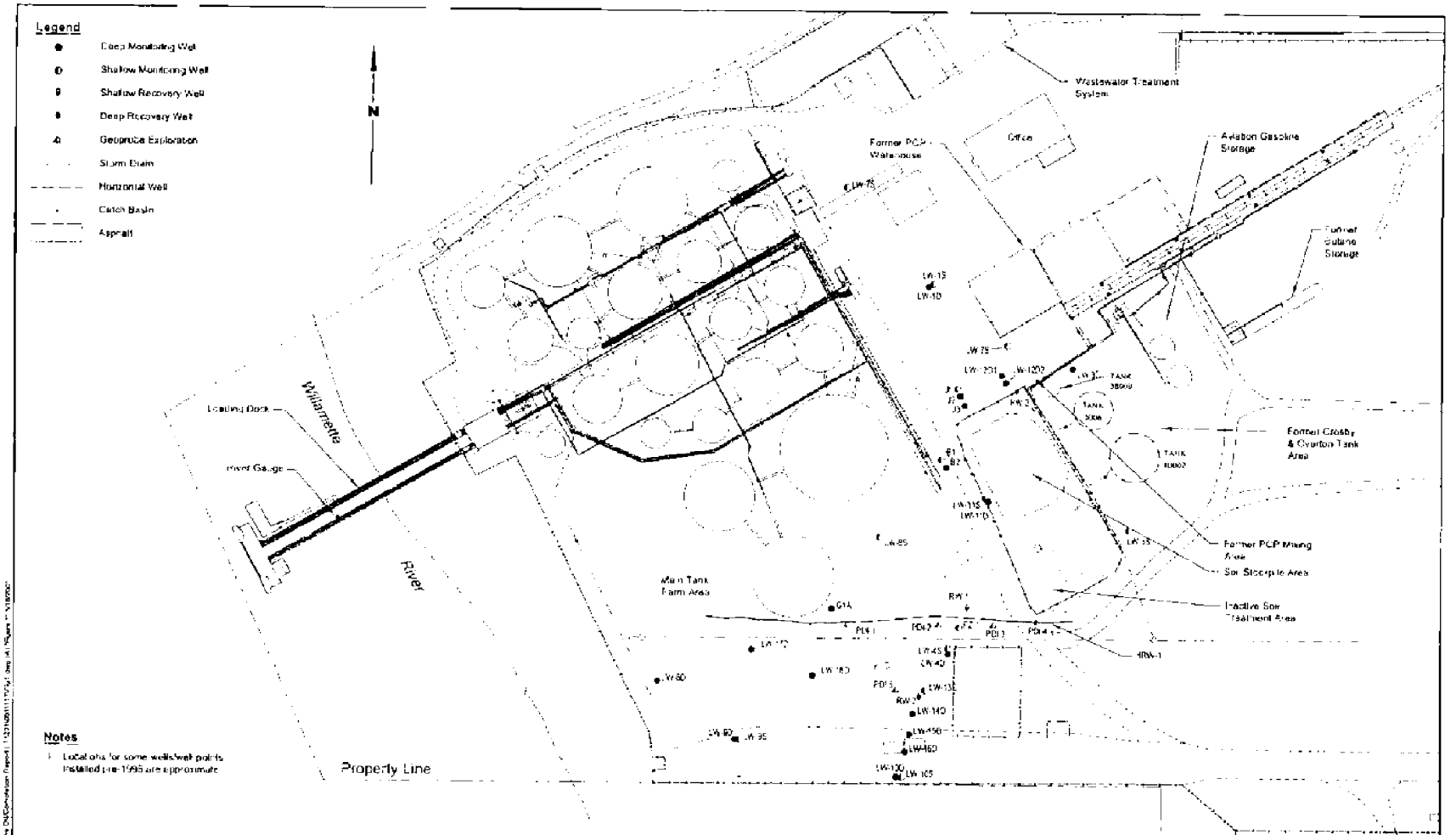
TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - THIRD QUARTER 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL)(a)	DTW(b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
Deep Wells:							
B2	08/16/01	11:58	30.31	26.75	3.56	----	
G1A	08/16/01	10:52	29.72	25.51	4.21	----	
J2	08/16/01	11:51	29.65	25.57	4.08	----	
LW1D	08/16/01	11:38	28.31	23.73	4.58	----	
LW3D	08/16/01	11:47	30.80	26.43	4.37	----	
LW4D	08/16/01	11:15	30.17	26.27	3.90	----	
LW6D	08/16/01	10:54	30.84	26.72	4.12	----	
LW9D	08/16/01	11:02	30.98	26.57	4.41	----	
LW10D	08/16/01	11:04	31.12	27.16	3.96		
LW11D	08/16/01	11:25	29.04	26.94	2.10	----	
LW12D1	08/16/01	11:42	30.02	25.39	4.63	----	
LW14D	08/16/01	11:08	30.54	27.00	3.54	----	
LW15D	08/16/01	11:07	30.85	27.05	3.80	----	
LW16D	08/16/01	11:05	28.40	24.43	3.97	----	
LW17D	08/16/01	10:55	27.82	23.80	4.02	----	
LW18D	08/16/01	11:00	27.82	23.81	4.01	----	
RW2	08/16/01	11:11	30.68	28.98	1.70	----	
Other:							
River Gauge	08/16/01	10:20	28.13	24.83	3.30	----	
River Gauge	08/16/01	11:29	28.13	25.23	2.90	----	

---- No measurable product or odor observed.

(a) Reference Elevation is the north side of the top of the 2-in well casing. Reference elevation surveys were conducted by Tec Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.

(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].



Landau Associates

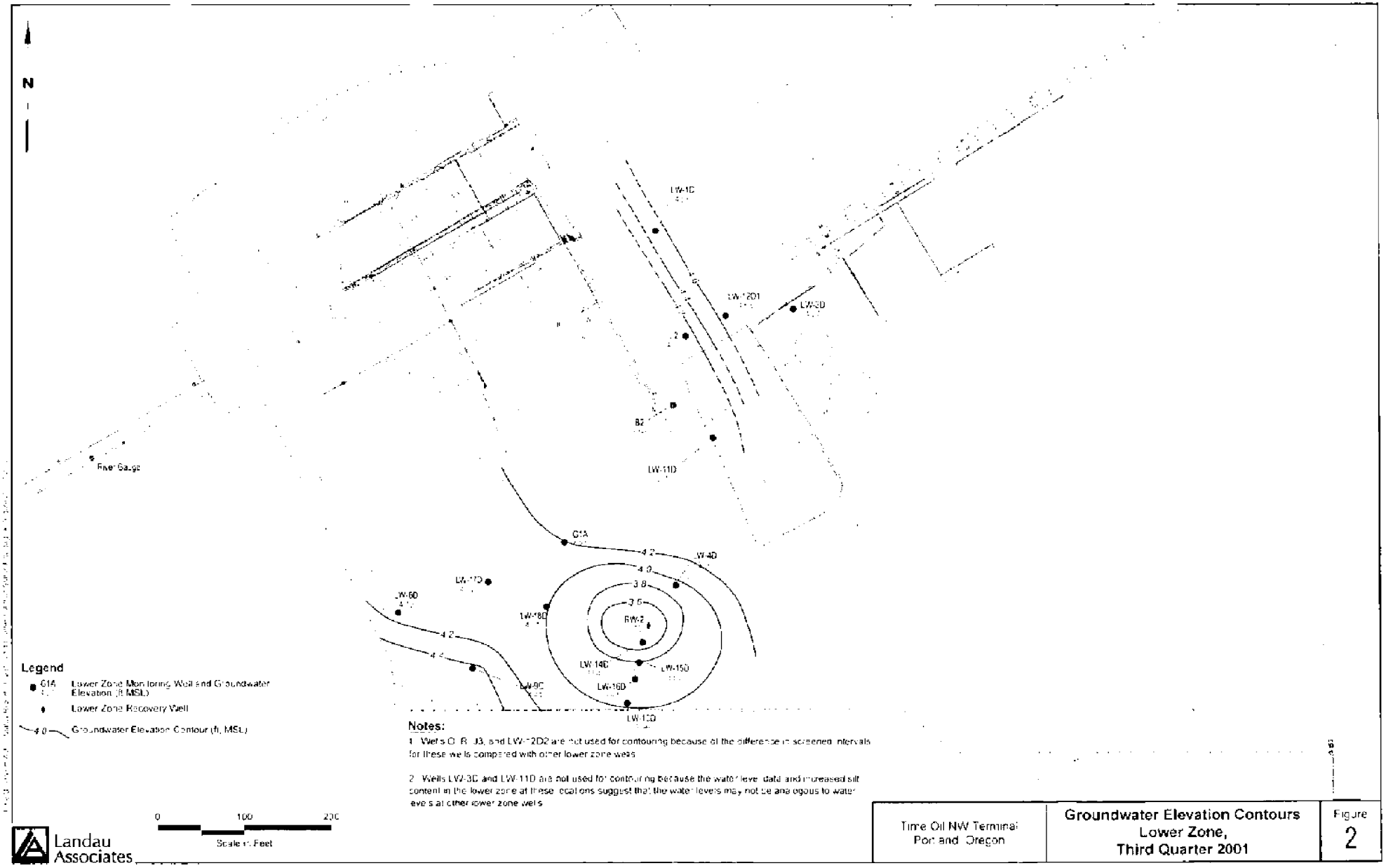
CONFIDENTIAL PRIVILEGED COMMUNICATION AND ATTORNEY WORK PRODUCT - RESTRICTED DISTRIBUTION

Time Oil N.W. Terminal
Portland, Oregon

Site Plan

Figure 1

BZTO104(e)016550



Notes:

1. Wells G1B, J3, and LW-12D2 are not used for contouring because of the difference in screened intervals for these wells compared with other lower zone wells.

2. Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.

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Time Oil NW Terminal Portland, Oregon	Groundwater Elevation Contours Lower Zone, Third Quarter 2001	Figure 2

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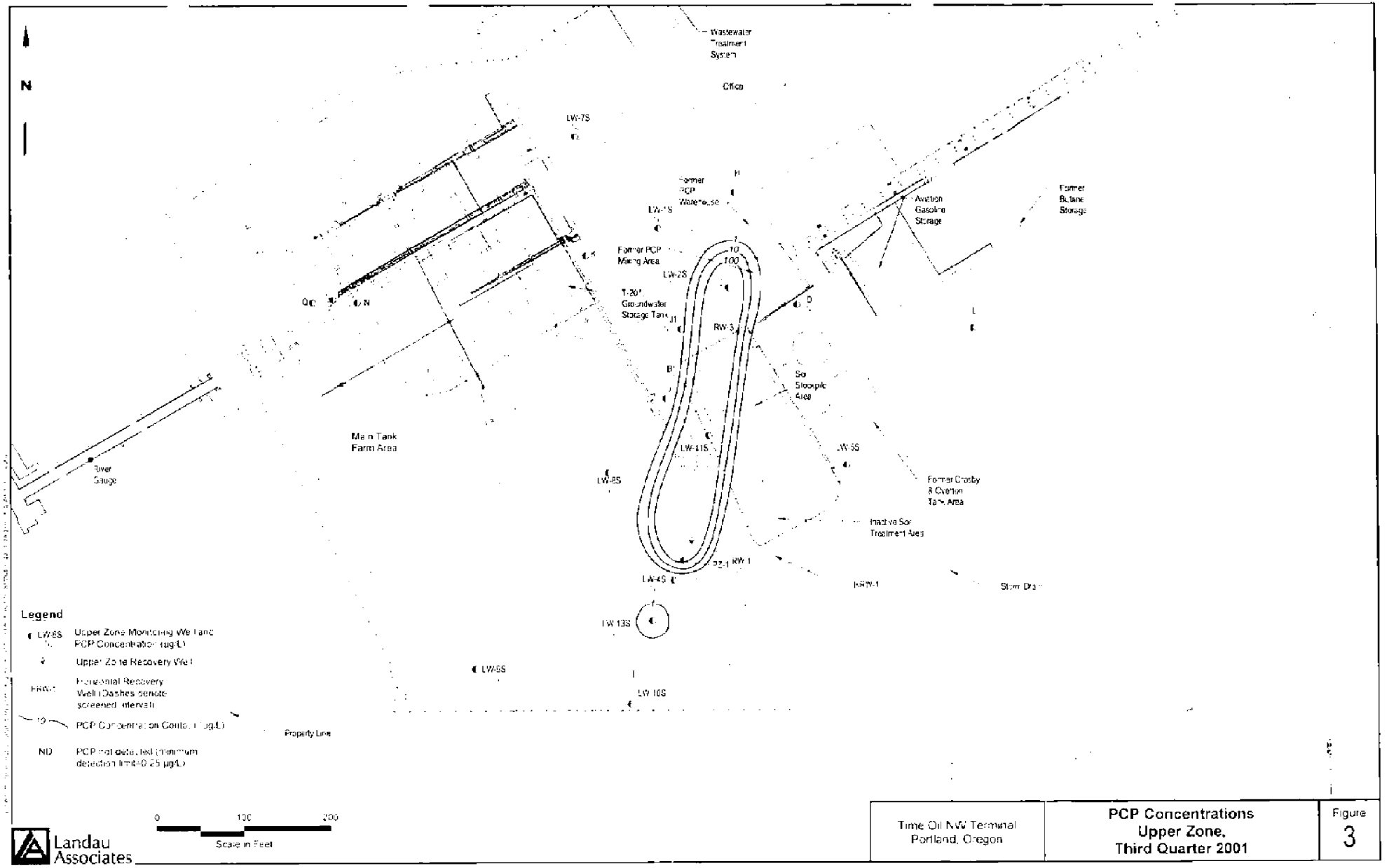

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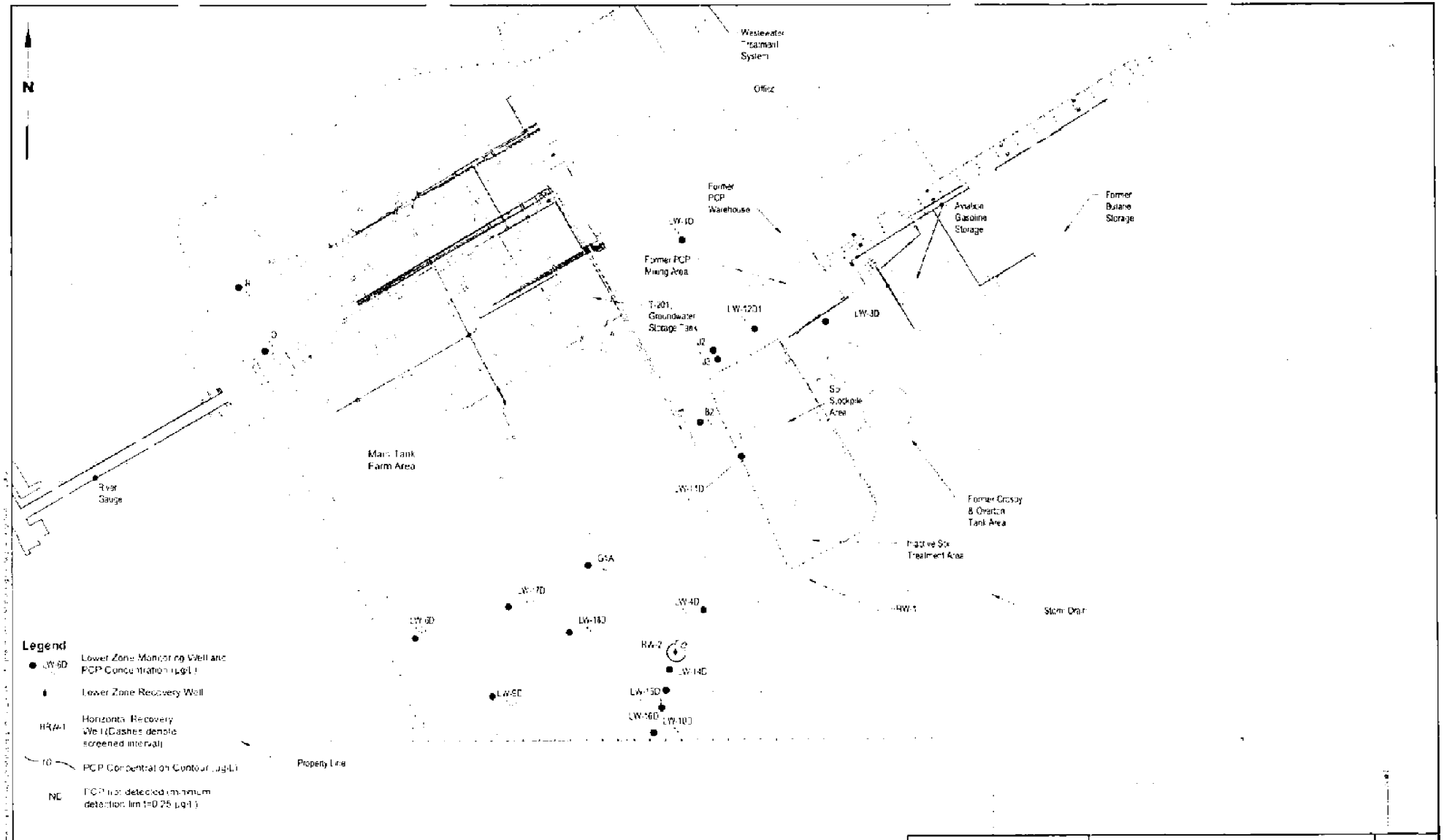

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Time Oil NW Terminal Portland, Oregon	PCP Concentrations Lower Zone, Third Quarter 2001	Figure 4

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Landau Associates
Environmental and Geotechnical Services

TRANSMITTAL

To: Beazer East, Inc.
One Oxford Centre, Suite 3000
Pittsburg, PA
15219-6401

Date: February 19, 2002

Attn: Mr. Mike Tischuk

Project No.: 231001.139

RE: **Time Oil Northwest Terminal**

Copies	Description
1	Executive Summary - Phase II RI Report
1	Well Location Map
1ea	PCP Concentration Contour Maps (11 maps)
1ea	Fourth Quarter 2001 Plots (10 plots)

Message:

The above-noted materials are provided for your review and input.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB:tam
[illegible] S:\PROJ\231\TRANSMIT FAX Beazer.doc
Enclosures

cc: Mr. Kevin Murphy, Time Oil Co.
Mr. Jim Mueller, URS Greiner

130 2nd Avenue S. Edmonds, WA 98020 (425) 778-0907 Fax (425) 778-6409

Landau Associates
Environmental and Geotechnical Services

MEMORANDUM

TO: Mike Tischuk, Beazer East, Inc.
Jim Mueller, URS Griener
Kevin Murphy, Time Oil Co.

FROM: Rebekah Brooks

DATE: February 19, 2002

RE: GROUNDWATER CONCENTRATION TRENDS
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Groundwater results collected during quarterly events at the Time Oil Northwest Terminal between April 1997 and November 2001 show variable trends and distribution in pentachlorophenol (PCP) concentrations between the upper zone (shallow wells) and the lower zone (deep wells). Enclosed maps showing the distribution of PCP in the upper zone and lower zone groundwater indicate that the distribution in the upper zone has stayed relatively consistent during this time; however, the magnitude of the PCP concentrations has generally decreased at all upper zone well locations, except LW-2S, which is located within the former PCP mixing area (source area). The distribution and magnitude of PCP in the lower zone has changed significantly during this time. PCP concentrations in the lower zone in 1999 were as high as 16,500 µg/L at well LW-4D with elevated concentrations at several other well locations within the lower zone. Also of note are low level concentrations that were detected in a deep sand unit well (unit underlies the lower zone) near the PCP mixing area. Only one well (LW-12D2) is drilled in this unit and no information is currently available on PCP concentrations in this unit at other locations at the terminal.

With time and the implementation of a groundwater interim action (i.e. pump and treat) at lower zone recovery well RW-2 in October 2000, PCP groundwater concentrations and the extent of PCP detections in the lower zone have decreased significantly. Implementation of an interim action within the upper zone at the horizontal recovery well (HRW-1) is planned within the next few weeks; however, because of the interconnection of the upper and lower zones, some contamination recovery in the upper zone may already be occurring.

PCP concentration contour maps for the upper zone are provided on Figures 2 through 7. PCP concentration contour maps for the lower zone are provided on Figures 8 through 12. Graphs providing concentration versus time and water level elevation or river stage information are provided on the enclosed EXCEL plots. Also enclosed is the executive summary from the Phase II Remedial

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Investigation Report (Landau Associates, April 2001) which provides a description of the hydrogeologic system at the Northwest Terminal.

2/19/02 S:\SHAREDOC\231\001\139\PCPdatamem.doc

EXECUTIVE SUMMARY

Between 1996 and 1999, Landau Associates conducted soil and groundwater studies for Time Oil Co. (Time Oil) at its Northwest Terminal in Portland, Oregon to assess the nature and extent of contamination resulting from a former pentachlorophenal (PCP) mixing operation and a former waste oil storage area. These studies, referred to as the Phase II Remedial Investigation (Phase II RI), followed a Phase I RI that addressed soil excavated in 1989 from the former PCP mixing area (the soil is currently stockpiled on a liner and under a cover just to the southwest of the former PCP mixing area). Both RI phases have been conducted with oversight by the Oregon Department of Environmental Quality (DEQ) and under the provisions of a voluntary cleanup program (VCP) agreement between Time Oil and DEQ, dated August 21, 1996. The information obtained in the Phase II RI will be used in an upcoming human health and ecological risk assessment and a subsequent feasibility study of potential remedial actions.

FACILITY DESCRIPTION

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility in the industrialized Rivergate area of north Portland, Oregon. Within the Northwest Terminal, two specific areas were the focus of the Phase II RI:

- **The former pentachlorophenol mixing area** where specialty wood treating products containing PCP in various formulations (typically with petroleum based carriers) were blended and stored for offsite shipment. The former PCP mixing area is located in the approximate center of the terminal and includes the former PCP warehouse and the area south of the warehouse (formerly occupied by various mixing and storage tanks and currently empty). From 1967 to 1984, PCP-containing products were formulated in and shipped from this area under an agreement with the Koppers Company. No PCP blending activities have occurred at the terminal since 1984.

- **The former Crosby & Overton tank area** located directly south of the former PCP mixing area where waste oils were stored between 1974 and 1989 in two aboveground storage tanks that were, during that time, leased to Crosby & Overton, Inc. Crosby & Overton reportedly provided services to collect and store waste oils from separators, oil slop tanks, ship tank cleaning, and related tasks. The tanks have since been removed from this area.

These areas are referenced together as the Phase II RI areas and/or Phase II RI source areas.

SCOPE OF THE PHASE II RI

Between 1984 and the commencement of the Phase II RI in 1996, several pre-RI environmental investigations were conducted by Time Oil at the Northwest Terminal to evaluate the potential for contamination associated with former operations at the terminal. Those investigations identified both soil and groundwater contaminated with PCP and other chemicals related to the former PCP mixing area, and PCBs and TPH related to the former Crosby & Overton tank area. Those investigations also led to

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interim remedial actions conducted by or for Time Oil between 1987 and 1989, including several soil removal efforts.

The scope of the Phase II RI was designed to fill data gaps that remained from the earlier environmental investigations and remedial actions. Those data gaps included the following:

- Hydrogeologic conditions:
  - the nature and lateral extent of the confining layer between the upper and lower water-bearing zones in and downgradient of the Phase II areas,
  - the predominant flow directions in each of the water-bearing zones, and the extent to which seasonal factors significantly influence groundwater flow at the site,
  - hydraulic connection between groundwater and the Willamette River and other surface water bodies within a 1-mile radius of the facility,
  - site-specific values for aquifer properties that influence contaminant transport rates,
- Nature and extent of contamination and contaminant fate and transport:
  - the lateral and vertical extent of contamination in unexcavated soil and in groundwater,
  - whether PCP is the primary constituent of concern of the former PCP mixing area, or whether carrier and additive chemicals used in the former mixing operations also are present in soil and/or water at concentrations of concern,
  - whether nonaqueous phase contamination exists,
- Contaminant exposure pathway issues:
  - current and future land use at the terminal and surrounding properties,
  - current and future use of groundwater at the terminal and surrounding properties, and
  - existing ecological conditions at the terminal and surrounding properties.

PHASE II RI ACTIVITIES

To fill the noted data gaps, the Phase II RI included the following primary investigative components:

- Soil Investigations: sampling and analyses of soil from 45 shallow soil borings and cone penetrometer test (CPT) explorations, 5 surface soil samples, 25 new shallow and deep monitoring and recovery well borings and 2 dust samples from the rafters of the former PCP warehouse.
- Groundwater Investigations: sampling and analyses of groundwater during an initial groundwater screening event in October 1996 from selected wells, drilling and installation of nine shallow and four deep monitoring wells in March 1997, sampling and analysis of

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groundwater using direct push methods during February 1998 and February through April 1999, drilling and installation of four shallow and five deep monitoring wells and two recovery wells (one shallow and one deep) during February through April 1999, quarterly water quality sampling and analyses between March 1997 and December 1999, aquifer testing in May through June 1999, and installation of a third recovery well in November 1999.

- Abandonment of five shallow wells and one well point.

- Land use and beneficial water use evaluations.

PHASE II RI RESULTS

The results of Phase II RI investigations are described below. Descriptions of the nature and extent of contamination in soil or groundwater at the terminal are focused on COPCs identified during the risk-based screening process.

Hydrogeologic Conditions

Four principal near-surface hydrogeologic units have been identified at the terminal, based on similar geologic soil types and hydrogeologic characteristics. In descending order from ground surface, these units include: an upper water-bearing zone, a confining unit, a lower water-bearing zone, and a deep sand unit. Depending on the continuity of the confining unit and silt layers separating the units, the hydrogeologic units can act as distinct aquifer units under unconfined conditions in the upper zone or under confined to semi-confined conditions in the lower zone, or act as a single unconfined aquifer (i.e., toward the Willamette River).

Upper Zone

- The upper zone is a discontinuous, unconfined aquifer in fill and river alluvial deposits, consisting predominantly of sand. Seasonal variability occurs in the upper zone water levels, and thus, the saturated thickness of the zone varies, with seasonal high water levels in the winter and spring and seasonal low water levels in the fall.

- Horizontal groundwater flow in the upper zone within the developed area of the terminal is generally consistently to the west-southwest toward the Willamette River; however, localized changes in the flow direction to the south-southwest occur in an area near and including the former PCP mixing area. On the east property, a localized change in the groundwater flow pattern occurs, such that the groundwater flow direction in this area appears to be approximately radial away from the north central property boundary. The groundwater flow direction in the upper zone does not appear to vary significantly seasonally.

- Average hydraulic conductivity estimates for the upper zone range from about 40 to 160 ft/day (including slug/bail test results) and the transmissivity is estimated to range from

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about 180 to 520 ft^2/day. Groundwater velocities in the upper zone are estimated to range between about 0.7 to 7 ft/day.

Confining Unit

A silt to sandy silt unit of variable thickness and areal extent separates the upper and lower water-bearing zones across most of the terminal, and appears to act as a confining or semi-confining layer for the lower water-bearing zone. The silt unit consists of material that is characteristic of natural river overbank deposits, is heterogeneous, and varies in thickness across the site from less than 1 ft to about 17 ft. The confining layer thins and terminates west and southwest near the Willamette River and to the north of the former PCP mixing area. Thinning of the confining unit also occurs in a lenticular area south of the former PCP mixing area. As a result, the upper and lower zones appear to be hydraulically connected, or the upper zone does not exist and the lower zone acts as an unconfined aquifer. Average vertical hydraulic conductivities of this unit range between 1.4×10^{-8} to 2.4×10^{-6} cm/sec.

Lower Zone

- The lower water-bearing zone occurs in interlayered river channel and overbank deposits and consists of sandy to silty sand with silt interlayers. The lower zone ranges in thickness from about 15 to 40 ft, depending on the continuity of underlying silt layers. Where underlying silt layers are continuous, the silt likely separates the lower zone from a deeper sand unit. Where the silt layers are discontinuous, the lower zone is hydraulically interconnected with the deeper sand unit.

- Groundwater flow in the lower zone is similar to that in the upper zone, with flow generally westerly toward the Willamette River. Groundwater flow directions in the lower zone change in response to short-term fluctuations in Willamette River stage.

- Seasonal lows in the lower zone generally occur during the fall, and seasonal highs most commonly occur during the spring in response to higher river stage.

- Average hydraulic conductivity estimates for the lower zone range from 25 to 130 ft/day (including slug/bail test results) and are comparable to those of the upper zone; however, transmissivities, ranging from about 2,100 to 4,100 ft^2/day, are higher than in those in the upper zone. Groundwater velocities in the lower zone are estimated to range from 0.05 to 1.4 ft/day.

- Leakage between the upper and lower zones appears to occur; vertical gradients appear to be consistently downward from the upper to the lower zone varying seasonally in magnitude.

Deep Sand Unit

A deep sand unit is encountered at the terminal at about 60 to 65 ft BGS. The unit is differentiated from the overlying sand and silt of the lower zone because it predominantly consists of fine to medium sand with low silt content. The deep sand unit extends to at least 100 ft BGS, but the full extent of the unit is unknown based on data collected to date.

Nature and Extent of Contamination: Soil

- PCP was the contaminant of potential concern (COPC) detected at the most elevated concentrations [up to 500 parts per million (ppm)] in soil. The highest concentrations occurred most frequently in the former PCP mixing area at depths near the water table [about 12 to 13 ft below ground surface (BGS)] and in surface soil adjacent to the sump located at the northwest corner of the existing soil stockpile. Elevated PCP concentrations (up to 16 ppm at the surface and up to 25 ppm near the water table) were also found at the edge of the former Crosby & Overton area closest to the former PCP mixing area.

- Polynuclear aromatic hydrocarbons (PAHs) were detected predominantly in surface soil (0 to 6 inches BGS) in the former Crosby & Overton area, with concentrations of carcinogenic constituents up to 27 ppm [benzo(a)pyrene and chrysene] and noncarcinogenic constituents up to 67 ppm (pyrene). The occurrence of these constituents predominantly in the former Crosby & Overton area appears to result from waste oil releases that occurred historically in that area.

- Low level PCB concentrations (up to about 16 ppm) were detected in surface soil in the former Crosby & Overton area and, as with elevated concentrations of carcinogenic PAHs, appears to result from historical waste oil handling in that area.

- Chromium and selenium, priority pollutant metals identified as COPCs, were detected in soil at concentrations up to 53 ppm at depths between ground surface to near the water table, in and adjacent to the former Crosby & Overton area and at two of the surface soil locations on the north side of the former PCP warehouse.

- Dioxins/furans were detected in soil at concentrations (as total TEQ) up to 5.1 parts per billion (ppb), with the higher concentrations occurring where PCP concentrations were also elevated (at depths near the water table in and adjacent to the former PCP mixing area).

- Diesel-range hydrocarbons (which include mineral spirits) were detected in soil at concentrations up to 5,100 ppm, with the most elevated levels occurring in surface soil in the former Crosby & Overton area and near the water table in and in close proximity to the former PCP mixing area.

- No nonaqueous phase liquid (NAPL) [including dense NAPL (DNAPL)] was directly observed in the soil during the Phase II RI. However, slight to strong hydrocarbon- and solvent-type odors and sheens were observed in soil mainly collected from depths ranging from the ground surface to the top of the silt confining layer in areas within and downgradient of the former PCP mixing area. At the CPT locations where an ultraviolet light was used to check for the presence of NAPL in soil, fluorescence was detected at two locations within or in close proximity to the main tank farm. The fluorescence response was likely related to terminal petroleum storage operations. Any contamination related to the main tank farm area will be investigated during the Phase III RI.

Nature and Extent of Contamination: Groundwater

- PCP in the upper zone groundwater extends in a narrow plume from the former PCP mixing area source area southwestward to its most downgradient extent, approximately 350 ft from

the source area (at LW-4S). The eastern and western boundaries of the plume and the downgradient edge of the plume are defined by nondetected PCP concentrations at monitoring locations bordering the plume.

- Well LW-11S contained the maximum concentration of PCP observed in an upper zone well (24,000 ppb in May 1999). At well LW-4S, the most downgradient well where PCP has been detected, PCP concentrations of less than 10 ppb have generally been observed.

- PCP in the lower zone groundwater consists of several discrete areas of contamination located below areas within the upper zone plume alignment where downward migration from the upper to lower zones appears to have occurred. The easternmost and westernmost extent of PCP migration in the lower zone are defined by nondetected concentrations at monitoring locations bordering the areas.

- The highest concentrations of PCP in the lower zone (and until the May 1999 event, in both water-bearing zones) occurred in well LW-4D at concentrations ranging from 0.6 to 18,000 ppb. In May 1999, PCP concentrations at this well decreased significantly to about 7 ppb and have remained below 5 ppb since then. In the PCP mixing area, PCP concentrations up to 110 ppb were observed at well LW-12D1.

- PCP was detected in the deep sand unit underlying the lower zone at up to 210 ppb at CPT-2 and up to about 4 ppb at LW-12D2, the only two locations that monitor this unit.

- The other chlorinated phenol compound identified as a COPC (2,4,6-trichlorophenol), occurred in the lower zone at concentrations ranging from 0.25 to 20 ppb, with the maximum concentration occurring at well LW-4D in November 1998.

- Volatile organic compounds (VOCs) identified as COPCs were observed at concentrations up to 4,000 ppb in the upper zone mainly within and downgradient of the former PCP mixing area. VOC concentrations up to 1,100 ppb occurred in lower zone wells within the main tank farm area and mainly within and downgradient of the former PCP mixing area. Benzene and toluene concentrations observed in the lower zone in the main tank farm area (up to about 1,000 ppb) are not likely associated with activities in the Phase II RI areas because of the lack of elevated concentrations of these compounds in the Phase II RI source areas.

- Naphthalene and 2-methylnaphthalene were the only PAH compounds that were detected consistently in upper and lower zone wells. Concentrations in both zones were usually below 100 ppb. The occurrence of naphthalene in upper zone groundwater does not appear to be completely associated with elevated PCP concentrations; the presence of 2-methylnaphthalene appears to be related to the presence of naphthalene. The correlation between naphthalene and PCP in the lower zone is indeterminate. Naphthalene and 2-methylnaphthalene are common components of mineral spirits; detections of these compounds were commonly observed with detections of diesel-range hydrocarbons (including mineral spirits).

- Chromium and lead, priority pollutant metals identified as COPCs, were detected in groundwater in the upper and lower zones at concentrations up to 0.164. Maximum concentrations in the upper zone were observed at wells F and LW-5S; maximum concentrations in the lower zone were observed at well LW-3D.

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- The highest dioxin/furan concentrations (as total TEQ) occurred in the upper zone at LW-2S [up to 1,890 parts per quadrillion (ppq)] where PCP concentrations were also elevated in the upper zone. In the lower zone, dioxins/furans were detected at concentrations up to about 7 ppq (TEQ) at wells LW-4D and LW-6D.

- Diesel-range hydrocarbons (with a pattern typically lying between mineral spirits and diesel) were detected mainly within and downgradient of the former PCP mixing area in both water-bearing zones with concentrations up to 15 ppm. Low level gasoline-range hydrocarbons also were detected in both zones at concentrations up to 10 ppm.

- PCBs were not detected in groundwater where analyzed (i.e., at wells D and LW-5S located in the former Crosby & Overton area).

- Bis(2-ethylhexyl)phthalate, a semivolatile compound retained as a COPC, was detected in the upper zone at concentrations up to 12 ppb and in the lower zone up to about 20 ppb.

- Light NAPL (LNAPL) was only observed in wells N, P, and Q located in the main tank farm area during the Phase II RI. Product thicknesses have ranged from less than 0.01 ft to 1.2 ft with strong petroleum hydrocarbon odors. The product was removed from the wells by bailing on a periodic basis, when sufficient volumes had accumulated. Because these wells are located in an area where a release of unleaded gasoline occurred in 1994, the presence of LNAPL in this area is not considered to be related to historical activities in the Phase II RI source areas. Contamination related to the main tank farm area will be investigated during the Phase III RI.

Contaminant Fate and Transport: Soil

Contamination of soil in the Phase II areas is a result of the release of hazardous substances directly onto the soil in the former PCP mixing area during PCP formulation activities and in the former Crosby & Overton tank farm area during lease operations and subsequent migration. The majority of the contaminated soil in the former PCP mixing area was believed to be excavated in 1989 and placed on the soil stockpile, but residual amounts still remain at depth in this area. Soil contamination has been identified at depths exceeding 12 ft BGS (the approximate water table) within and directly adjacent to the mixing area. Surface soil contamination is limited to small, localized areas, but occurs in areas directly south of the mixing area.

Contaminant Fate and Transport: Groundwater

Elevated levels of PCP in the upper and lower zone groundwater at the terminal indicate that PCP has partitioned from the soil and/or NAPL into the groundwater. PCP has been observed in groundwater in both zones in and to the south and southwest (downgradient) of the former PCP mixing area. Low PCP concentrations were also detected within the deep sand unit within the former PCP mixing area. The available data suggest that the primary source of the groundwater contamination in the upper zone results from partitioning of PCP from the residual amounts remaining in the soil within and adjacent to the

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former PCP mixing area and subsequent advective migration from this area. PCP in the lower zone likely results from downward migration of PCP via groundwater from the upper to the lower zone where the silt layer separating the upper and lower zone is heterogeneous and/or discontinuous. No DNAPL were encountered during any investigation. Therefore, downward migration across the confining unit likely occurs under a natural downward gradient at several locations along the upper zone plume alignment where elevated concentrations in the lower zone are observed (depending on how circuitous the route is between the upper and lower zones). Under this scenario, the PCP concentration distribution within the lower zone would appear to mimic that of the upper zone, while mean groundwater flow in the lower zone would still be toward the river. Further migration of dissolved PCP in the lower zone groundwater would be primarily controlled by advective groundwater flow in a downgradient direction from the impacted areas.

Historically and currently, the PCP in the upper zone is limited to a narrow plume that extends from the former PCP mixing area downgradient approximately 350 ft. PCP concentrations in the upper zone are most elevated within and just downgradient of former PCP mixing area, the identified source area for PCP. PCP has migrated in a downgradient direction toward the south-southwest, but not as far as the south property boundary.

Groundwater contamination in the lower zone consists of several discrete areas of PCP contamination, including one area below the former PCP mixing area and two areas below the upper zone PCP plume alignment. The highest PCP concentrations in groundwater in the lower zone were detected at a well (LW-4D) located approximately 350 ft south of the PCP mixing area in October 1997. By December 1999, the PCP concentration at that well had decreased an order of magnitude. As in the upper zone, PCP has not been detected at downgradient lower zone monitoring locations at the south property boundary or near the Willamette River. The lack of PCP detections in these areas may be related to natural mixing of river and groundwater within the river bank, (particularly in the lower zone where the river tidal influence is greatest), natural attenuation of the PCP (through adsorption, biodegradation, etc.), a possible slow rate of advection, or a combination of these mechanisms.

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Contaminant Exposure Pathway Issues

A land use evaluation conducted as part of the Phase II RI identified the historical and current land use at the terminal and the adjacent properties as primarily industrial (with a preference for river-dependent and river-related industries, enhanced reparian habitat and public access) with some commercial use. The evaluation identified that the likely reasonable future land use in this area would likely not change.

A beneficial water use evaluation for the terminal, adjacent properties, and within a 1-mile radius of the terminal indicated that the current and likely future beneficial uses of groundwater and surface water in these areas is primarily industrial, with some irrigation use, and that changes to the use of water in this area are unlikely in the future.

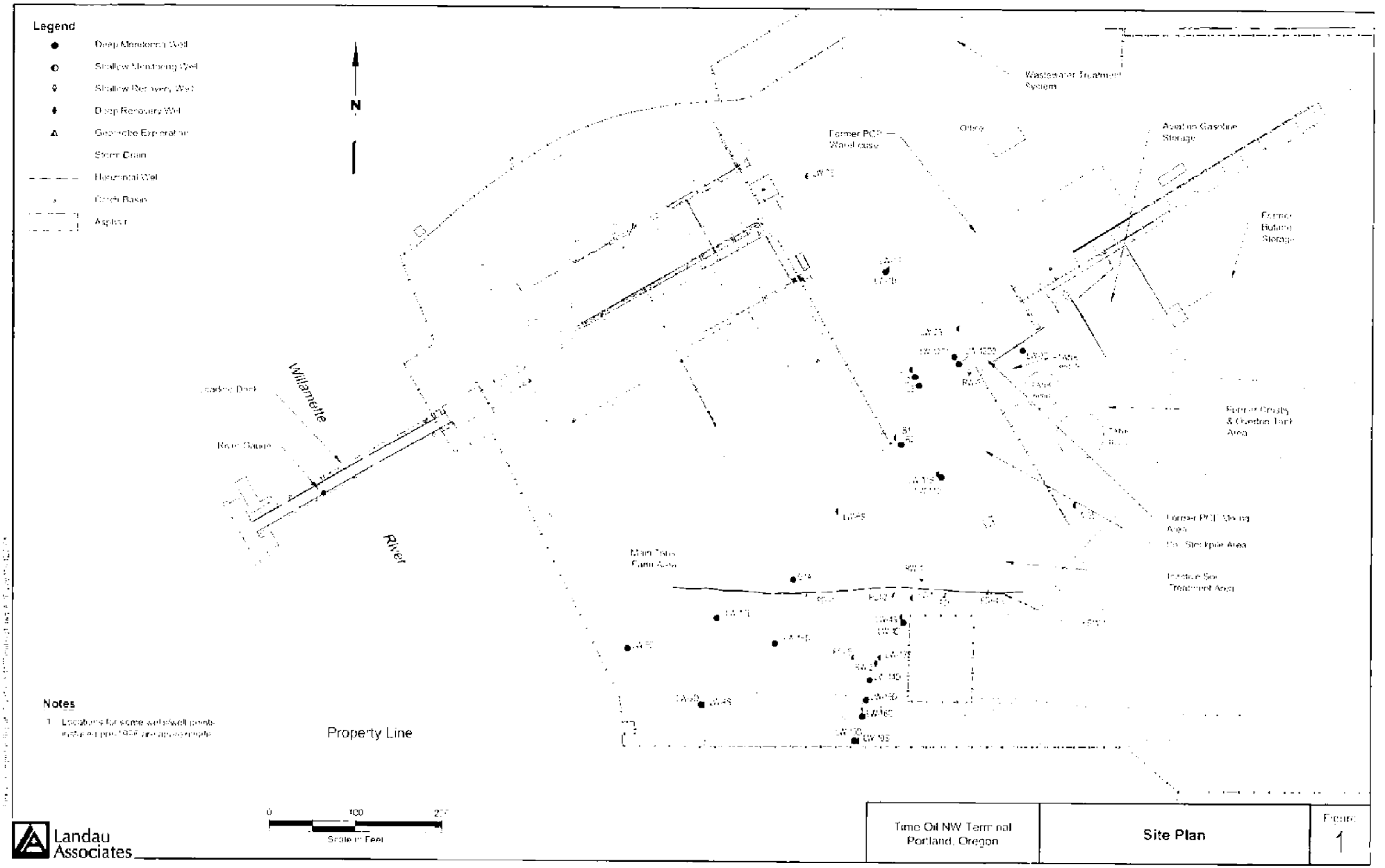
Surface water bodies (e.g., wetlands) on the east property and the adjacent property to the north do not provide exposure pathways to human or ecological receptors from the Phase II RI areas. The groundwater to surface water pathway will be addressed during Phase III RI. The locality of facility will be defined following evaluation of the Phase III data. The locality of facility is not expected to extend beyond the areas included in the land use and beneficial water use evaluations.

RECOMMENDATIONS RESULTING FROM THE PHASE II RI

The Phase II RI focused primarily on addressing data gaps identified in the review of information from previous investigations and those identified during implementation of the RI. While the Phase II RI has adequately addressed those specific data gaps, additional activities are recommended to address current contamination at the terminal before implementation of a final remedial action, and to complete the VCP agreement with DEQ. The recommended future activities include the following:

- A groundwater interim action at the downgradient edges of the PCP plumes in the upper and lower zones (currently in progress)
- Phase III RI/FS
- Supplemental soil sampling of the zone of groundwater fluctuation within the former PCP mixing area
- Stormwater sampling within the storm drain line near the horizontal well
- Human health and ecological risk assessments
- Feasibility study.

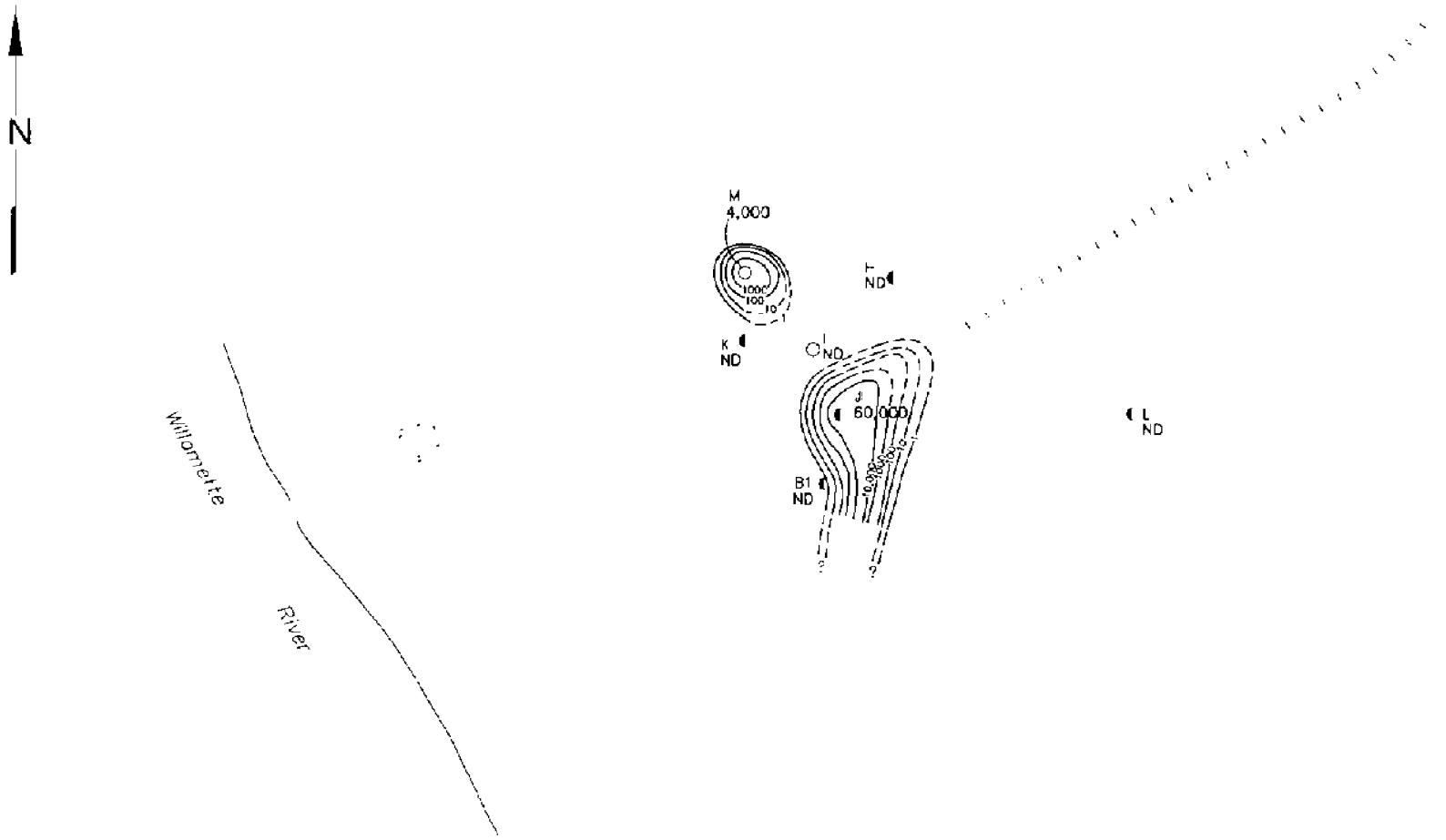
These activities are discussed in more detail in the text of the RI.



Landau Associates

Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 1

BZTO104(e)016566



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.

Legend

B1 ND ◖ Well Point Location, identification and PCP Concentration (in µg/L)

○ Current Abandoned Well

PCP Concentration Contour (in µg/L)

ND Not detected at method reporting limit (0.25 µg/L)

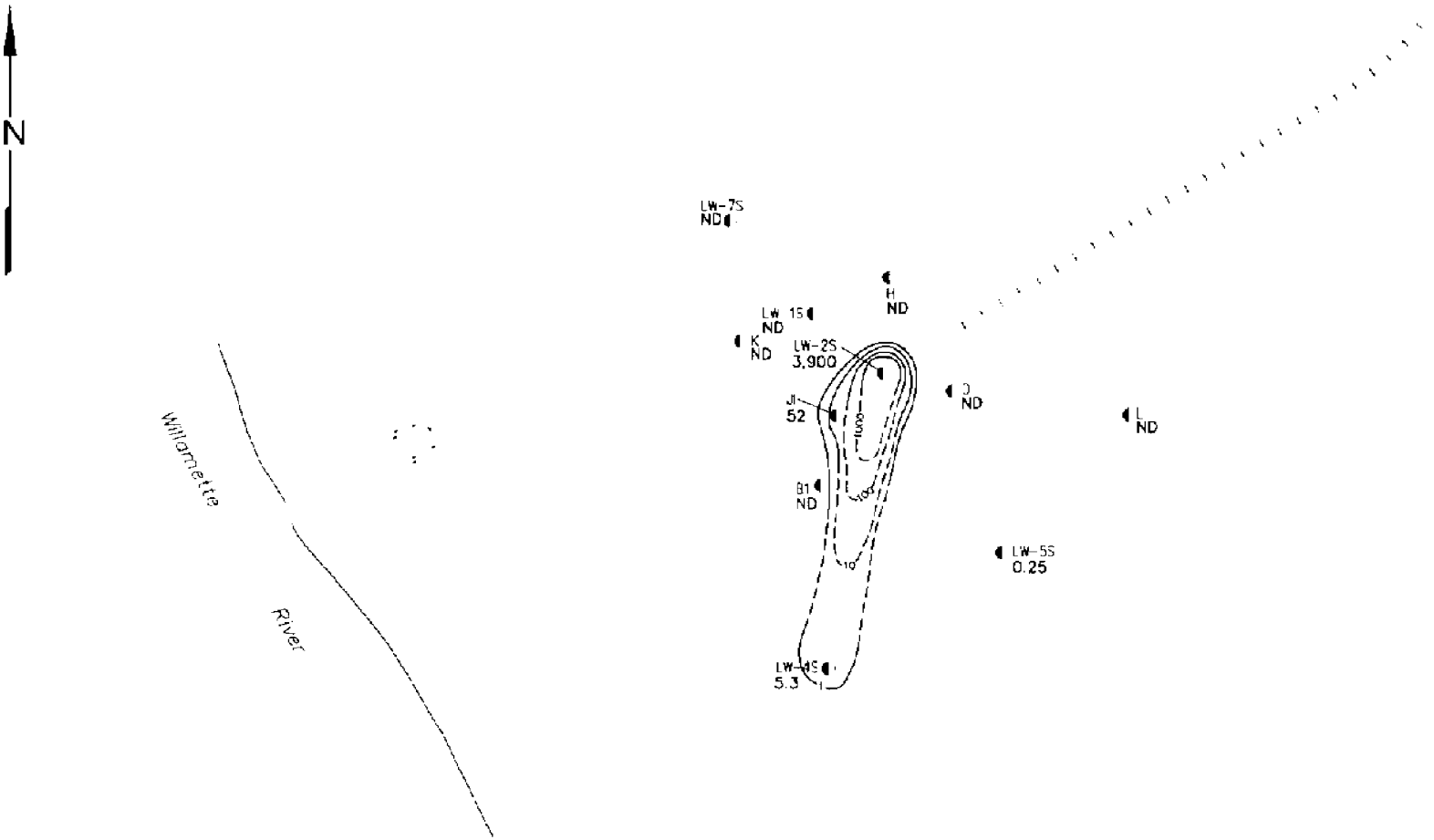
0 200 400
Scale in Feet

Landau Associates

Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Upper Zone, February 1991

Figure 48



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.

Legend

LW-4S ND — Shallow Monitoring Well Location, Identification, and PCP Concentration (in µg/L)

PCP Concentration Contour (in µg/L)

ND — Not detected at method reporting limit (0.25 µg/L)

0 200 400
Scale in Feet

Landau Associates

Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Upper Zone, March-April 1997

Figure 49

Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.
3. PCP concentration for well F is from the August 1998 sampling event. Because of its location, this well has only been sampled once.

Legend

LW-1D ND — Shallow Monitoring Well Location, Identification, and PCP Concentration (in µg/L)

PCP Concentration Contour (in µg/L)

ND — Not detected at method reporting limit (0.25 µg/L)

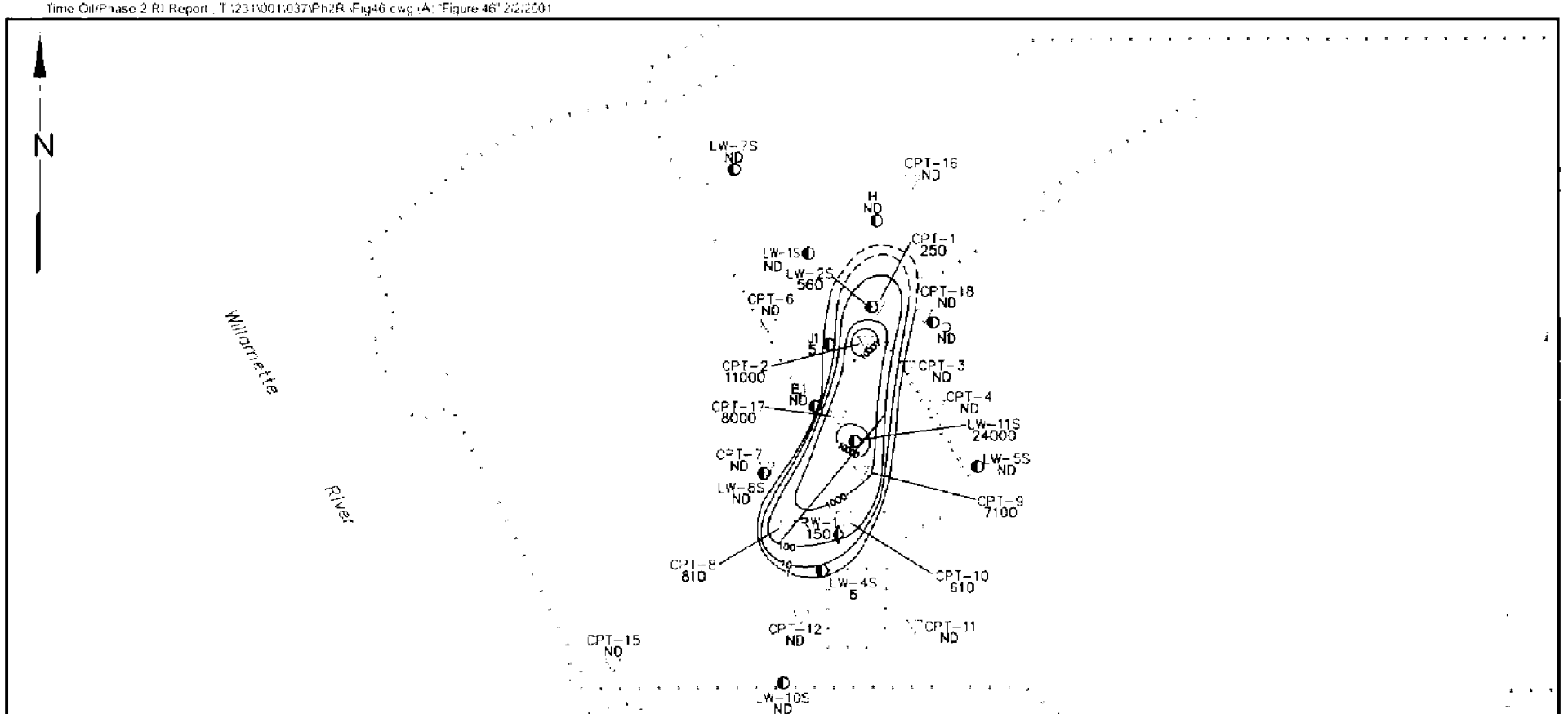
0 200 400
Scale in Feet

Landau Associates

Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Upper Zone, January 1998

Figure 50



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.

2. See appendices for definition of data validation qualifiers and complete set of data.

Legend

CPT-1 250 — CPT Exploration Location, Indentification, and PCP Concentration (in µg/L) (March 1999)

LW-1S ND — Monitoring Well Location, Identification, and PCP Concentration (in µg/L) (May 1999)

PCP Concentration Contour (in µg/L)

ND — Not detected at method reporting limit (0.25 µg/L)

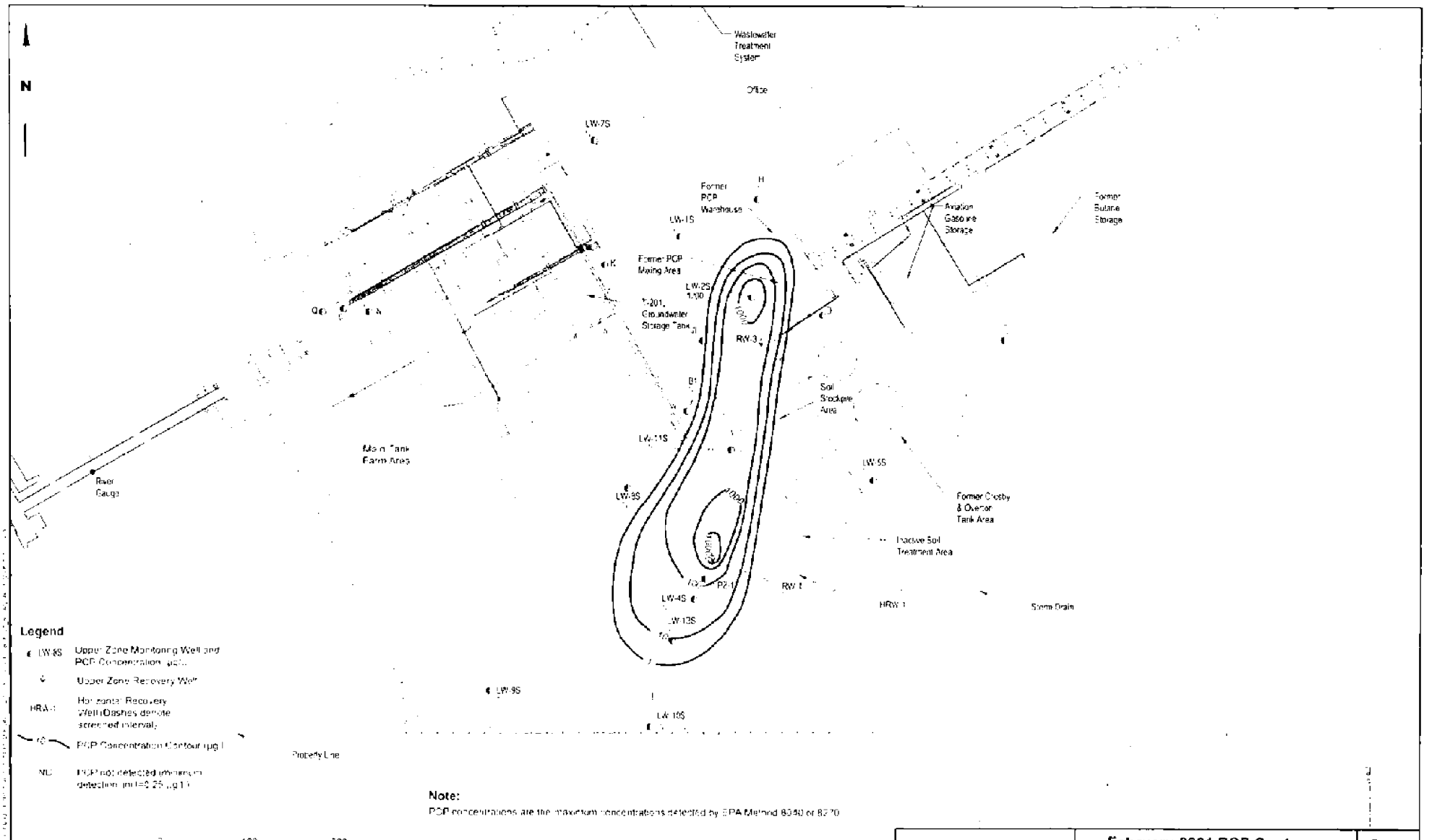
0 200 400
Scale in Feet

Landau Associates

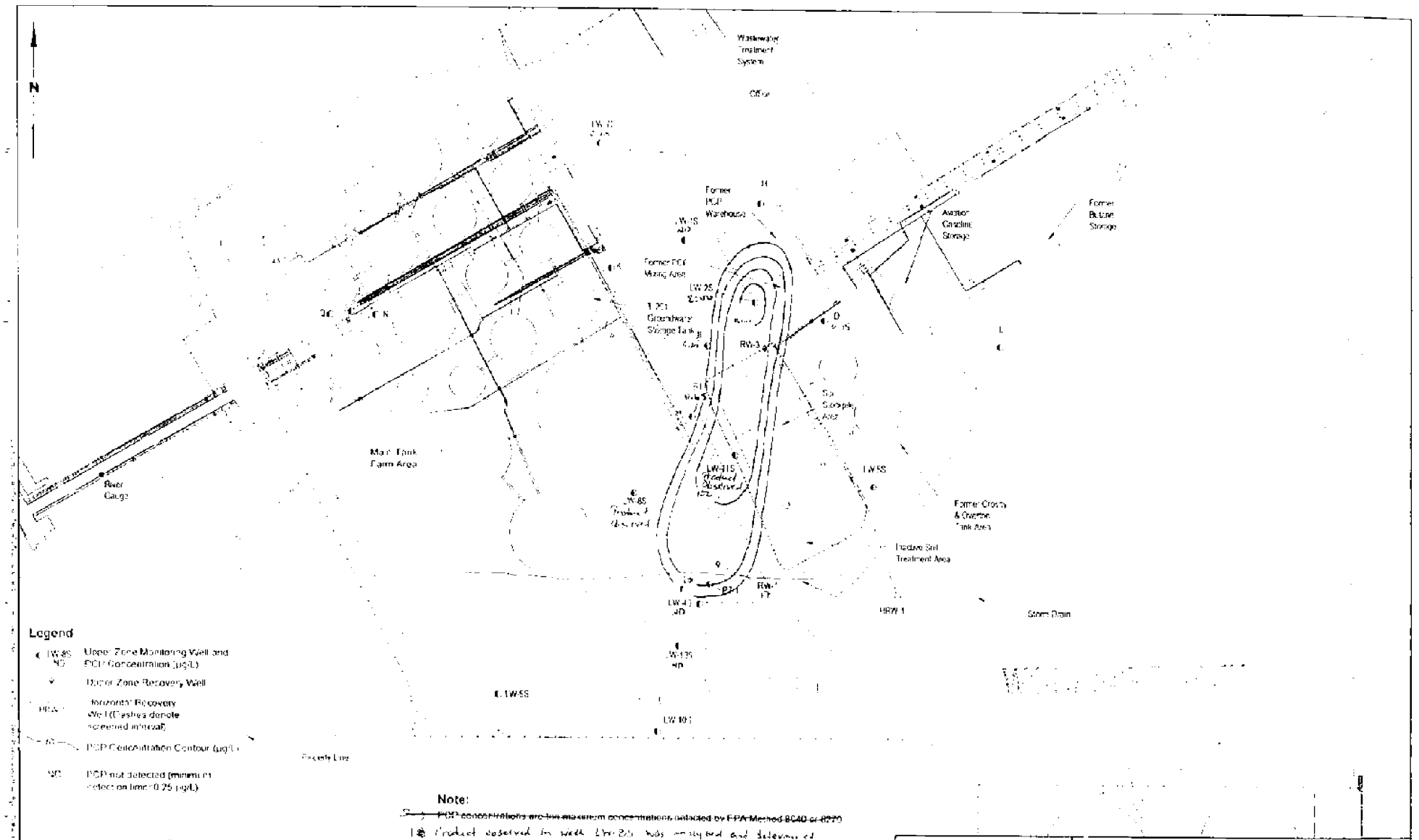
Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Upper Zone, Spring 1999

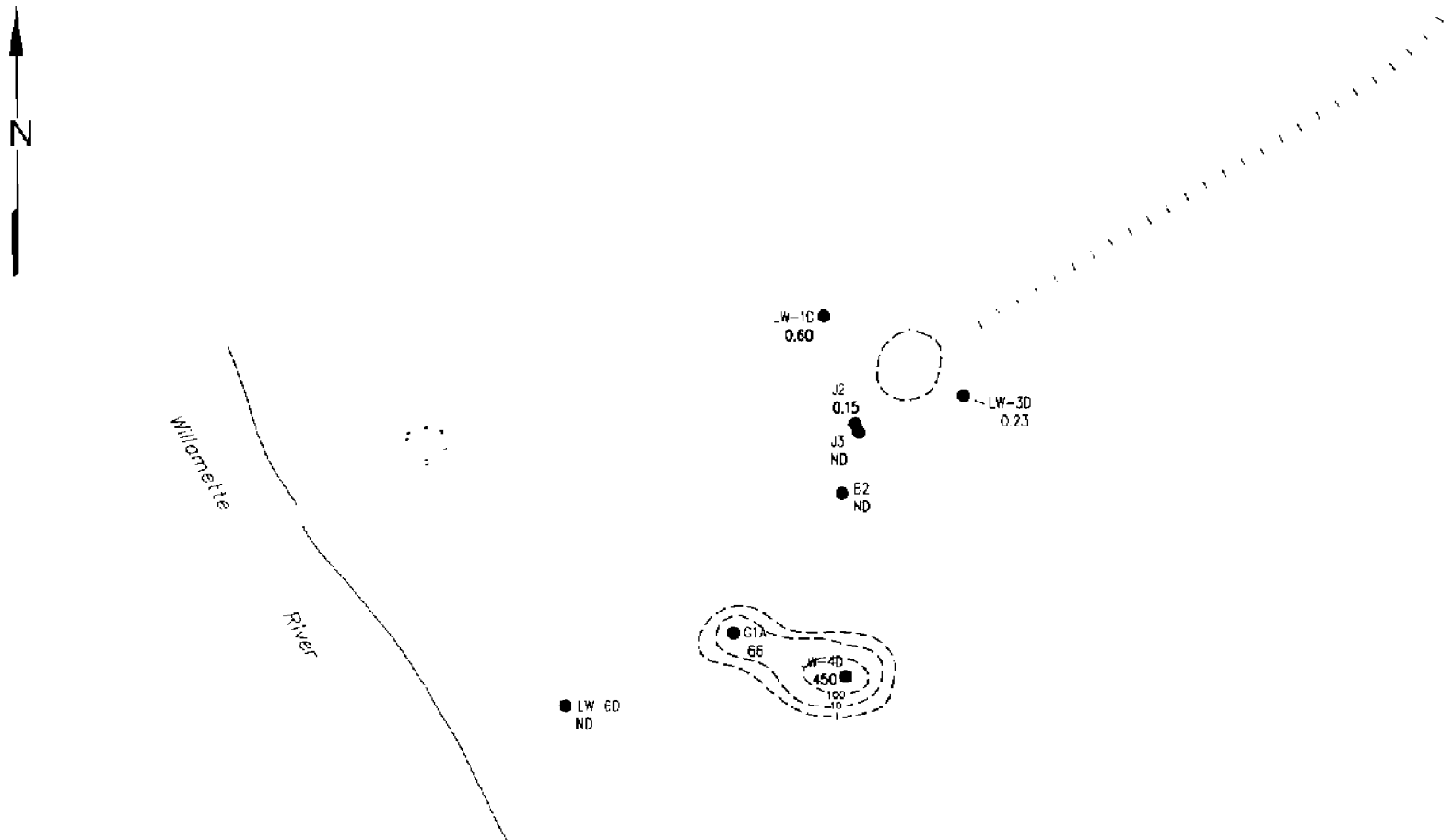
Figure 46



BZTO104(e)016571



BZTO104(e)016572



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.

Legend

LW-6D ND ● Monitoring Well Location, Identification, and PCP Concentration (in µg/L)

PCP Concentration Contour (in µg/L)

ND Not detected at method reporting limit (0.25 µg/L)

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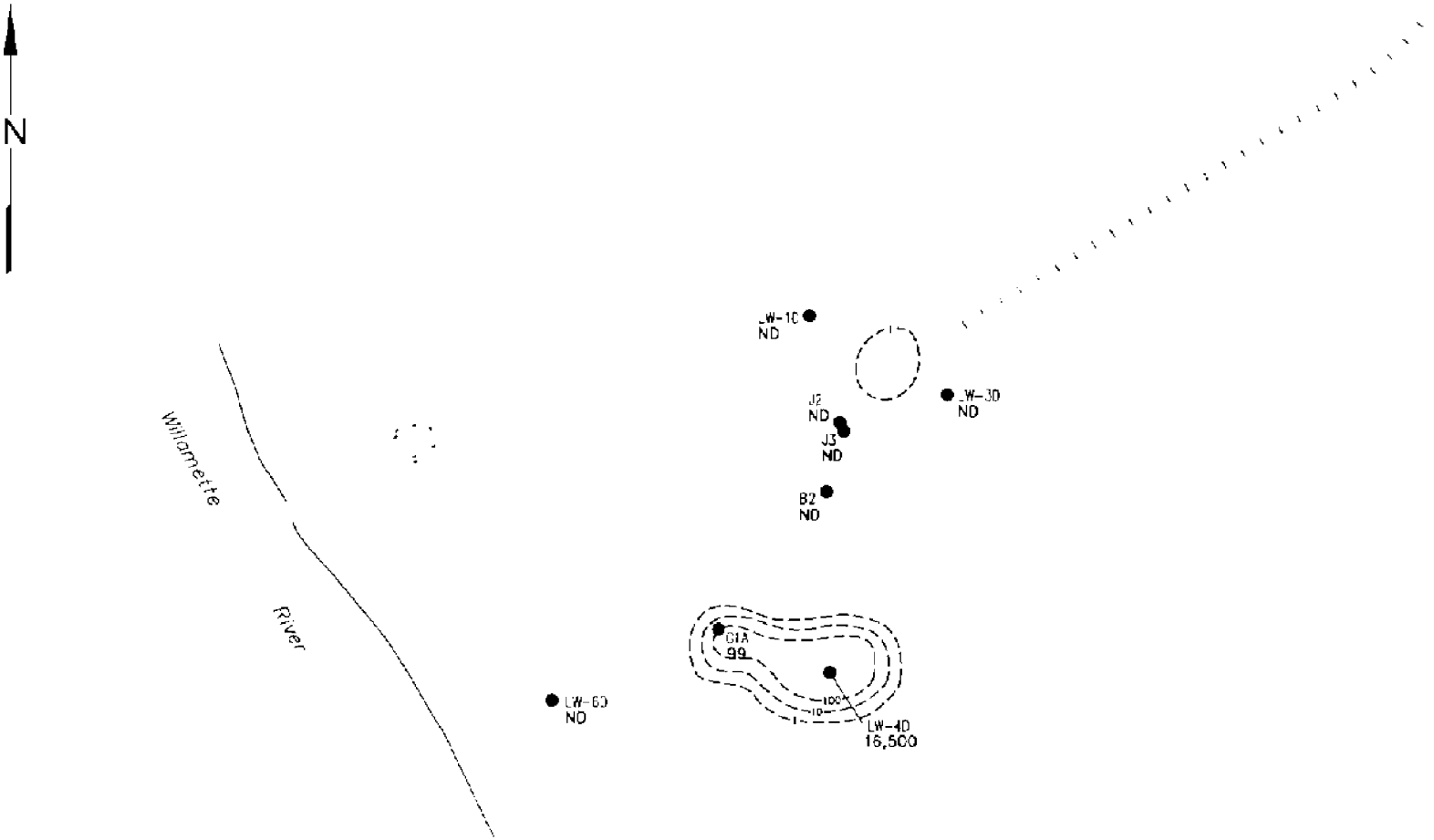
0 200 400
Scale in Feet

Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Lower Zone, March-April 1997

Figure 51



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.

Legend

LW-1D ND ● Deep Monitoring Well Location, Identification, and PCP Concentration (in µg/L)

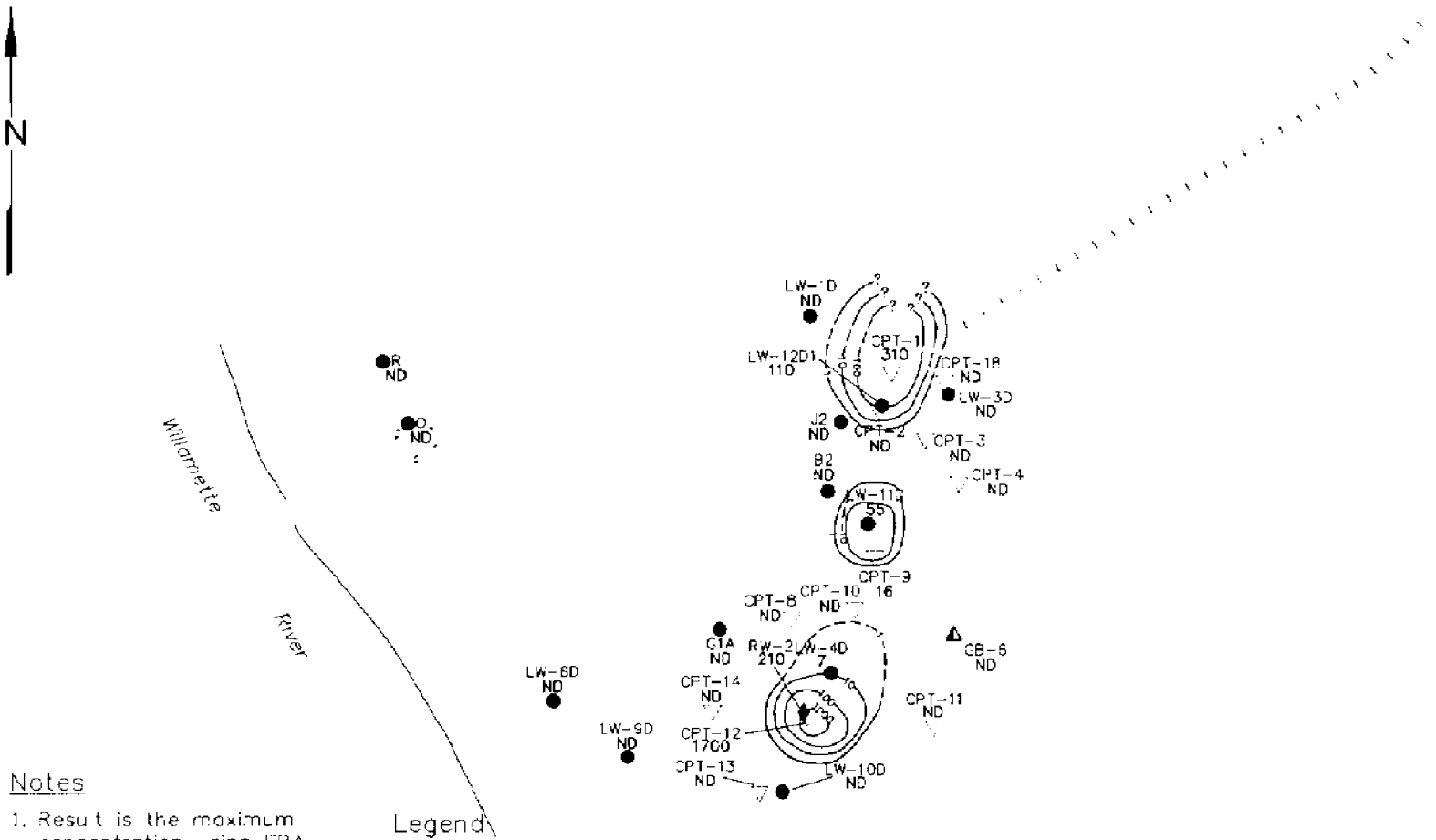
PCP Concentration Contour (in µg/L)

ND Not detected at method reporting limit (0.25 µg/L)

0 200 400
Scale in Feet

Landau Associates

Time Oil NW Terminal Portland, Oregon	**PCP Groundwater Concentrations Lower Zone, January 1998**	Figure 52



Notes

1. Result is the maximum concentration using EPA methods 8270 and 8040 or any duplicate sample results.
2. See appendices for definition of data validation qualifiers and complete set of data.
3. Monitoring well and CPT exploration results from May 1999 and March 1999, respectively. Geoprobe result (GB-6) from January 1998.

Legend

- ● Monitoring Well
- CPT Exploration
- ▲ Geoprobe Exploration
- RW-2 / 210 — Location Identifier / PCP Concentration (µg/L)
- PCP Concentration Contour (in ug/L)
- ND — Not detected at method reporting limit (0.25 µg/L)

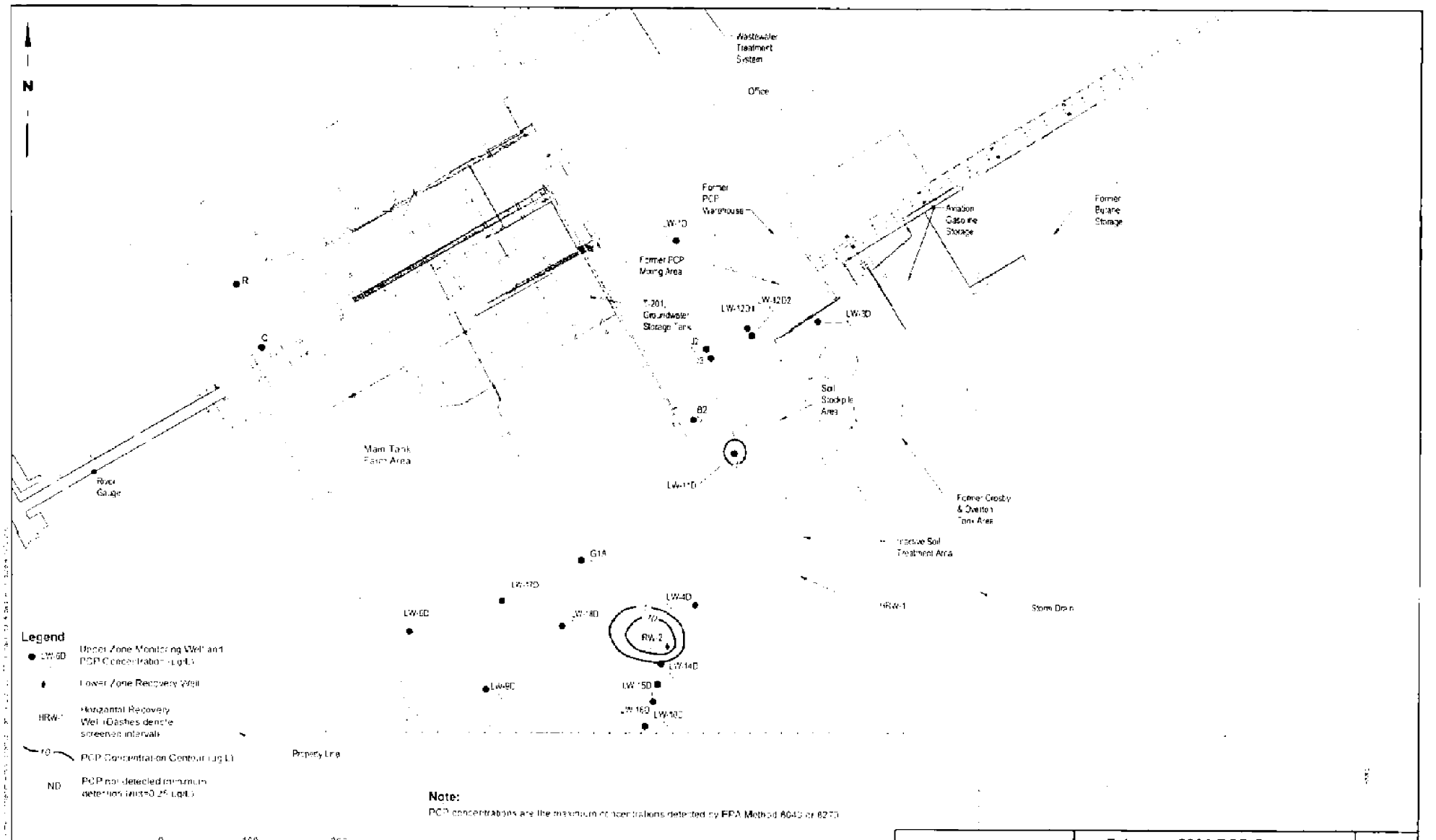
Landau Associates

0 200 400
Scale in Feet

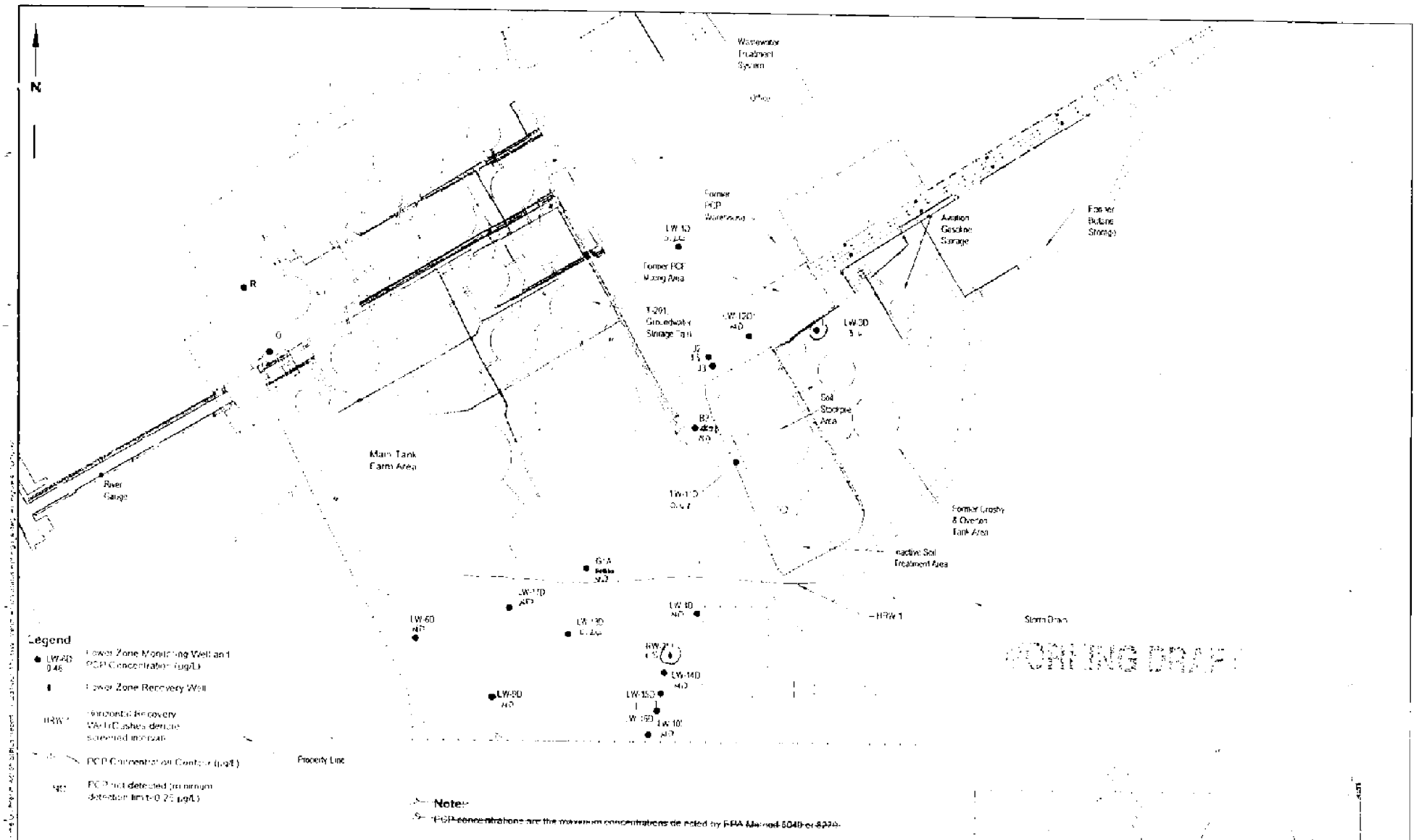
Time Oil NW Terminal
Portland, Oregon

PCP Groundwater Concentrations Lower Zone, Spring 1999

Figure 47



BZTO104(e)016576



WORKING DRAFT

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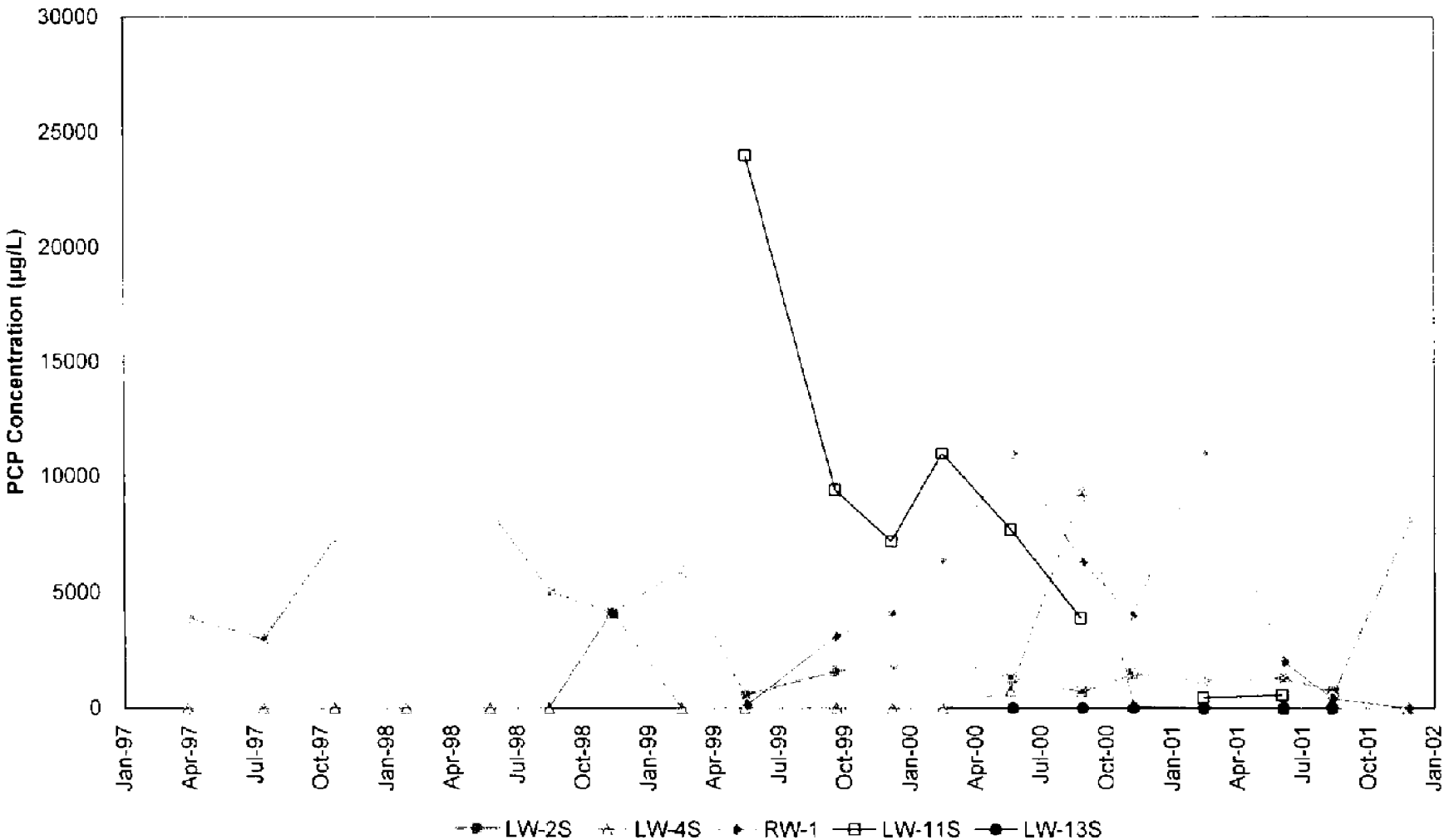
WELLS LW-2S, LW-4S, RW-1, LW-11S, and LW-13s
PCP



2/19/02 s:\sheets\timeoil\ph2n\PLOTS2001 PCP vs. Time-Shallow

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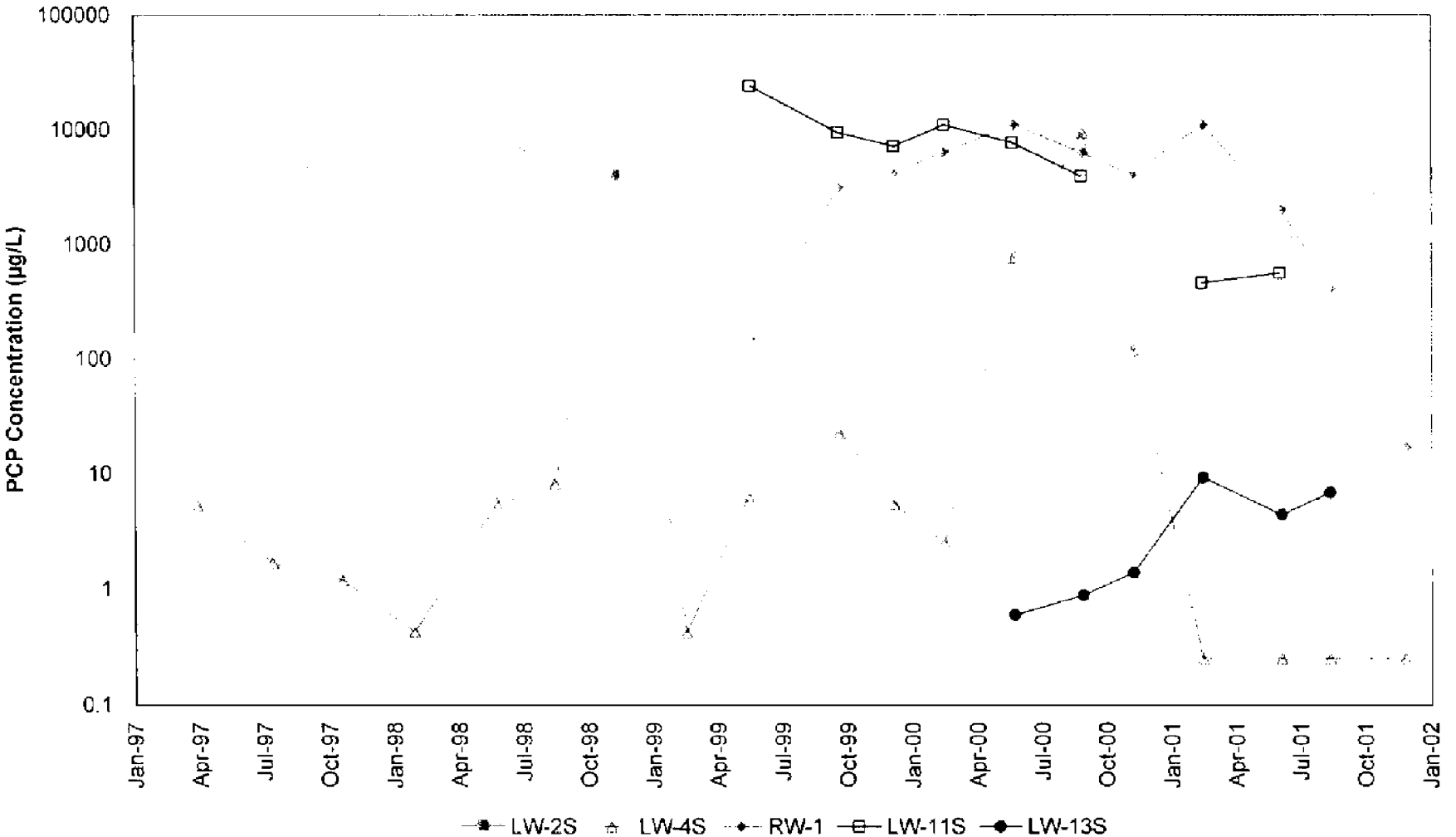
WELLS LW-2S, LW-4S, RW-1, LW-11S, and LW-13s
PCP



2/19/02 s:\sheets\timeo\l\ph2ri\PLOTS2001 Log PCP vs. Time-Shallow

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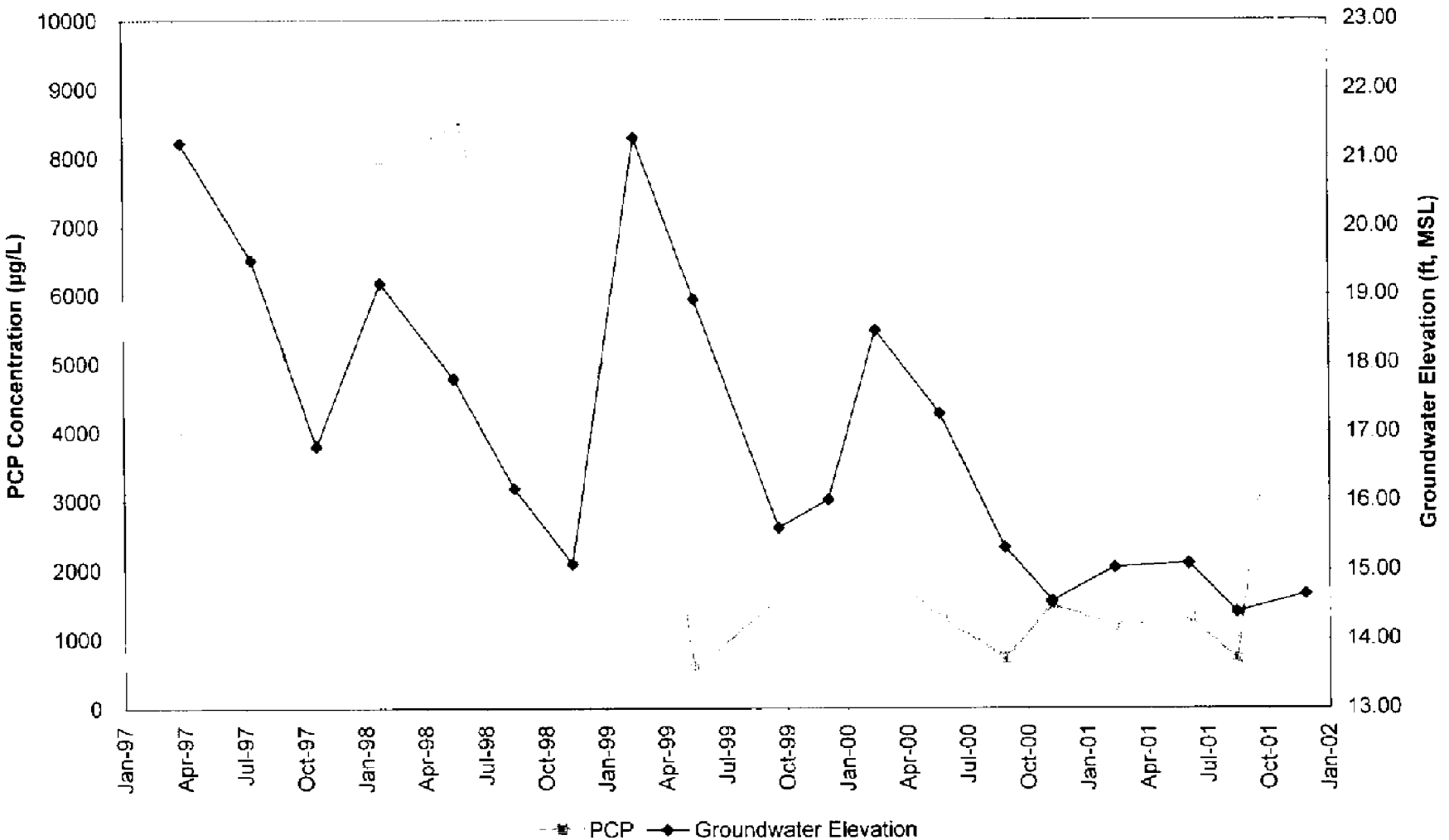
LW-2S
PCP Concentrations and Groundwater Elevations



2/19/02 s:\sheets\timeoil\ph2ri\PLOTS2001 LW2S PCP-WL

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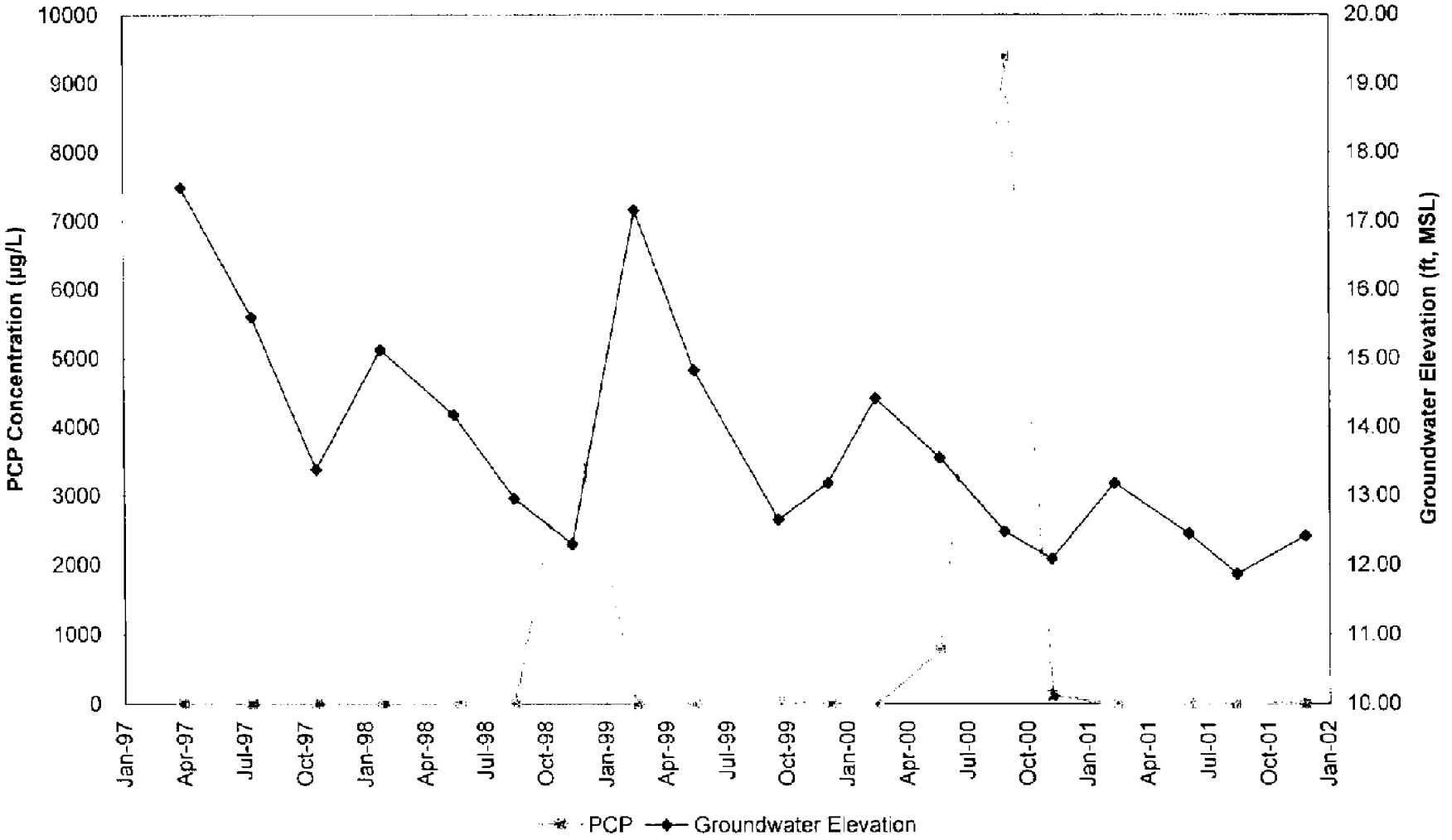
BZTO104(e)016580

LW-4S
PCP Concentrations and Groundwater Elevations



2/19/02 s:\sheets\timeol\ph2rl\PLOTS2001 LW4S PCP-WL

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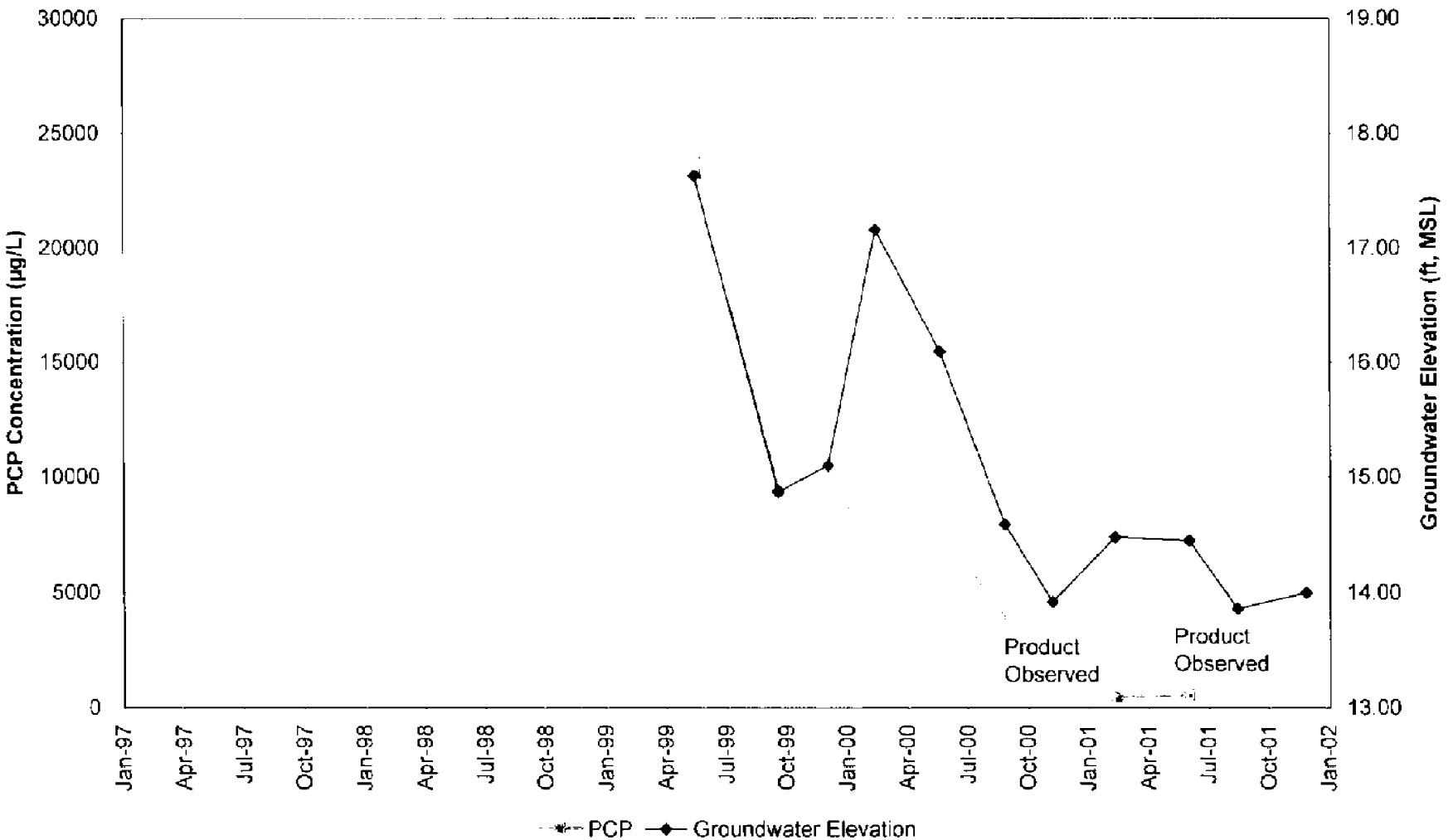
LW-11S
PCP Concentrations and Groundwater Elevations



2/19/02 s:\sheets\timeoil\ph2ri\PLOTS2001 LW11S PCP-WL

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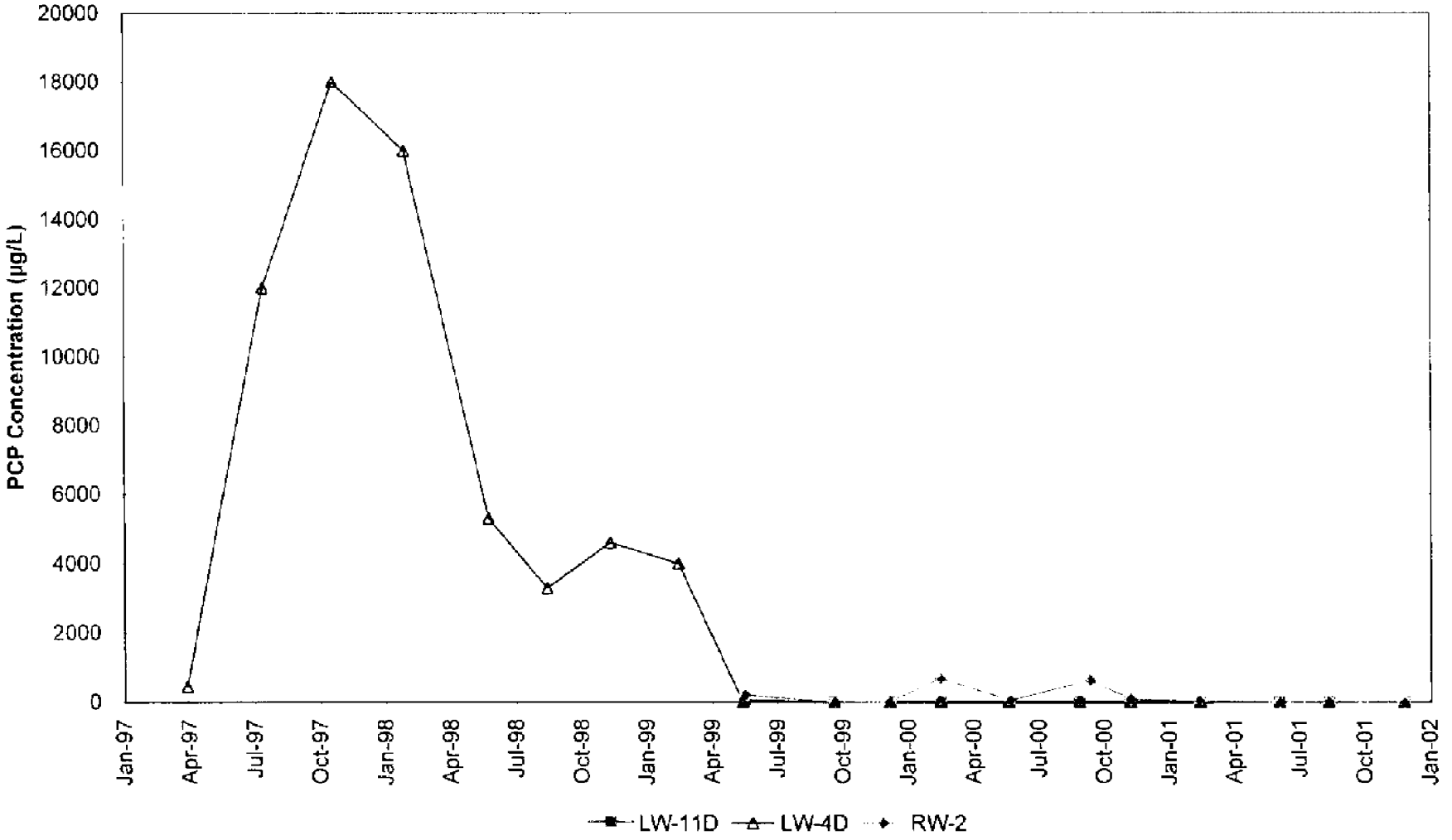
WELLS LW-11D, LW-4D, and RW-2
PCP



2/19/02 s \sheets\timeoil\ph2n\PLOTS2001 PCP vs Time-Deep

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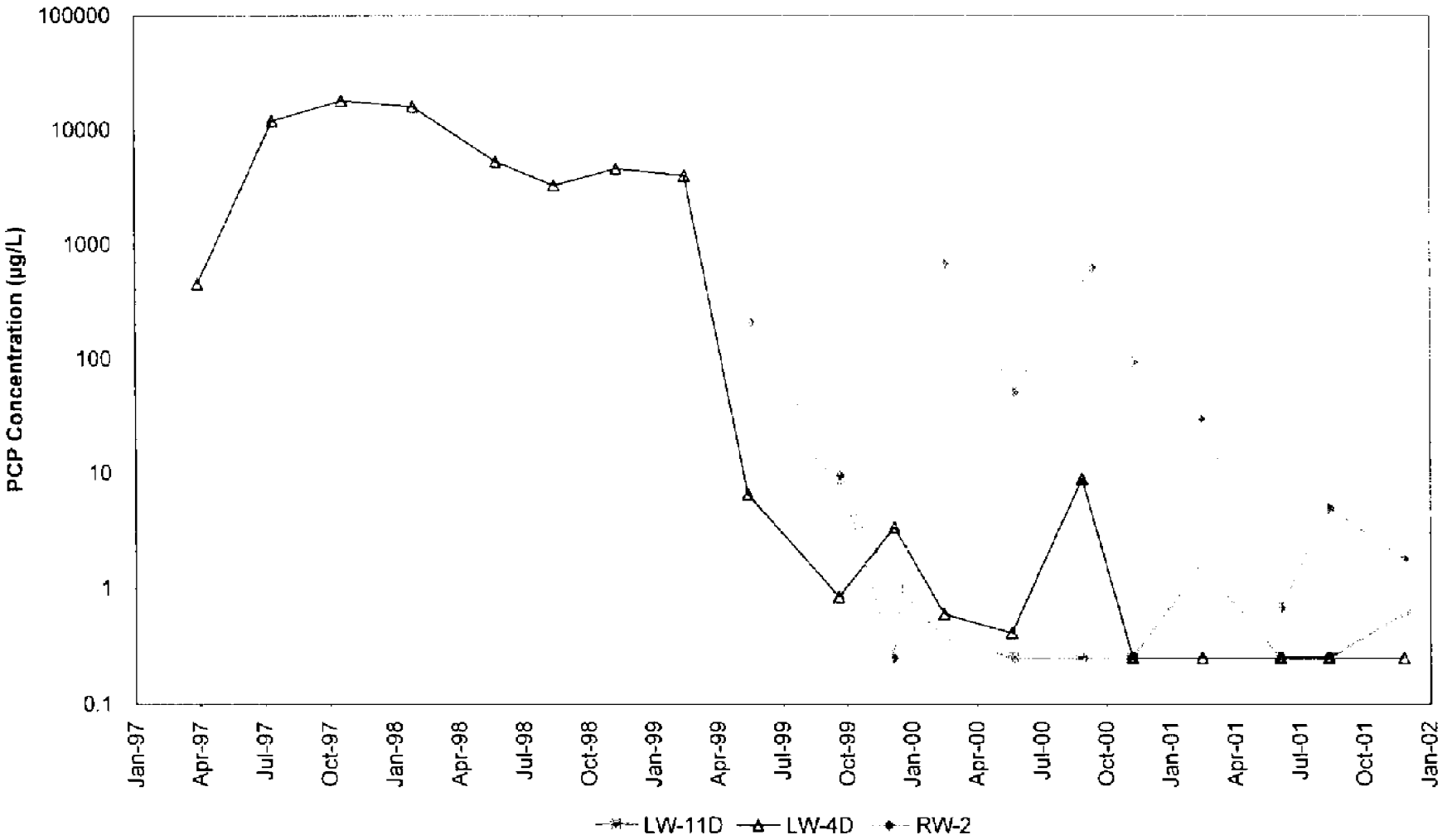
WELLS LW-11D, LW-4D, and RW-2
PCP



2/19/02 s:\sheets\timeoil\ph2n\PLOTS2001 Log PCP vs. Time-Deep

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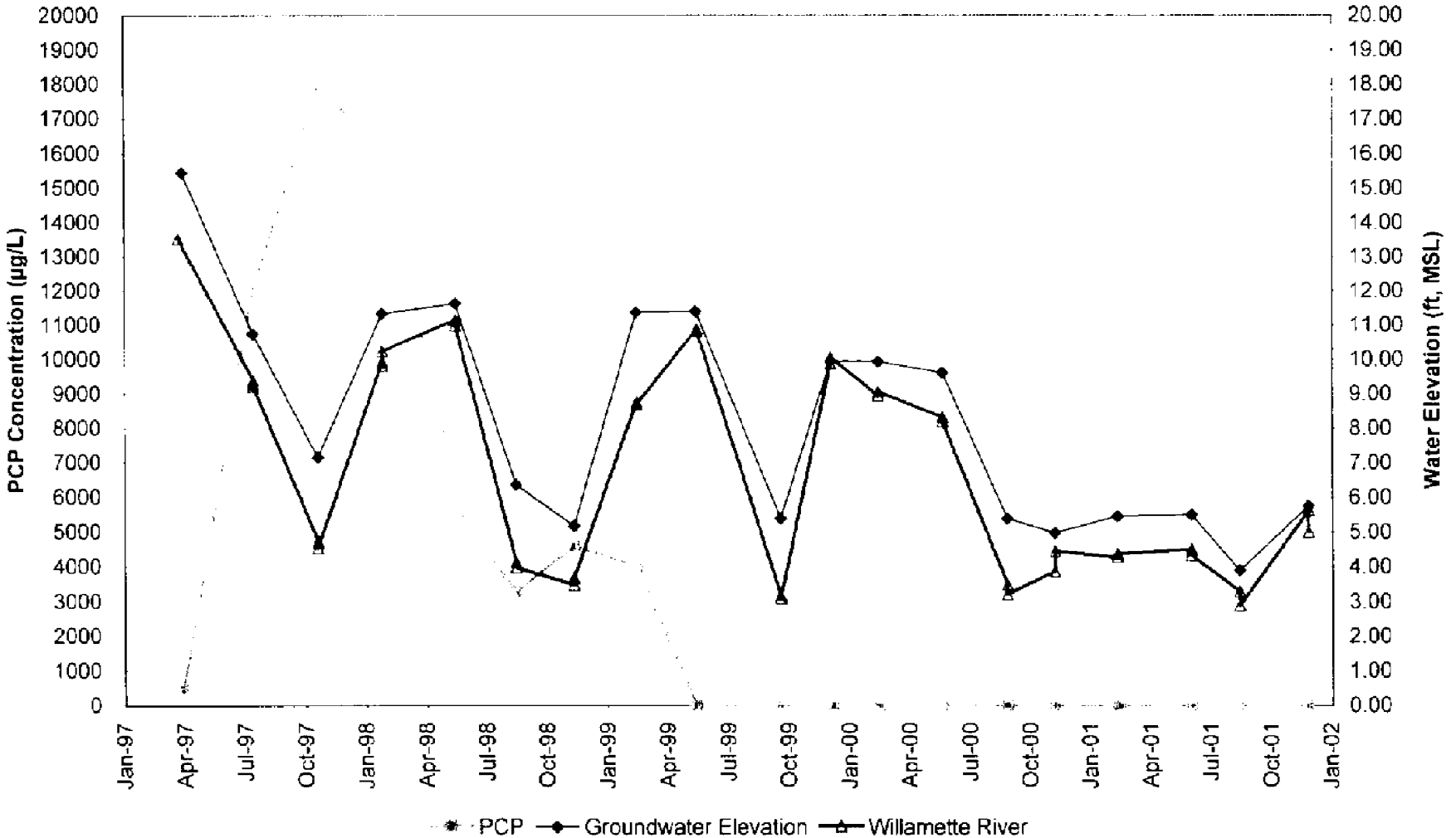
LW-4D
PCP Concentrations, Groundwater Elevations, and River Stage



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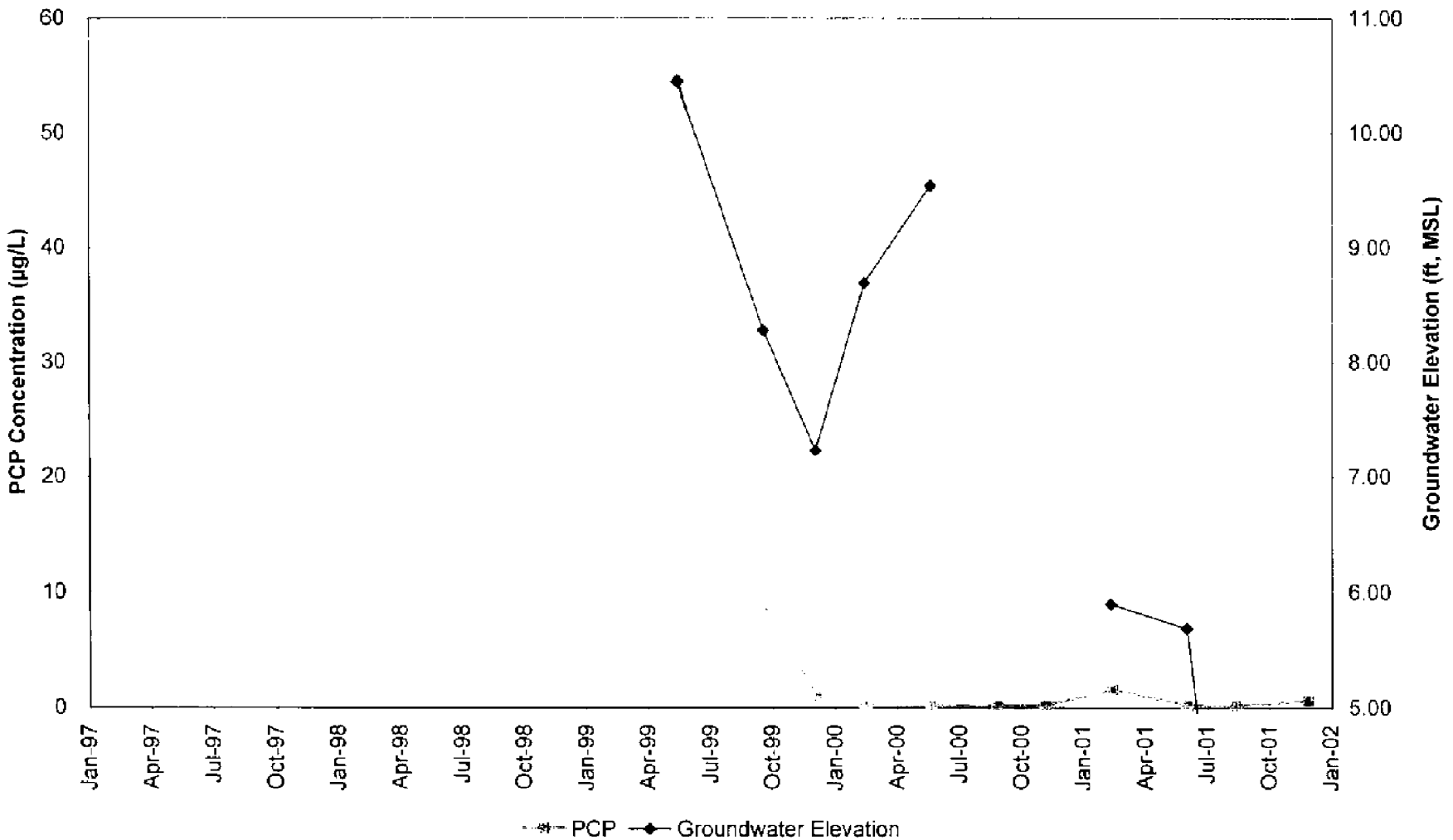
LW-11D
PCP Concentrations and Groundwater Elevations



2/19/02 s:\sheets\limeoil\ph2n\PLOTS2001 LW11D PCP-WL

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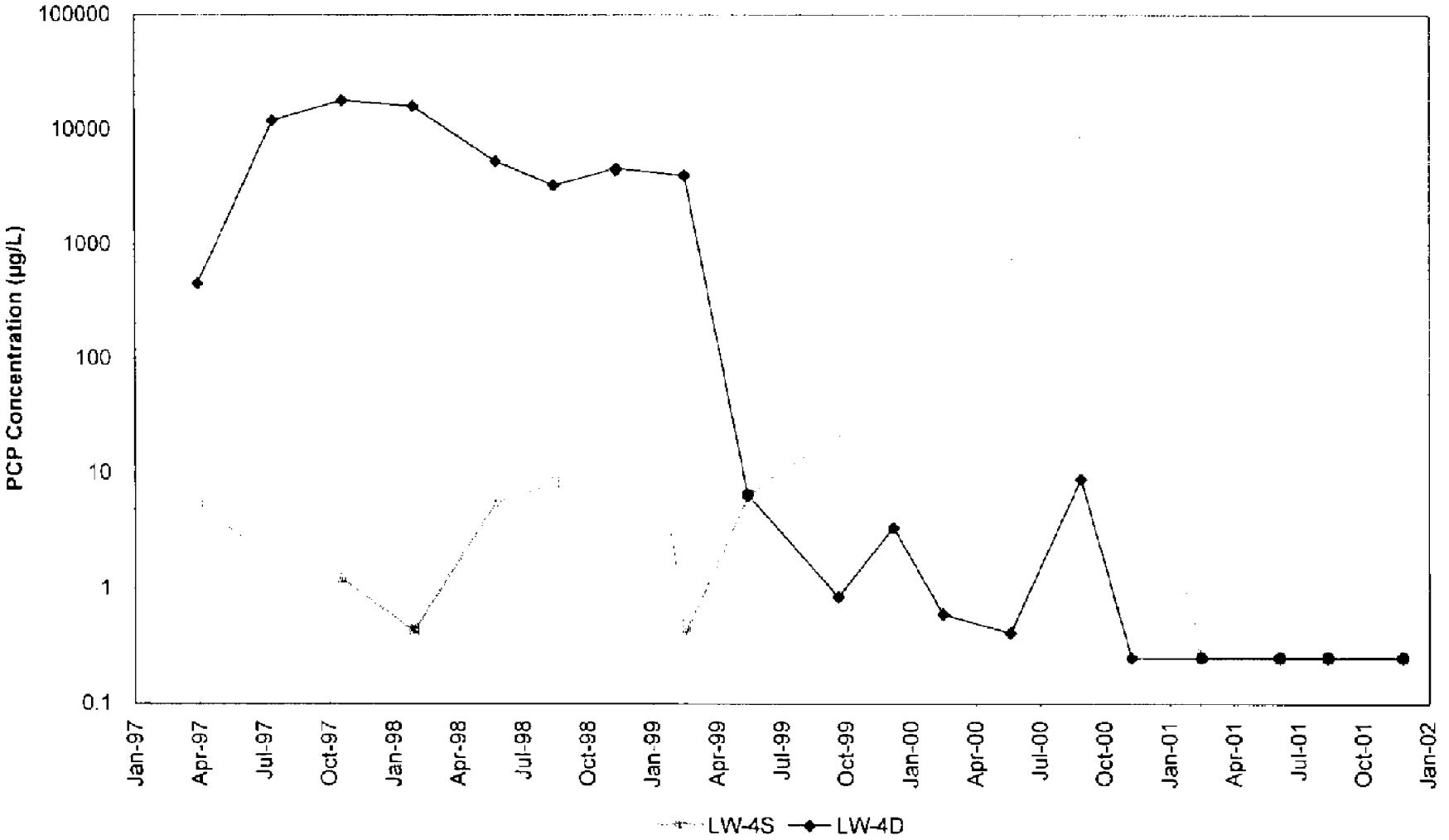
WELLS LW-4S and LW-4D
PCP



2/19/02 s:\sheets\timeoil\ph2ri\PLOTS2001 Log LW4S-LW4D-PCP

Landau Associates

86-102(E) D

Landau Associates
Environmental and Geotechnical Services

January 8, 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the January 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
2/8/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
January 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the December 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately a total of 5.82 million gallons of groundwater have been recovered, treated, and discharged. Analytical results indicate pentachlorophenol is degraded to nondetectable concentrations or concentrations less than the discharge limitations in the effluent. Water was not treated from January 5 to 23, 2002, because water was being treated at a higher flow rate than the groundwater was being delivered to Tank 16804. Groundwater treatment resumed on January 23, but at a reduced frequency of one batch of water every 6 hours.
- Continued review of the system operations performance for the groundwater interim action system and the onsite wastewater treatment system.
- Began startup activities for the groundwater interim action in the upper zone at HRW-1, including collection of baseline groundwater levels and testing of the current pumping system.
- Continued client and remediation contractor review of the *Soil Stockpile Removal Action Plan.*
- Conducted client review of the *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report.*
- Continued processing fourth quarter 2001 groundwater data and conducted data validation.
- Installed GIS\Key software, began database conversion to a GIS format, and conducted GIS\Key training.
- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.
- Continued preparation of the *Phase III Preliminary Evaluation Report.*
- Conducted client review of the *East Property Remedial Action Plan.*

RESULTS COLLECTED

- Second stormwater sampling event. A summary of the results with the first stormwater sampling event is attached.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- During testing of the pumping system at HRW-1, it was determined that the current pump was not able to maintain flow rates less than 2.5 gpm with the existing system head loss. A smaller pump was identified that should be able to sustain a flow rate of 0.5 gpm. The pump has been ordered and

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installation is planned for late February. We will test the new pumping system after installation and before full-scale operation of the interim action system in HRW-1.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2. Continue full-scale treatment and discharge to POTW.
- Replace pump in HRW-1 with pump that would be able to maintain a sustainable flow rate.
- Begin implementation of the groundwater interim action in the upper zone at HRW-1, including system startup procedures, groundwater level measurements, and effluent sampling and analysis with full-scale treatment and discharge to POTW.
- Incorporate client's and remediation contractor's comments on the *Soil Stockpile Remedial Action Plan* and submit to DEQ.
- Complete client review of *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report* and submit to DEQ.
- Prepare the *Fourth Quarter 2001 Groundwater Interim Action Status Report* and the *Fourth Quarter 2001 Groundwater Report*.
- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.
- Complete transfer to project database information into GIS\Key.
- Complete client review of the *East Property Remedial Action Plan* and submit to DEQ. Begin preparation of a contractor scope of work for the remedial action activities.
- Complete preparation of the *Phase III Preliminary Evaluation Report*, including development of recommendations for the scope for the Phase III RI, and provide to client for review.

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STORMWATER SAMPLE ANALYTICAL RESULTS
PHASE II SUPPLEMENTAL SAMPLING
TIME OIL NORTHWEST TERMINAL

Location	Lab ID	Date Collected	TOTAL PETROLEUM HYDROCARBONS (a) Gasoline (mg/L)	Mineral Spirits (mg/L)	Kerosene (mg/L)	Diesel (mg/L)	Lube Oil (mg/L)	PENTACHLOROPHENOL (µg/L)
SDM-1	0109005-02	9/4/2001	0.250 U	0.250 U	0.630 U	0.630 U	0.630 U	**11.5**
	0111183-02	11/30/2001	NA	NA	NA	0.250 U	0.500 U	**0.700**
SDM-2	0109005-01	9/4/2001	0.250 U	0.250 U	0.630 U	0.630 U	0.630 U	0.500 U
	0111183-01	11/30/2001	NA	NA	NA	**0.261**	0.500 U	0.500 U

U = Indicates compound was analyzed for, but was not detected at the reported sample detection limit.
NA = Not Analyzed.
(a) Samples collected in September, 2001 were analyzed using total petroleum hydrocarbon (TPH) method, NWTPH-HCID. Samples collected in November 2001 were analyzed using NWTPH-Dx.

86-102 (E) E2

REC'D MAR 2 0 2002

ISOTEC REMEDIATION PROGRAM PROPOSAL

TIME OIL – NORTHWEST TERMINAL SITE
PORTLAND, OREGON

MARCH 19, 2002

PREPARED FOR

TIME OIL COMPANY
2737 W. COMMODORE WAY
SEATTLE, WA 98199-1257

AND

BEAZER EAST, INC.
ONE OXFORD CENTRE, SUITE 3000
PITTSBURGH, PA 15219

PREPARED BY

IN-SITU OXIDATIVE TECHNOLOGIES, INC.
5200 DTC PARKWAY, SUITE 150
ENGLEWOOD, COLORADO 80111

ISOTEC PROJECT NO. 900533

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2.2 Field Pilot Test 4

Section 3 Project Costs *6*

Section 1 Introduction

In-Situ Oxidative Technologies, Inc., (ISOTEC) is pleased to offer this proposal to Time Oil Company (Time Oil) and Beazer East, Inc. (Beazer) for remediation services. ISOTEC proposes to implement in-situ oxidation using ISOTEC's Fenton's reagent-based technology for the Time Oil Company Northwest Terminal in Portland, Oregon. The contaminant of concern at the Northwest Terminal is pentachlorophenol (PCP). Mr. Stan Haskins will be the Project Manager for this project. He is currently managing two in-situ oxidation projects for ISOTEC in Vancouver, Washington and Frenchglen, Oregon. He has also consulted on Time Oil projects in Washington in previous positions.

1.1 ISOTEC Process

The ISOTEC process is an in-situ remedial technology that destroys organic contamination using Fenton's reagent-based oxidation chemistry. Fenton's chemistry was first documented by H.J.H. Fenton in 1894. It is characterized by the combination of soluble iron with low concentrations of hydrogen peroxide to produce hydroxyl radicals ($OH^{\bullet}$). These hydroxyl radicals are very powerful and short-lived oxidizers. Similar to the reaction of other oxidizers, the hydroxyl radicals attack the carbon double bonds of the chlorinated hydrocarbon molecule. Under certain conditions reductive species can also be formed by Fenton's chemistry. This gives Fenton's reagent two separate pathways to attack a wide range of contaminants. The summary equation for Fenton's chemistry is shown below.

$$Fe^{+2} + H_2O_2 \rightarrow Fe^{+3} + OH^- + OH^{\bullet}$$

Where H_2O_2 is hydrogen peroxide, Fe^{+2} is ferrous iron, Fe^{+3} is ferric iron, $OH^{\bullet}$ is hydroxyl free radical and OH^- is hydroxide ion.

Iron is used to catalyze the reaction. Maintaining iron in solution is important for the process to be successful in an in-situ application. To eliminate the necessity of performing the reaction under low pH conditions, as is the case with traditional Fenton's chemistry, complexed iron is used in in-situ applications via the ISOTEC process. The hydrogen peroxide and dissolved iron solutions are injected through a site-specific delivery system providing sufficient distribution to selectively treat the area of concern. Reaction time is very fast, with oxidation capacity of the reagent being used up in a matter of a few days. Hydrogen peroxide breaks down into water and oxygen and the iron catalyst is oxidized and precipitates out of solution. It is important to note that the concentration of hydrogen peroxide will be relatively dilute, generally less than 15%, which eliminates the potential for significant exothermic reactions that are associated with higher concentrations of hydrogen peroxide. Experience with this process using low hydrogen peroxide concentrations and complexed iron has resulted in less than a 25°F temperature increase in field applications.

Hydrogen peroxide not consumed in the above reaction will continue to oxidize the groundwater contaminants and will naturally degrade to oxygen and water. The

stoichiometric relationship between trichloroethene (TCE) oxidation and hydrogen peroxide consumption can be predicted from the oxidative reaction:

$$C_2Cl_3H + 3H_2O_2 \rightarrow 2CO_2 + 2H_2O + 3Cl^- + 3H^+$$

Where C_2Cl_3H is TCE, H_2O_2 is hydrogen peroxide, CO_2 is carbon dioxide, Cl^- is chloride ion, and H^+ is hydrogen ion.

ISOTEC's Fenton based oxidation process is effective on a wide range of contaminants including hard to treat recalcitrant compounds such as petroleum hydrocarbons, gasoline additives including MTBE and BTEX, chlorinated solvents and pesticides. Hydroxyl radicals generated by the ISOTEC process will oxidize nearly all contaminants with carbon / carbon double bonds (i.e., DCE and PCE) and single bonded contaminants with extractable hydrogen (i.e., TCA).

The ISOTEC process consists of injecting stabilized hydrogen peroxide and complexed iron catalysts into contaminated aquifers or vadose zones. As compared to conventional Fenton's Reagent which requires acidic conditions (pH $\leq$ 3) the ISOTEC process is effective at neutral (pH = 7) conditions. This is an important consideration in full-scale application since acidifying an aquifer is typically impractical. ISOTEC's oxidation method utilizes a site-specific delivery system(s) designed to treat organic contaminants within an area of concern. ISOTEC oxidants and catalysts generate hydroxyl radicals, which react with the organic contaminants within the subsurface producing innocuous by-products such as carbon dioxide and water (and chloride ions if chlorinated compounds are being treated).

The site specific stoichiometry is typically estimated through a laboratory study, with preliminary treatment quantities calculated. Application is tested in the field during a pilot program to determine process efficiency and extent of treatment, which varies depending on the site's subsurface hydrogeology and the contaminant distribution and concentration. Based on results from the laboratory study and pilot program, design and implementation of a full-scale remedial treatment program is proposed, if required.

Safety is a priority with the ISOTEC process. ISOTEC has not had a significant health and safety incident in over six years of field application. Most negative effects noted with in-situ oxidation occur with aggressive oxidation reactions utilizing high concentration reagents under pressurized conditions. These conditions can create a significant temperature rise and an enormous amount of carbon dioxide and/or oxygen off-gas, which can mobilize vapors and contaminants within the subsurface. ISOTEC does not utilize this approach. Reagents utilized by ISOTEC are stabilized and at low concentrations, with injection in a controlled manner to reduce the possibility of surface breakout or subsequent migration. Furthermore, based on sites with shallow groundwater, extreme caution must be exercised while injecting reagents as the mounding effect created raises the ground water elevation to close proximity of the surface. Again, the stabilized ISOTEC reagents utilized, along with control of the injection process, limit these concerns.

1.2 Current Site Conditions

The Time Oil Northwest Terminal is an inactive bulk petroleum storage and transfer facility in Portland, Oregon. Based on information submitted to ISOTEC, the subsurface at the site appears to be comprised of four distinct hydrogeologic units: an upper water-bearing zone, a confining unit, a lower water-bearing zone, and a deep sand unit. ISOTEC proposes to conduct a pilot test in the upper water-bearing zone (upper zone) located at approximately 13 to 18 feet below grade surface (bgs) and the lower water-bearing zone (lower zone) located at approximately 30 to 60 feet bgs. The upper zone is an unconfined aquifer in fill and river alluvial deposits, consisting predominantly of sand. It is important to note that seasonal variability occurs in the upper zone water levels. As a result, the saturated thickness of the zone varies, with seasonal high water levels in the winter and spring, and seasonal low water levels in the fall. The lower zone consists of sandy to silty sand with silt interlayers. The primary target contaminant is pentachlorophenol (PCP).

Section 2 ISOTEC Remediation Program

2.1 Laboratory Bench Scale Study

ISOTEC will perform a laboratory bench scale study on soil and groundwater samples collected from the Northwest Terminal site if requested. The laboratory bench scale study will be performed with the objective to evaluate the potential of the ISOTEC process to successfully treat the site-specific contamination and to determine the optimum oxidation conditions based on the contaminants detected. Results of the laboratory bench scale study will be available within six weeks of sample collection, and submitted as a letter report.

Experiments will be conducted on samples of site groundwater and on a mixture of site groundwater and site soil (soil-slurry) that is prepared by ISOTEC's treatability study laboratory. The samples will be subjected to a series of experiments using three different ISOTEC catalysts to evaluate the potential of chemical oxidation to successfully treat the site-specific contamination and to determine the optimum oxidation conditions. The ISOTEC catalysts used during the study will be selected based on the PCP contaminants present at the site.

2.2 Field Pilot Test

ISOTEC recommends a field test be conducted in the upper and lower zones near RW-1 and RW-2 respectively. Three injection wells will be installed near RW-1 and two injection wells will be installed near MW-2. ISOTEC will provide a specific design for these wells which will include a minimum design pressure specification of 35 psi.

The pilot test program will consist of introducing ISOTEC's blend of catalysts, oxidizers and stabilizers into the subsurface over a short time period. A work plan will be prepared and submitted to Time Oil/Beazer for review.

After reviewing the site data provided and particularly the lithology of the site, ISOTEC recommends a total of three shallow and two deep injection wells be installed as described above. The injection wells will be located on an average 15-foot radius of influence (ROI) to ensure complete reagent coverage across the selected areas. The injection wells will be screened from 13 to 20 feet bgs (shallow) and 30 to 40 feet bgs (deep). The field pilot test will initially include one injection event. Since ISOTEC (i.e. chemical oxidation) is a contact treatment, the injection point pattern discussed above will help ensure that reagents are distributed effectively to the selected areas.

Specific site monitoring should be performed during the treatment program to obtain information related to the treatment process and subsurface characteristics. ISOTEC recommends the installation of three additional monitoring wells (two shallow and one deep) in the pilot test areas. ISOTEC recommends groundwater samples be collected prior to ISOTEC's treatment and within two weeks following the completion of the injection event. Samples from the monitoring wells should be collected and analyzed for

the contaminants of concern. ISOTEC has assumed that Time Oil/Beazer will be responsible for all laboratory sampling and analyses as well as the installation of the proposed injection and monitoring wells.

An ISOTEC injection team typically consists of a field supervisor, along with two field technicians. All members of the injection team have completed health and safety training consistent with the Occupational Safety and Health Administration (Title 29 of the Code of Federal Regulations 1910.120). Based on review of the subsurface characteristics, field activities for the site are estimated at 5 working days per injection event (includes mobilization, injection activities and demobilization). ISOTEC typically begins work within 30 days of receipt of regulatory approval. A bound report will be submitted outlining details of the ISOTEC process, field activities, field analyses, with recommendations for any additional work.

Section 3 Project Costs

Costs associated with the ISOTEC field injection program will be charged on lump sum or per event basis as indicated below.

- ***Meetings*** ***$3,500***
  - Two meetings in Portland with one ISOTEC representative.
- ***Laboratory Treatability Study (optional)*** ***($6,500)***
- ***Work Plan*** ***$6,000***
- ***Health and Safety Plan*** ***$1,500***
- ***Field Injection*** ***$31,614/event***
- *Mobilization and Demobilization*
- *ISOTEC Reagents and Preparation*
  - Includes injection of oxidizer and catalyst into approximately 5 injection wells.
- *Mixing, Injection and Monitoring Equipment*
  - Includes equipment procurement, shipping and storage.
- *Field Implementation*
  - Includes site supervisor and one field technician for 5 days per event.
- ***Technical Review, Project Management and Final Report*** ***$7,500***
- ***Total ISOTEC Injection Program Costs (for one event)*** ***$49,664***

Notes:

1. *ISOTEC will require a source of on-site water supply to perform treatment program activities. Access and costs associated with this request will be provided/incurred by Time Oil/Beazer.*
2. *Treatment program cost includes all labor, equipment, chemicals, materials, travel and other associated equipment shipping.*
3. *Work quoted is based on level D personal protection equipment (PPE) and daytime working hours. Additional costs for higher level PPE will be quoted as necessary.*
4. *A decontamination area, water disposal and secondary containment for reagents will be provided by Time Oil/Beazer, if required.*
5. *Time Oil/Beazer will be responsible for workplan approval, permits, groundwater sampling, utility locates, and waste disposal.*

Terms and Conditions

This estimate is based upon the information submitted. Free phase product if noted during the full scale remediation, and additional and/or different contaminant compounds or concentrations not listed within the data supplied will affect the overall degree of contaminant removal. Should any free phase and/or contaminant compounds not noted within the data presented be encountered, additional treatment applications may be required to meet cleanup objectives.

All consulting prices quoted are pending Agency approval of remedial plans as submitted. Substantial modifications imposed by the approving Agency may incur additional charges. Any additional charges will be discussed with the client for approval prior to the initiation of additional work.

Client agrees to prevent unauthorized persons from entering the work area. If any unauthorized persons enter the work area, ISOTEC will not be responsible for any injury or damage which may occur to that individual or his property. Client shall provide a utility markout and map of all known underground utilities. Injection point locations may be modified pending a review of subsurface utility locations.

The work performed pursuant to this proposal will be undertaken in a professional manner in accordance with best prevailing industry standards. ISOTEC shall not be liable for direct, indirect, incidental, special or consequential damages or liability caused by pollutants remaining on the property or adjacent property due to acts or omissions by ISOTEC or its subcontractors unless such damages or liabilities are caused by ISOTEC's or its subcontractors' failure to act in a professional manner in accord with prevailing industry standards. ISOTEC's liability for such failure to act shall not exceed the value of this contract measured by the fees paid by client or due under this contract and fees previously paid or due for work performed at the property or in connection therewith.

Payment terms (invoiced monthly) are net 30 days. Any payment due which is not received within 30 days will be subject to a service charge of 1.5% monthly. Any payments not received within sixty (60) days will be put out for collection. Invoices will be submitted on a monthly basis for activities completed

Permit fees, if any, are not included within the quoted prices and shall be itemized separately to include an additional 15% handling charge, or be paid directly by the Client.

This Agreement and the rights and duties of the parties, shall be governed by and construed in accordance with the laws of the State of New Jersey. The parties consent to the jurisdiction of the State courts of the State of New Jersey, and agree that venue shall be proper in any such courts to the exclusion of the courts in any other State or Country. The parties further agree that such designated forum is proper and convenient. The parties hereby unconditionally and irrevocably waive any and all rights to a trial by jury in any suit, counterclaim, or cross-claim arising in connection with, out of, or otherwise relating to this Agreement.

All prices quoted are valid for a period of sixty (60) days from the time this proposal was written. After a period of 60 days, ISOTEC will not be held to the terms and prices quoted herein.

Finally, ISOTEC would like to thank Time Oil/Beazer for the invitation to work and bid on this project. We hope that this cost proposal will meet your needs and look forward to working with you on this project to a satisfactory completion. If you have any questions, please feel free to contact me at (303) 843-9079.

Sincerely,

Christopher Nelson, P.E.
In-Situ Oxidative Technologies, Inc.

ACKNOWLEDGED AND ACCEPTED:

_____ _____
(print name, title) (signature, date)

Landau Associates
Environmental and Geotechnical Services

RECD MAR 1 1 2002

TRANSMITTAL

To: SEE DISTRIBUTION

Date: March 4, 2002

Attn:

Project No.: 231001.117

RE: **Time Oil Northwest Terminal**

Copies	Description
1	Memorandum RE: Groundwater Interim Action Status Report - Fourth Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon (3/4/02)

Message:

Please find attached the above-referenced document for your review.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
3/4/02 S:\WPROC\231\TRANSMIT FAX\Qtrly DIASRpt_fin.doc

Enclosure

DISTRIBUTION:

Patty Dost, Schwabe, Williamson & Wyatt
Kevin Murphy, Time Oil Co.
Mike Tischuk, Beazer East, Inc.

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Landau Associates
Environmental and Geotechnical Services

DRAFT
TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers and Rebekah Brooks

DATE: March 1, 2002

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – FOURTH QUARTER 2001
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

This memorandum presents a summary of the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon for the fourth quarter of 2001. System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm fourth quarter 2001 compliance with performance criteria for the lower water-bearing zone (lower zone) at the site. Specific performance criteria achieved included: 1) continuous pumping from RW-2, except for brief periods of system maintenance, 2) reversal of the lower zone groundwater flow direction at the leading edge of the pentachlorophenol (PCP) plume, 3) chemical confirmation that continued migration downgradient of RW-2 is not occurring, and 4) compliance with the requirements of the existing discharge permit. Figure 1 shows a site plan for the terminal. In addition to the discussion of system performance and status, a brief summary of data collected for the interim action is provided below.

SYSTEM PERFORMANCE AND STATUS

The groundwater interim action system for the lower zone continued to operate throughout the fourth quarter of 2001 as groundwater was extracted from well RW-2 at an average rate of approximately 8 gpm. During this time period, RW-2 operated for 2,234 hours (approximately 93 days) and extracted approximately 1,074,000 gallons of groundwater. The recovered groundwater was pumped to a collection tank for subsequent treatment by the activated sludge wastewater treatment plant located at the site. Approximately 1,321,000 gallons of groundwater were treated at the terminal wastewater treatment plant and discharged to the sanitary sewer under a permit with the City of Portland (Permit No. 400-121) in the fourth quarter of 2001 (October 1 through December 31, 2001). The volume of treated wastewater included a portion of the recovered groundwater and rinsate water generated onsite from the cleaning of former bulk petroleum storage tanks. Recovered groundwater that was not treated was stored in tank No. 16804 located within the main tank farm area of the terminal pending transfer to the onsite wastewater

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treatment facility. The operational history of the groundwater interim action in the lower zone is summarized in Table 1.

In addition to RW-2, a horizontal recovery well (HRW-1) was installed at the terminal for recovery of groundwater from the upper water-bearing zone (upper zone); however, groundwater extraction and treatment has been restricted to the lower zone at well RW-2 due to the low groundwater level in HRW-1 since installation. Below normal precipitation through the summer and fall of 2001 resulted in depressed upper zone groundwater levels at the terminal. The low water level alarm in HRW-1 was activated through most of the fourth quarter 2001. The submersible pump in HRW-1 was reinstalled in December 2001 after being removed for the performance of the vacuum-enhanced pumping test in August 2001. The conductivity sensor was also reinstalled in December after being removed for repair. After reinstallation, the water level in HRW-1 had risen above the sensor; therefore, preparation began for startup of the groundwater interim action in the upper zone at HRW-1. It is currently anticipated the startup of HRW-1 will occur during the first quarter 2002 using the submersible pump.

DATA COLLECTION AND RESULTS

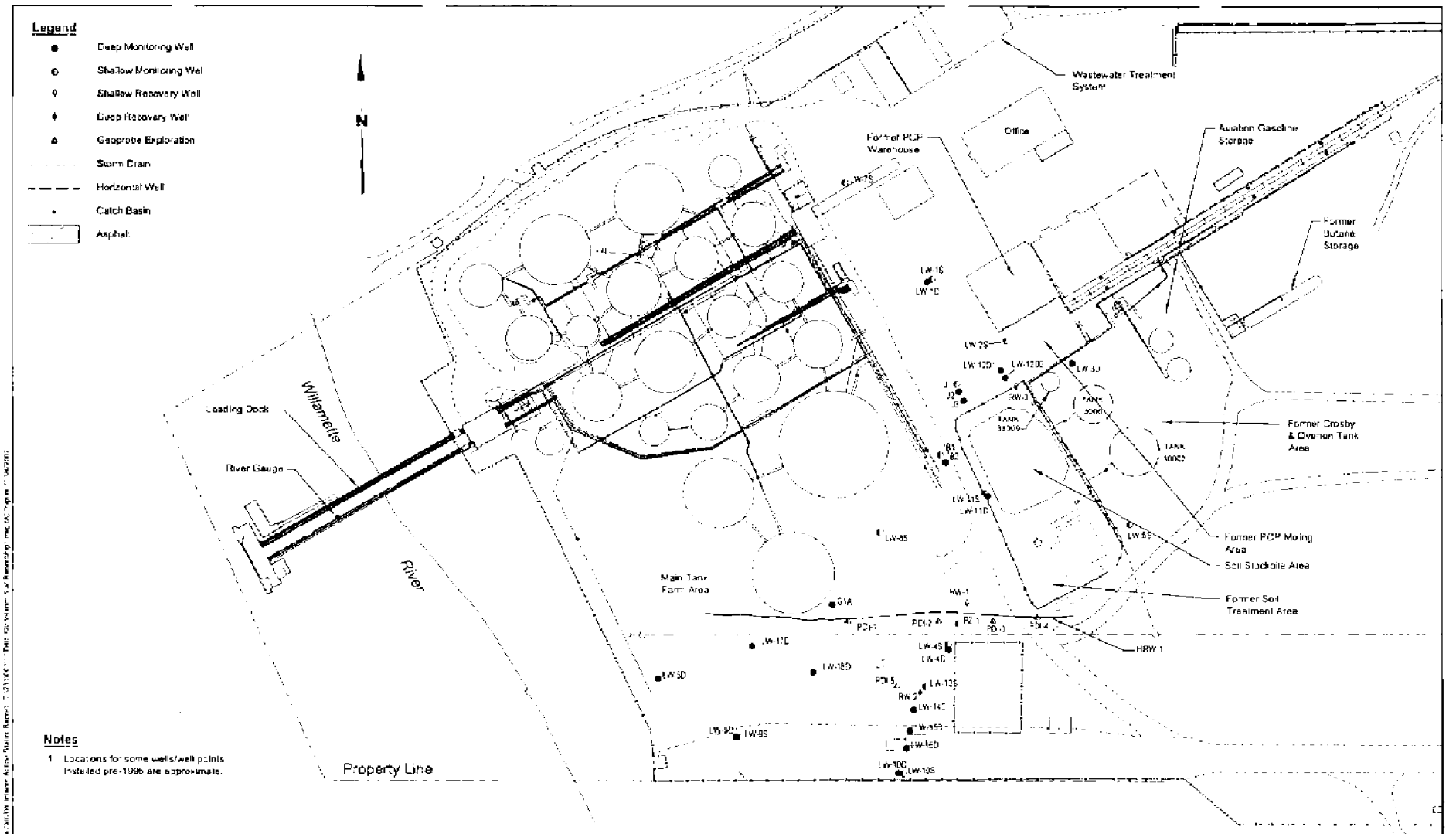
As shown on Figure 2, the data indicate that current pumping conditions appear to achieve hydraulic capture to the west near LW-18D and south to well LW-10D. As shown in Figure 4, the lower zone PCP plume (the PCP plume has historically been defined as the 1 µg/L PCP concentration contour) appears to have been reduced significantly in the area influenced by the interim action so that no lower zone concentrations exceed 1 µg/L except for detections of 3 µg/L in LW-3D and 1.8 µg/L in RW-2. These results indicate that the interim action in the lower zone has been successful in the containment and extraction of PCP-contaminated groundwater in the lower zone. Groundwater PCP concentrations and hydraulic capture in the area of the interim action will continue to be monitored to demonstrate compliance with lower zone performance criteria.

REFERENCES

Landau Associates. 2000. *Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon.* July 14.

Landau Associates. 1999. *Aquifer Test Report, Time Oil Northwest Terminal, Portland, Oregon.* December 20.

Landau Associates. 1998. *Technical Memorandum Re: Additional Groundwater Investigation, January-February, 1998, Time Oil Northwest Terminal, Portland, OR.* Submitted to Karla Urbanowicz, Oregon Department of Environmental Quality, Portland, OR. July 28.



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Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 1

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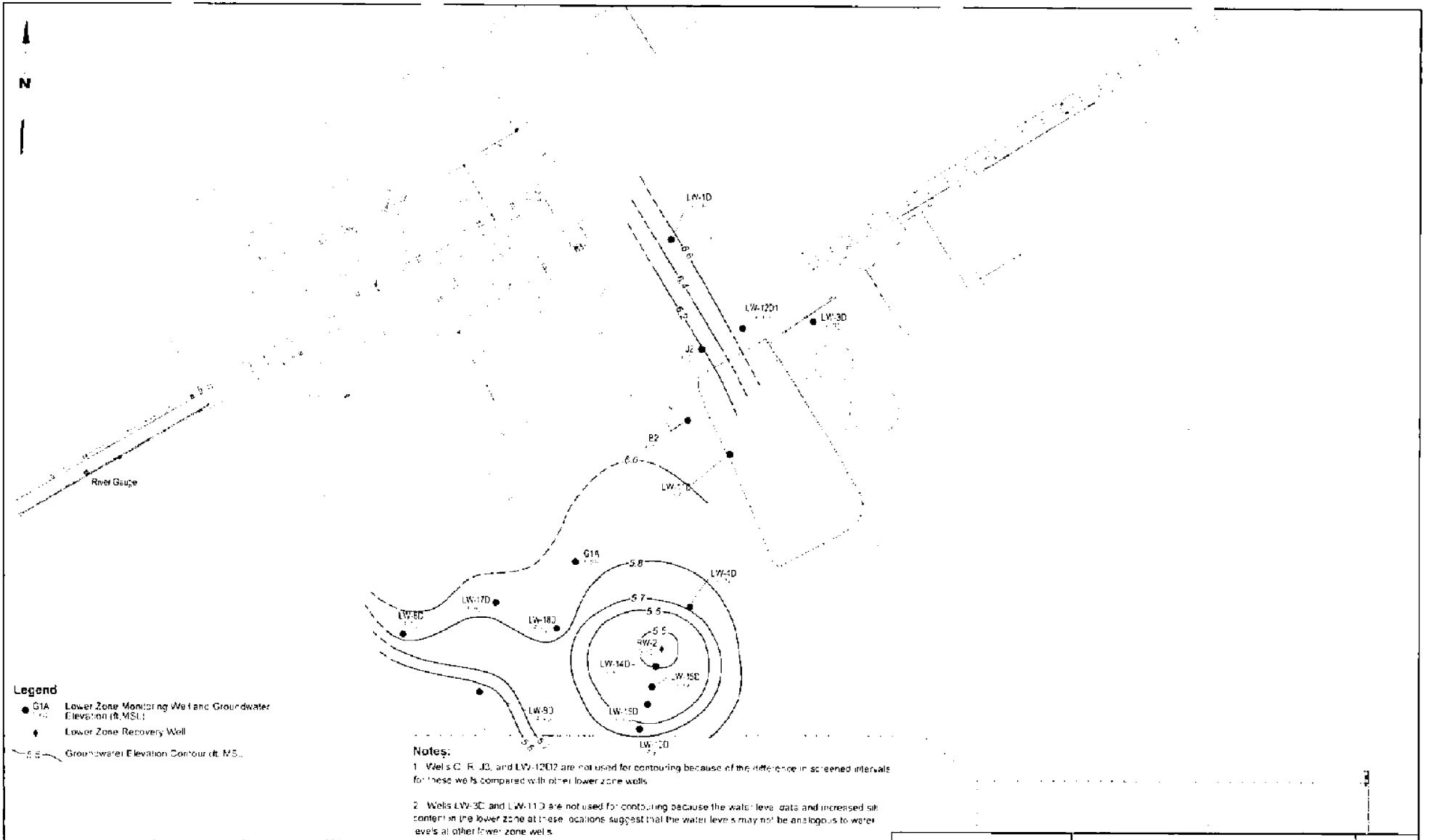

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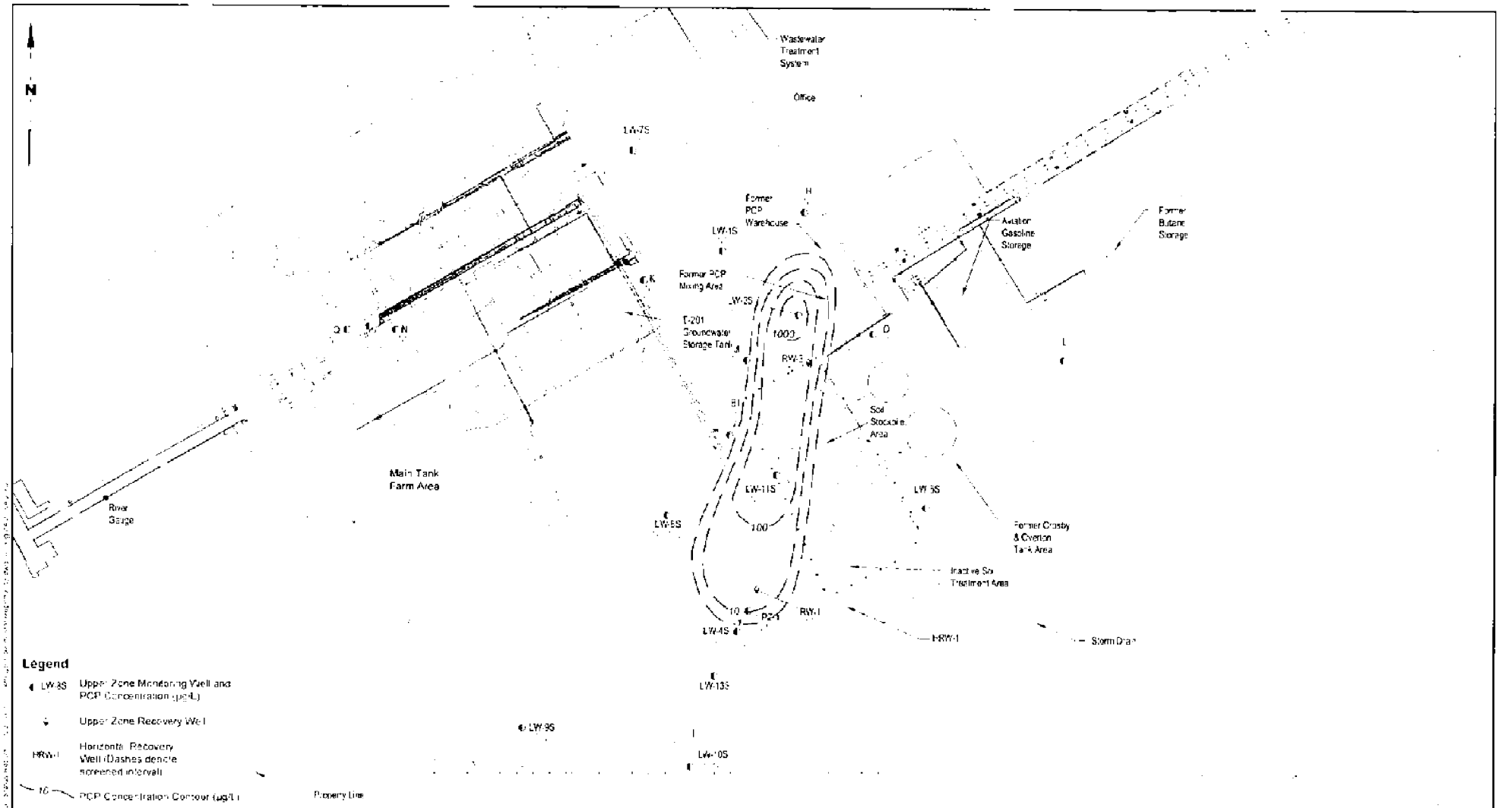

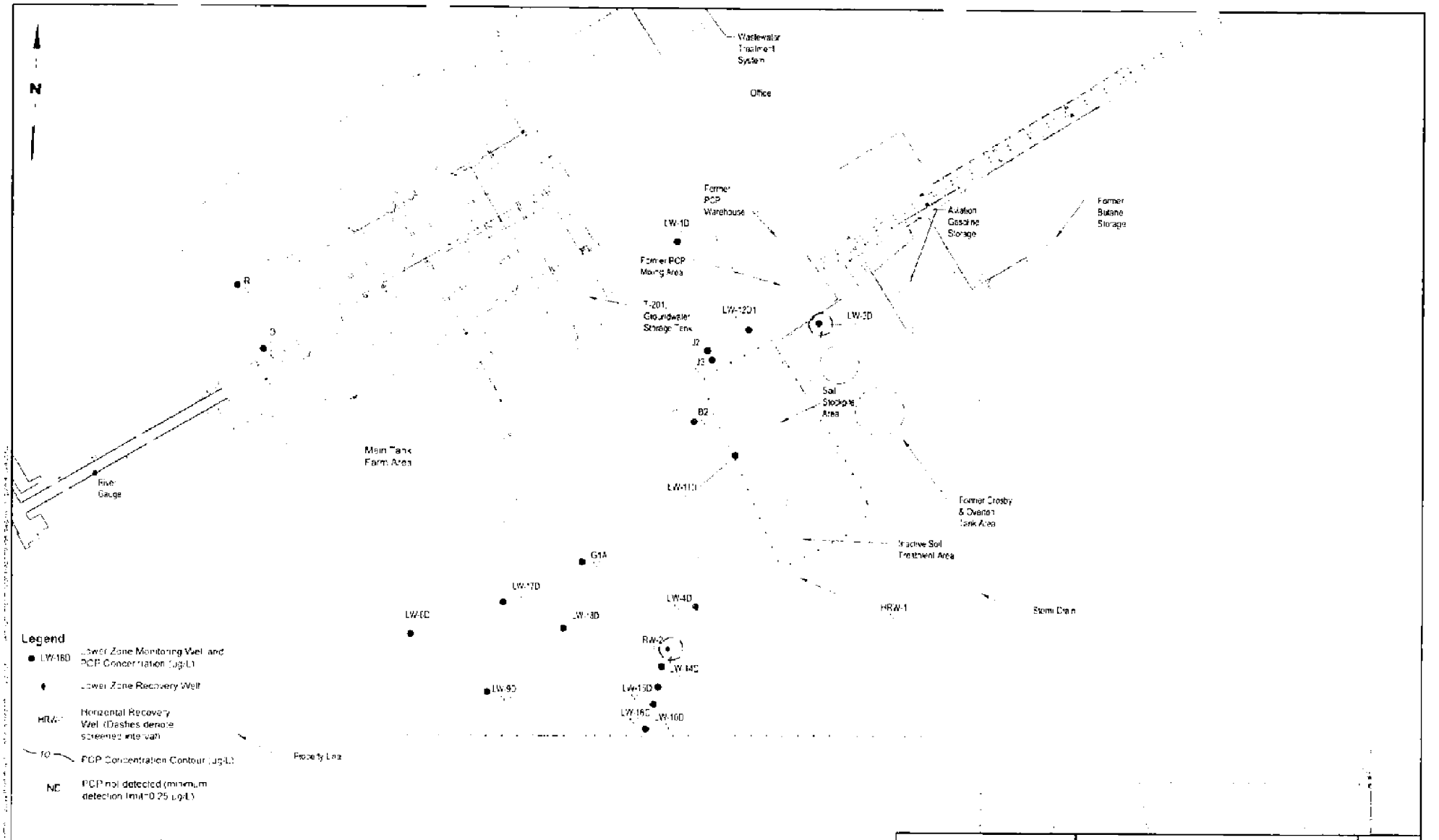

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Time Oil NW Terminal Portland, Oregon	PCP Concentrations in Groundwater Lower Zone, Fourth Quarter 2001	Figure 4

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TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
LOWER WATER-BEARING ZONE
TIME OIL NORTHWEST TERMINAL

Monitoring Period	RW-2 Discharge				Treatment System Discharge			Comments
	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	
Fourth Quarter 2000								
October 2000	439,003			0.35	0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/9/00	95	0.24	467,478	11/7/00	ND (a)	
December 2000	348,720	12/20/00	39	0.11	497,656	12/6/00	5.89	
						12/20/00	9.73	
Quarterly Totals	*1,093,324*			*0.70*	*965,134*			
First Quarter 2001								
January 2001	416,140	1/18/01	38.8	0.13	239,207	1/18/01	14.3	
February 2001	335,008	2/13/01	30	0.08	184,192			
March 2001	332,963	3/7/01	ND (b)	0.03	517,332	3/7/01	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*	*940,731*			
Second Quarter 2001								
April 2001	377,931			0.04	275,519			
May 2001	344,252	5/22/01	12.3	0.04	195,522	5/22/01	5.29	
June 2001	361,846	6/4/01	0.68	0.04	563,853			
Quarterly Totals	*1,084,029*			*0.11*	*1,034,894*			
Third Quarter 2001								
July 2001	351,509			0.01	559,015			
August 2001	486,123	8/13/01	5	0.02	66,876			
Quarterly Totals	*837,632*			*0.03*	*625,891*			
Fourth Quarter 2001								
October 2001	393,168	10/11/01	ND (a)	0.01	484,158	10/11/01	ND (a)	
November 2001	319,798			0.01	118,786	11/1 & 11/15/01	ND (a)	
December 2001	361,058	12/6/01	ND (c)	0.01	717,769	12/6/01	ND (c)	
Quarterly Totals	*1,074,024*			*0.02*	*1,320,713*			

(a) PCP not detected above the detection limit of 5 µg/L; concentration-dependent calculations based on half the detection limit.
(b) PCP not detected above the detection limit of 25 µg/L; concentration-dependent calculations based on half the detection limit.
(c) PCP not detected above the detection limit of 5.25 µg/L; concentration-dependent calculations based on half the detection limit.

DRAFT

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TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - FOURTH QUARTER 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL)(a)	DTW(b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
Deep Wells:							
B2	11/28/01	12:46	30.31	24.14	6.17	----	
G1A	11/28/01	11:32	29.72	23.84	5.88	----	
J2	11/28/01	12:36	29.65	23.45	6.20	----	
LW1D	11/28/01	12:29	28.31	21.73	6.58	----	
LW3D	11/28/01	12:42	30.80	24.48	6.32	----	
LW4D	11/28/01	12:04	30.17	24.41	5.76	----	
LW6D	11/28/01	11:46	30.84	24.92	5.92	----	
LW9D	11/28/01	11:53	30.98	25.40	5.58	----	
LW10D	11/28/01	11:55	31.12	25.46	5.66	----	
LW11D	11/28/01	12:53	29.04	24.54	4.50	----	
LW12D1	11/28/01	12:38	30.02	23.33	6.69	----	
LW14D	11/28/01	11:56	30.54	25.03	5.51	----	
LW15D	11/28/01	11:55	30.85	25.29	5.56	----	
LW16D	11/28/01	11:57	28.40	22.87	5.53	----	
LW17D	11/28/01	11:50	27.82	22.00	5.82	----	
LW18D	11/28/01	11:51	27.82	22.00	5.82	----	
RW2	11/28/01	12:02	30.68	26.86	3.82	----	
Other:							
River Gauge	11/28/01	11:16	28.13	22.50	5.63	----	
River Gauge	11/28/01	12:18	28.13	23.13	5.00	----	

---- No measurable product or odor observed.

(a) Reference Elevation is the north side of the top of the 2-in well casing. Reference elevation surveys were conducted by Tec Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.

(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].

DRAFT

Landau Associates
Environmental and Geotechnical Services

REC'D MAR 1 1 2002

March 8, 2002

86-102
(E) 1

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the February 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
3/8/02 S:\WFROC\231\TRANSMIT FAX\Monthly Rpt_Ltr doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

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Seattle (Edmonds) Tacoma Portland (Lake Oswego) Spokane

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
February 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the January 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an approximate average flow rate of 11 gpm. Approximately a total of 6.26 million gallons of groundwater have been recovered, treated, and discharged, with a total of about 438,000 gallons treated in February 2002. Analytical results indicate pentachlorophenol is degraded to nondetectable concentrations or concentrations less than the discharge limitations in the effluent.
- Continued review of the system operations performance for the groundwater interim action system at RW-2 and the onsite wastewater treatment system.
- Replaced the pump at HRW-1 with a smaller pump that should be able to sustain a flow rate of 0.5 gpm, tested the pump, and began startup of groundwater interim action system in the upper zone at HRW-1, including system startup procedures, groundwater level measurements, and effluent sampling and analysis with full-scale treatment and discharge to POTW.
- Submitted the *Phase I - Soil Stockpile Removal Action Plan (RAP)* to DEQ.
- Time Oil is continuing negotiations with Envirocon regarding the transportation and disposal of the stockpiled soil to HAZCO's facility in Richmond, British Columbia, Canada, as approved by DEQ in their letter dated September 25, 2001. All regulatory permits are currently in place. Shipments could begin as soon as the contract is negotiated and DEQ approves the Stockpile RAP. However, HAZCO has temporarily suspended its earlier acceptance of the soil pending conclusion of current discussions in Richmond about the shipment. Time Oil expects this issue to be resolved shortly.
- Conducted client review of the *Third Quarter 2001 Groundwater Report.* Completed client review of the *Third Quarter 2001 Groundwater Interim Action Status Report* and submitted to DEQ.
- Began preparation of the *Fourth Quarter 2001 Groundwater Report.*
- Prepared for and conducted the first quarter 2002 groundwater sampling event, February 25-28, 2002.
- Continued database conversion to a GIS format.
- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.
- Continued preparation of the *Phase III Preliminary Evaluation Report.*
- Conducted client review of the *East Property Remedial Action Plan.*

RESULTS COLLECTED

- Fourth quarter 2001 groundwater data will be provided electronically to DEQ.

BZTO104(e)016612

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and in the upper zone at HRW-1. Continue full-scale treatment and discharge to POTW.
- Complete client review of *Third Quarter 2001 Groundwater Report* and submit to DEQ.
- Prepare the *Fourth Quarter 2001 Groundwater Interim Action Status Report* and the *Fourth Quarter 2001 Groundwater Report*.
- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.
- Complete transfer to project database information into GIS\Key.
- Complete client review of the *East Property Remedial Action Plan* and submit to DEQ. Begin preparation of a contractor scope of work for the remedial action activities.
- Complete preparation of the *Phase III Preliminary Evaluation Report*, including development of recommendations for the scope for the Phase III RI, and provide to client for review.

BZTO104(e)016613

86-102 (E) E'

Landau Associates
Environmental and Geotechnical Services

TRANSMITTAL

REC'D APR 2 9 2002

To: Oregon Dept. of Environmental Quality
2020 SW Fourth Ave. Suite 400
Portland, OR 97201-4987

Date: April 19, 2002

Attn: Mr. Tom Roick

Project No.: 231001.117

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Memorandum Re: Groundwater Action Interim Status Report - Fourth Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon (4/19/02)

Message:

The above-noted groundwater action interim status report is provided for your file. We apologize for the delay in getting this to you; it inadvertently slipped through the cracks because I thought we had already sent it to you. I hope it didn't cause you any inconvenience.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
4/19/02 S:\WPROC\231\TRANSMIT.FAX\Qtrly IASRpt_trn.doc
Enclosure

cc: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

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Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers and Rebekah Brooks

DATE April 22, 2002

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – FOURTH QUARTER 2001
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

This memorandum presents a summary of the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon for the fourth quarter of 2001. System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm fourth quarter 2001 compliance with performance criteria for the lower water-bearing zone (lower zone) at the site. Specific performance criteria achieved included: 1) continuous pumping from RW-2, except for brief periods of system maintenance, 2) reversal of the lower zone groundwater flow direction at the leading edge of the pentachlorophenol (PCP) plume, 3) chemical confirmation that continued migration downgradient of RW-2 is not occurring, and 4) compliance with the requirements of the existing discharge permit. Figure 1 shows a site plan for the terminal. In addition to the discussion of system performance and status, a brief summary of data collected for the interim action is provided below.

SYSTEM PERFORMANCE AND STATUS

The groundwater interim action system for the lower zone continued to operate throughout the fourth quarter of 2001 as groundwater was extracted from well RW-2 at an average rate of approximately 8 gpm. During this time period, RW-2 operated for 2,234 hours (approximately 93 days) and extracted approximately 1,074,000 gallons of groundwater. The recovered groundwater was pumped to a collection tank for subsequent treatment by the activated sludge wastewater treatment plant located at the site. Approximately 1,321,000 gallons of groundwater were treated at the terminal wastewater treatment plant and discharged to the sanitary sewer under a permit with the City of Portland (Permit No. 400-121) in the fourth quarter of 2001 (October 1 through December 31, 2001). The volume of treated wastewater included a portion of the recovered groundwater and rinsate water generated onsite from the cleaning of former bulk petroleum storage tanks. Recovered groundwater that was not treated was stored in tank No. 16804 located within the main tank farm area of the terminal pending transfer to the onsite wastewater

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treatment facility. The operational history of the groundwater interim action in the lower zone is summarized in Table 1.

In addition to RW-2, a horizontal recovery well (HRW-1) was installed at the terminal for recovery of groundwater from the upper water-bearing zone (upper zone); however, groundwater extraction and treatment has been restricted to the lower zone at well RW-2 due to the low groundwater level in HRW-1 since installation. Below normal precipitation through the summer and fall of 2001 resulted in depressed upper zone groundwater levels at the terminal. The low water level alarm in HRW-1 was activated through most of the fourth quarter 2001. The submersible pump in HRW-1 was reinstalled in December 2001 after being removed for the performance of the vacuum-enhanced pumping test in August 2001. The conductivity sensor was also reinstalled in December after being removed for repair. After reinstallation, the water level in HRW-1 had risen above the sensor; therefore, preparation began for startup of the groundwater interim action in the upper zone at HRW-1. It is currently anticipated the startup of HRW-1 will occur during the first quarter 2002 using the submersible pump.

DATA COLLECTION AND RESULTS

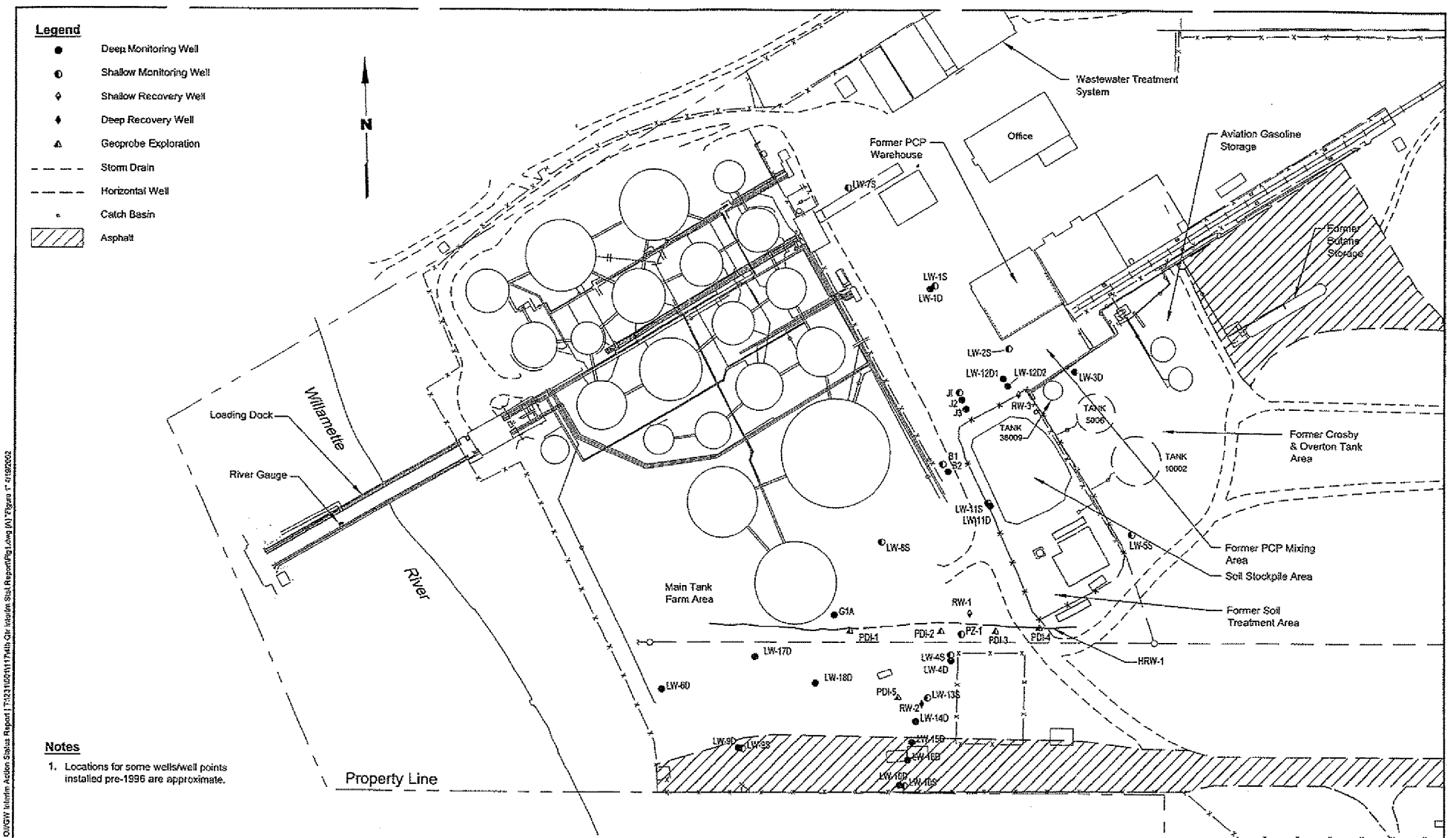
As shown on Figure 2, the data indicate that current pumping conditions appear to achieve hydraulic capture to the west near LW-18D and south to well LW-10D. As shown in Figure 4, the lower zone PCP plume (the PCP plume has historically been defined as the 1 μg/L PCP concentration contour) appears to have been reduced significantly in the area influenced by the interim action so that no lower zone concentrations exceed 1 μg/L except for detections of 3 μg/L in LW-3D and 1.8 μg/L in RW-2. These results indicate that the interim action in the lower zone has been successful in the containment and extraction of PCP-contaminated groundwater in the lower zone. Groundwater PCP concentrations and hydraulic capture in the area of the interim action will continue to be monitored to demonstrate compliance with lower zone performance criteria.

REFERENCES

Landau Associates. 2000. *Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon.* July 14.

Landau Associates. 1999. *Aquifer Test Report, Time Oil Northwest Terminal, Portland, Oregon.* December 20.

Landau Associates. 1998. Technical Memorandum Re: Additional Groundwater Investigation, January-February, 1998, Time Oil Northwest Terminal, Portland, OR. Submitted to Karla Urbanowicz, Oregon Department of Environmental Quality, Portland, OR. July 28.



Notes

1. Locations for some wells/well points installed pre-1996 are approximate.

Landau Associates

Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 1

Time Oil/GW Interim Action Status Report | T:\231\02\61\17\4th Qtr Interim Stat Report\Fig1.dwg [A1 "Figure 1" 4/18/2002

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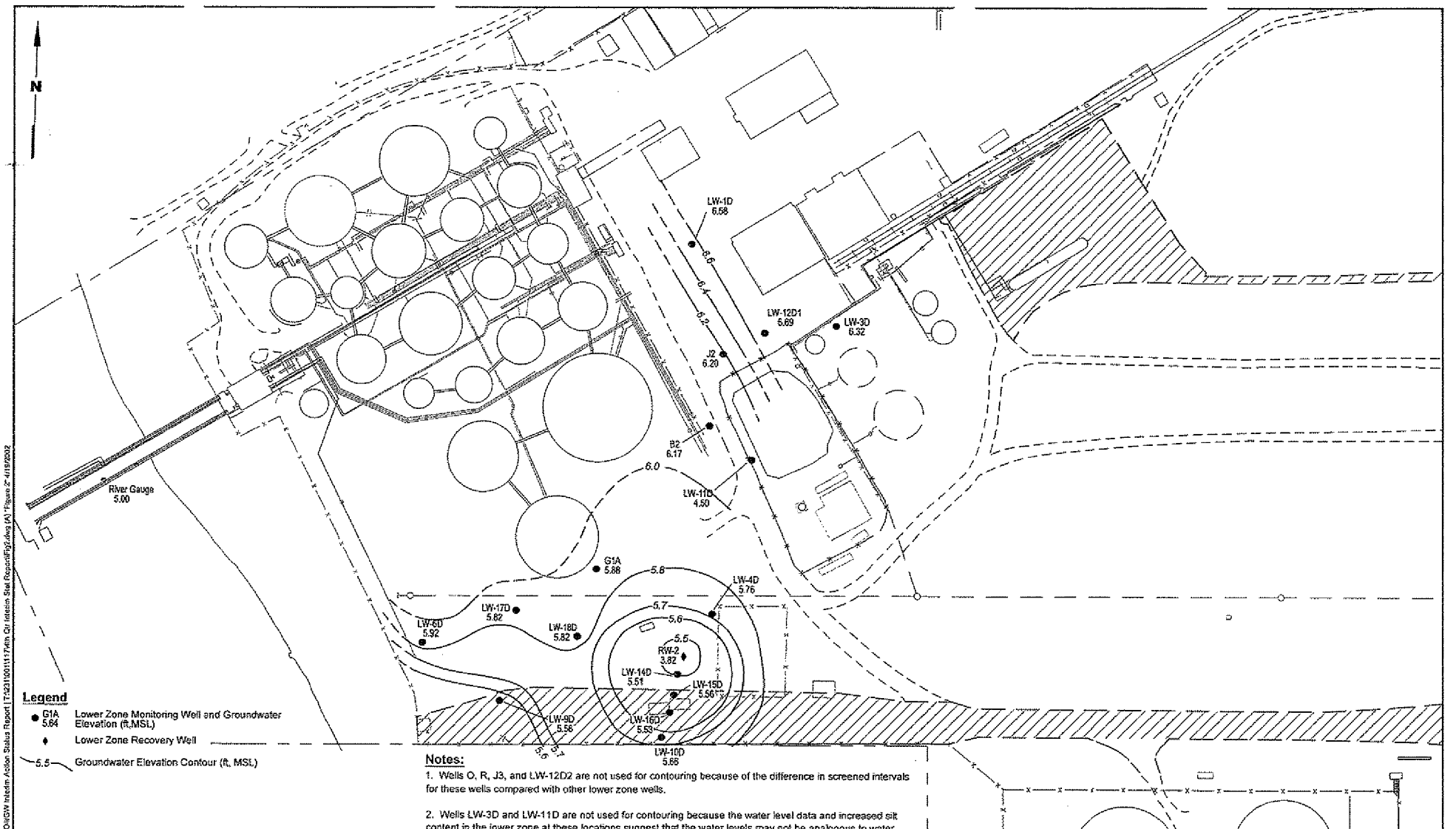

Notes:

1. Wells O, R, J3, and LW-12D2 are not used for contouring because of the difference in screened intervals for these wells compared with other lower zone wells.

2. Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.

Landau Associates

Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Lower Zone, Fourth Quarter 2001**	Figure 2

Time Oil/GW Interim Action Status Report | T:\231\001\117\4th Qtr Interim Stat Report\Fig2.dwg (A) "Figure 2" 4/19/2002

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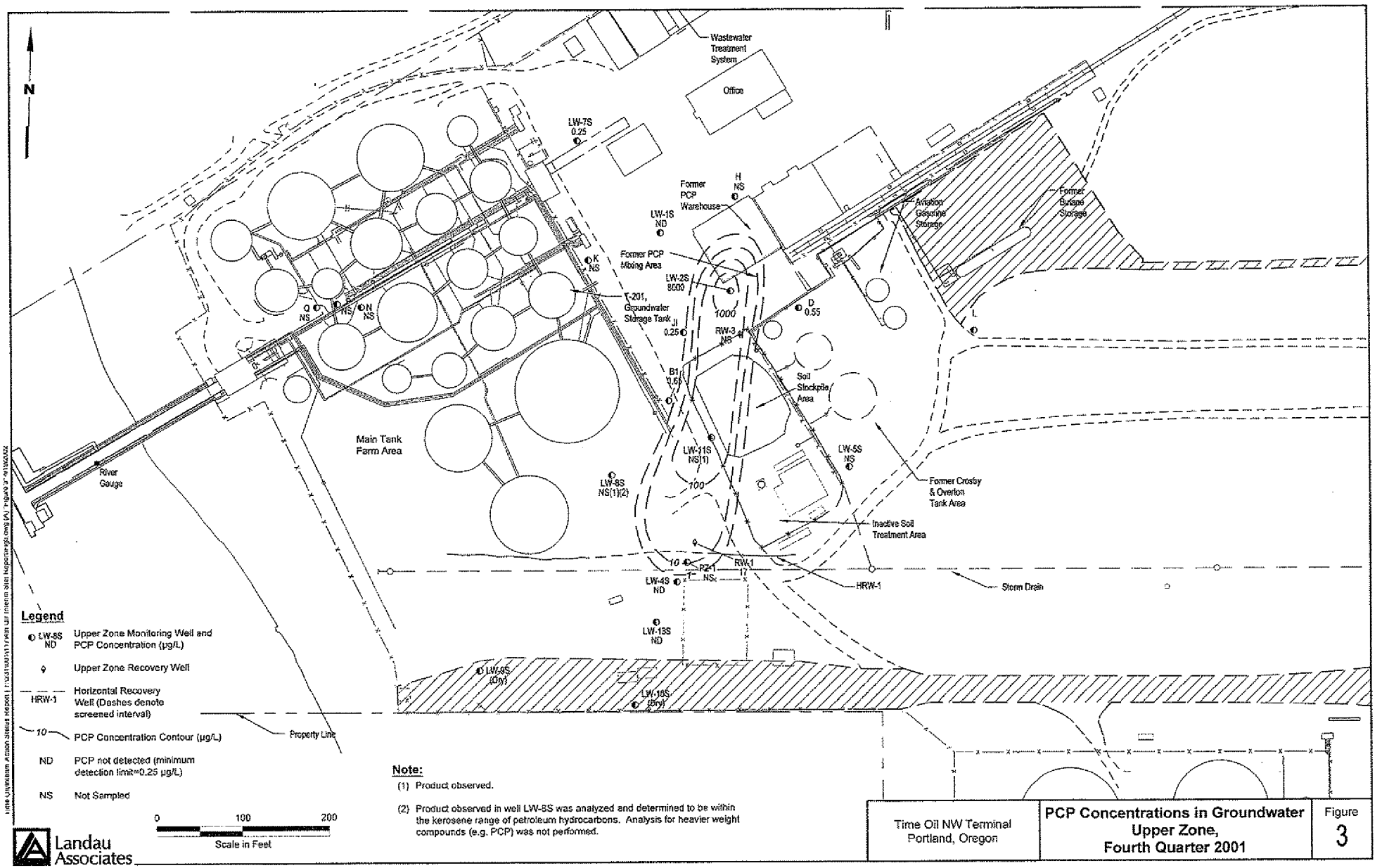

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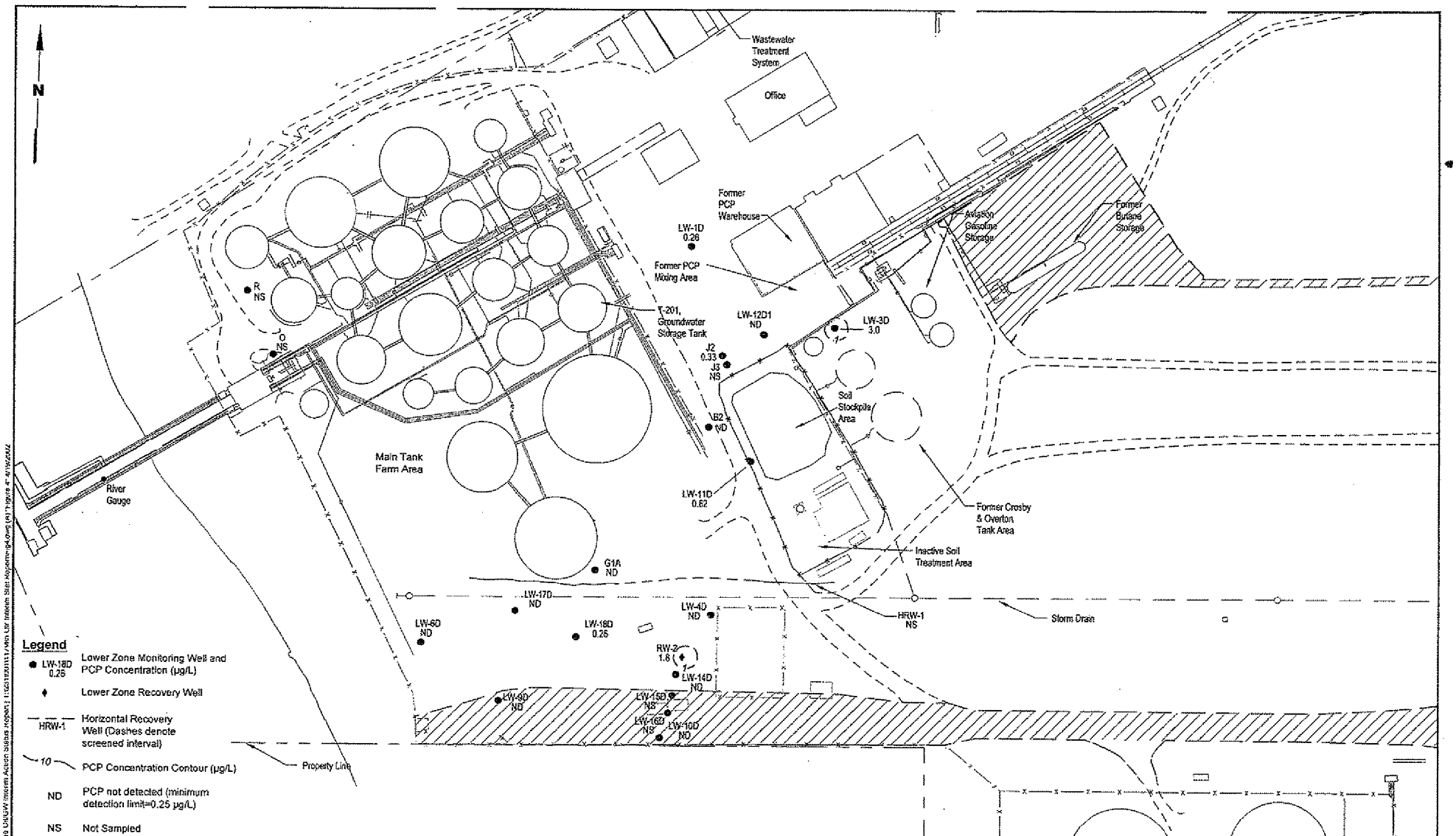

Time Oil NW Terminal
Portland, Oregon

PCP Concentrations in Groundwater Lower Zone, Fourth Quarter 2001

Figure 4

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TIME OIL CO.

2737 WEST COMMODORE WAY
P.O. BOX 24447

SEATTLE, WA 98199-1233
SEATTLE, WA 98124-0447

REC'D APR 0 8 2002

86-102
E) E.1

April 5, 2002

Thomas E. Roick
Remedial Action Specialist - Voluntary Cleanup & Site Assessment
Oregon Department of Environmental Quality
NW Region
2020 SW Fourth Ave., Suite 400
Portland, OR 97201-4987

Re: Time Oil Co. - Northwest Terminal

Soil Stockpile

Dear Tom:

Time Oil reported in the February 2002 monthly report that, although all necessary regulatory permits had been obtained for export of the soil stockpile for treatment and ultimate disposal at the Hazco and Ecowaste facilities in Richmond, British Columbia, Hazco and Ecowaste had temporarily suspended their earlier acceptance of the soil while they worked to resolve questions raised by the City of Richmond. Unfortunately, Hazco and Ecowaste have now withdrawn their offer to transport, treat, and dispose of the soil stockpile. I am enclosing a copy of the Hazco and Ecowaste press release announcing their decision not to accept the soil.

Time Oil is obviously very disappointed by this turn of events. As you know, there is no facility in the United States permitted to accept this material. We are actively looking for available options for the disposition of the soil stockpile and will keep you apprised of our findings. In the meantime, Time Oil will continue to maintain the lined, covered stockpile in a manner that presents no risk to human health or the environment.

If you have any questions, please give me a call, I can be reached at (206) 286-6443.

Sincerely,

Kevin M. Murphy

cc: Rebekkah Brooks
Patty Dost

Hazco Environmental Services Ltd.
#160, 13511 Vulcan Way
Richmond, BC V6V 1K4
604-214-7000

Ecowaste Industries Ltd.
#215, 10451 Shellbridge Way
Richmond, BC V6X 2W8
604-276-9511

For immediate release: March 26, 2002

Hazco Environmental Services and Ecowaste Industries have announced that they will not proceed with a plan to import and treat contaminated soil from a US site.

The soils would have received bioremediation treatment by Hazco before being placed in a landfill operated by Ecowaste. The proposal has been approved by both the federal and provincial governments, and in the opinion of the companies, would pose no unacceptable environmental risk.

"While we are confident the proposal was environmentally sound, we are also sensitive to the concerns expressed by our neighbours and fellow members of the community," said Hazco Vice-President Gregory Campbell. "We are proud to provide important and environmentally responsible services to the community and want to continue to build on that positive relationship."

Ecowaste President Stuart Somerville said the companies will now be asking the federal government to pursue harmonization of national and international standards. The provincial government will be asked by the companies to reassess the validity of its standards based on limits and requirements in place in other jurisdictions.

As well, Somerville said the companies will continue to co-operate with the City of Richmond and other concerned parties in the matter.

Hazco Environmental Services provides environmental remediation and other waste management services in Western Canada. Ecowaste Industries owns and operates the Richmond Landfill for non-contaminated soils and inert refuse, primarily from construction and demolition activities. In addition, Ecowaste operates a yard waste composting facility.

For further information contact:
Gregory Campbell, Hazco Environmental Services, 604-214-7000
Stuart Somerville, Ecowaste Industries, 604-276-9511

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REC'D APR 11 2002

Landau Associates
Environmental and Geotechnical Services

April 9, 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the March 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
4/9/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr.doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.✓

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
March 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the February 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an approximate average flow rate of about 7 gpm. Continued implementation of the groundwater interim action in the upper zone at HRW-1, at an approximately average flow rate of about 1 gpm. Approximately a total of 6.49 million gallons of groundwater have been recovered, treated, and discharged, with a total of about 281,000 gallons treated in March 2002. Analytical results indicate pentachlorophenol is degraded to nondetectable concentrations or concentrations less than the discharge limitations in the effluent.
- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Completed client review on the *Third Quarter 2001 Groundwater Report* and submitted to DEQ.
- Submitted the *Fourth Quarter 2001Groundwater Interim Action Status Report* to DEQ.
- Conducted internal reviews of the *Fourth Quarter 2001 Groundwater Report* and submitted to Time Oil for review.
- Began receiving and processing first quarter 2002 groundwater data.
- Completed database conversion to a GIS format.
- Began preliminary evaluations for remedial alternatives for upper zone groundwater.
- Provided a letter to DEQ describing the agency approval process for the stockpile and containing copies of the approval application forms, as requested by DEQ.
- Conducted internal reviews of the *Phase III Preliminary Evaluation Report* and provided to Time Oil for review.
- Completed client review of the *East Property Remedial Action Plan* and submitted to DEQ.
- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.

RESULTS COLLECTED

- A portion of the first quarter 2002 groundwater data.

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PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- Time Oil reported in the February 2002 monthly report that, although all necessary regulatory permits had been obtained for export of the soil stockpile for treatment and ultimate disposal at the Hazco and Ecowaste facilities in Richmond, British Columbia, Hazco and Ecowaste had temporarily suspended their earlier acceptance of the soil while they worked to resolve questions raised by the City of Richmond. Unfortunately, Hazco and Ecowaste have now withdrawn their offer to transport, treat, and dispose of the soil stockpile, as indicated in Time Oil's letter to DEQ, dated April 5, 2002. Time Oil is actively looking for available options for the disposition of the soil stockpile. In the meantime, Time Oil will continue to maintain the lined, covered stockpile in a manner that presents no risk to human health or the environment.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and in the upper zone at HRW-1. Continue full-scale treatment and discharge to POTW.
- Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.
- Provide the *Fourth Quarter 2001 Groundwater Report* to DEQ.
- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.
- Prepare a contractor scope of work for the east property remedial action activities.
- Complete client review of the *Phase III Preliminary Evaluation Report* and submit to DEQ.
- Evaluate availability of options for treatment/disposal of the stockpiled material.

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LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TRANSMITTAL

To: SEE DISTRIBUTION BELOW Date: May 23, 2002

Attn: Project No.: 231001.117

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Memorandum RE: Groundwater Interim Action Status Report - First Quarter 2002, Time Oil Northwest Terminal, Portland, Oregon (5/23/02)

The above-noted document is provided for your review and comment.

LANDAU ASSOCIATES, INC.

For Rebekah Brooks
Senior Hydrogeologist

RB/tam

DISTRIBUTION:

Patty Dost, Schwabe, Williamson & Wyatt
Kevin Murphy, Time Oil Co.
Mike Tischuk, Beazer East, Inc.

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DRAFT
TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers and Rebekah Brooks

DATE: May 23, 2002

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

This memorandum presents a summary of the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon (Figure 1) for the first quarter of 2002 (January 1 – March 29, 2002). System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm first quarter 2002 compliance with performance criteria for the upper water-bearing zone (upper zone) and the lower water-bearing zone (lower zone) at the site. Specific performance criteria include: 1) pumping of groundwater from an upper zone recovery well (HRW-1) when sufficient groundwater is present in the upper zone, 2) groundwater flow toward HRW-1 from the downgradient and upgradient directions, 3) continuous pumping from a lower zone recovery well (RW-2), except for brief periods of system maintenance, 4) reversal of the lower zone groundwater flow direction at the leading edge of the pentachlorophenol (PCP) plume, 5) chemical confirmation that continued migration of PCP in groundwater downgradient of RW-2 is not occurring, and 6) compliance with the requirements of the existing discharge permit. Figure 1 shows a site plan for the terminal. In addition to the discussion of system performance and status, a brief summary of data collected for the interim action is provided below.

SYSTEM PERFORMANCE AND STATUS

Relative to the six criteria presented above, the following information was derived from the operation of the groundwater interim action remedial system:

1) Startup activities for the groundwater interim action in the upper zone commenced during the first quarter 2002 resulting from increases in groundwater levels during the winter. On January 22, 2002, an attempt was made to begin to extract water from the upper zone at horizontal recovery well HRW-1. A total of approximately 1,812 gallons were extracted from HRW-1 from January 22 to 29, 2002 at an approximate pumping rate of 2.5 gpm, which repeatedly pumped the well dry. Repeated attempts to adjust the pumping rate downward in order to maintain an adequate head for extraction were unsuccessful. The pump in HRW-1 was replaced with a pump capable of extracting water at a lower flow rate and groundwater recovery was initiated again on February 28, 2002. From February 28 to March 29, 2002,

groundwater was extracted from HRW-1 at an approximate flow rate of 0.8 gallons per minute (gpm). An additional 40,352 gallons of water was extracted from the upper zone during this time, with a total of 42,164 gallons of upper zone groundwater extracted from HRW-1 during the first quarter of 2002. The groundwater recovery pump in HRW-1 was operated for approximately 866 hours and discharged water to an aboveground storage tank (Tank 16804) for temporary storage until treated by the terminal's wastewater treatment system. A summary of the groundwater recovery from HRW-1 is included in Table 1.

2) Groundwater elevation data were collected from the upper zone monitoring wells on February 27 as part of the first quarter 2002 groundwater monitoring event and on March 5, 2002 for compliance with the HRW-1 start-up monitoring requirements. The groundwater elevation data are summarized in Table 2 and presented on Figures 2 (February 27) and 3 (March 5). The groundwater elevation data for the upper zone appear to indicate that the groundwater elevations have decreased throughout the site from February 27 to March 5, 2002, but localized decreases in water levels in close proximity to HRW-1 were not observed. Therefore, the decrease does not appear to be due to the extraction of groundwater from HRW-1.

3) With the exception of periodic shutdowns for system maintenance, groundwater has been extracted continuously from the lower zone during the first quarter of 2002 by operating the groundwater recovery pump in RW-2. Approximately 894,518 gallons of groundwater were recovered from RW-2 during the first quarter of 2002 at an estimated rate of 7.2 gpm. During the period from January 2 to March 29, 2002, the recovery pump operated for approximately 2,063 hours and discharged water to Tank 16804 for temporary storage until treated by the terminal's wastewater treatment system. A summary of the groundwater recovery from RW-2 is included in Table 1.

4) Groundwater elevation data were collected from the lower zone on February 27, 2002. The groundwater elevation data are summarized in Table 2 and presented on Figure 4. Based on the groundwater elevation data collected, the groundwater flow direction has been reversed downgradient of the leading edge of the PCP plume in the lower zone.

5) Groundwater samples were collected at the site on February 26 through 28, 2002. Historically, the extent of groundwater impact has been estimated based on the extent of dissolved-phase PCP. The extent of PCP present in the upper and lower zone is depicted on Figures 5 and 6, respectively, based on data collected during the February 2002 groundwater sampling event. The analytical data indicate that lower zone monitoring wells downgradient of RW-2 do not exhibit detectable concentrations of PCP, confirming the hydraulic capture of lower zone groundwater in that direction.

6) The industrial wastewater discharge permit (City of Portland Permit No. 400.121400.121) for discharge of the extracted groundwater following treatment at the terminal's wastewater treatment plant includes the following discharge limitations:

Parameter	Permitted Limit
PCP	40 micrograms/liter (µg/L)
Benzene	50 µg/L
BETX (benzene, ethylbenzene, toluene, and xylenes)	750 µg/L
pH	5 to 11.5

DRAFT

Analyses of the treatment system effluent were not completed during the first quarter 2002. However, laboratory analyses for the listed parameters were completed in the fourth quarter of 2001 and none of the permitted limits were exceeded. The wastewater treatment system effluent was sampled during the first week of April 2002 for analysis of PCP. The analytical data will be reported in the second quarter 2002 interim action status report.

SCHEDULED OPERATION OF SYSTEM

During the second quarter of 2002, we anticipate the continued extraction of groundwater from the upper (HRW-1) and lower (RW-2) zones. We will attempt to optimize the recovery of groundwater from HRW-1 to reverse the groundwater flow direction downgradient of HRW-1. The continued rate of recovery of groundwater from HRW-1 may be dependent on the seasonal fluctuation of the groundwater elevation in the upper zone. The groundwater levels in HRW-1 may also be influenced by the flood stage of the Willamette River located adjacent to and southwest of the interim action area (Figure 7). We will continue to monitor the system to evaluate the system operation relative to the performance criteria referenced in the startup monitoring plan (Landau Associates 2000).

REFERENCES

Landau Associates. 2000. *Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon.* July 14.

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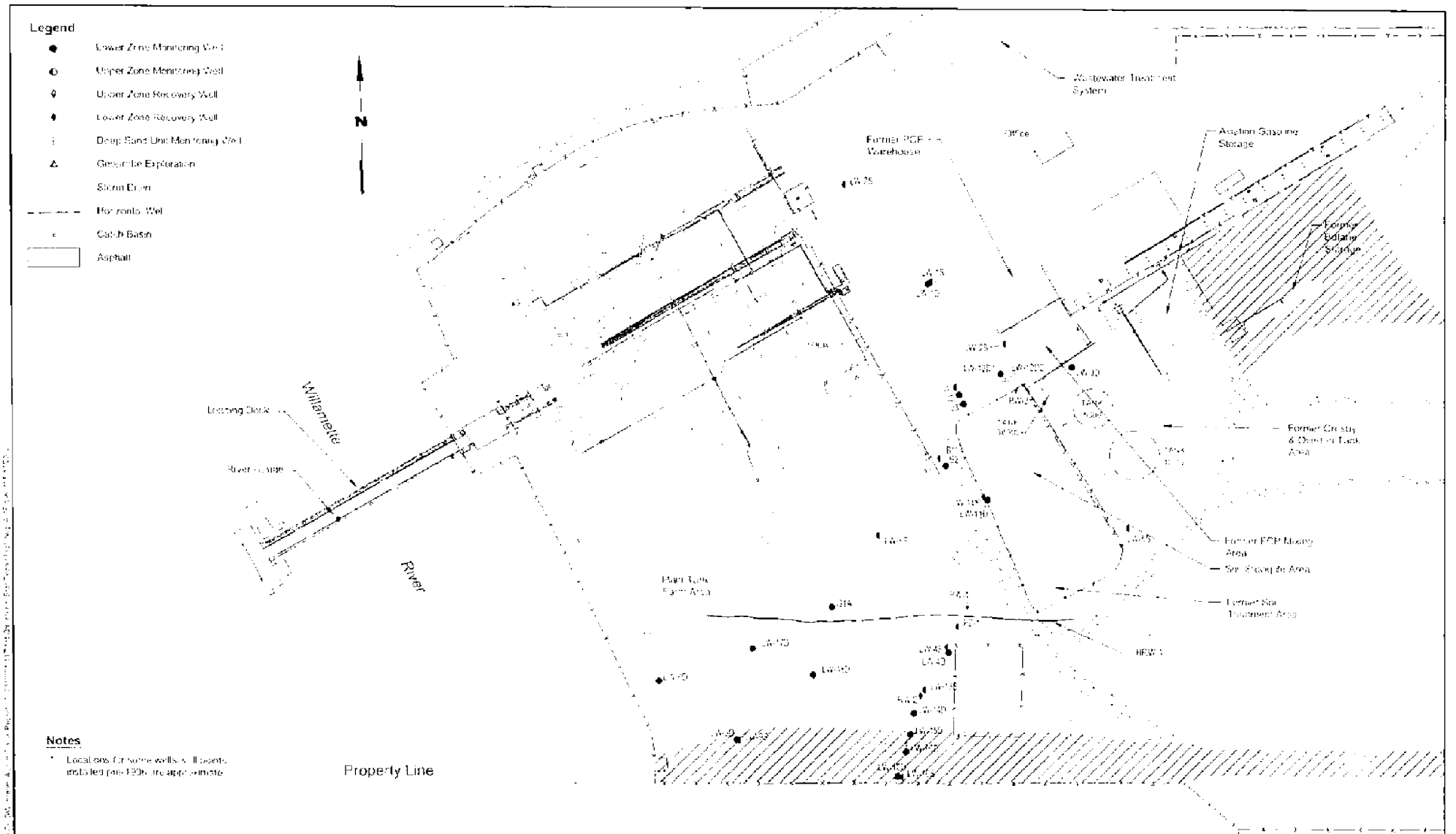

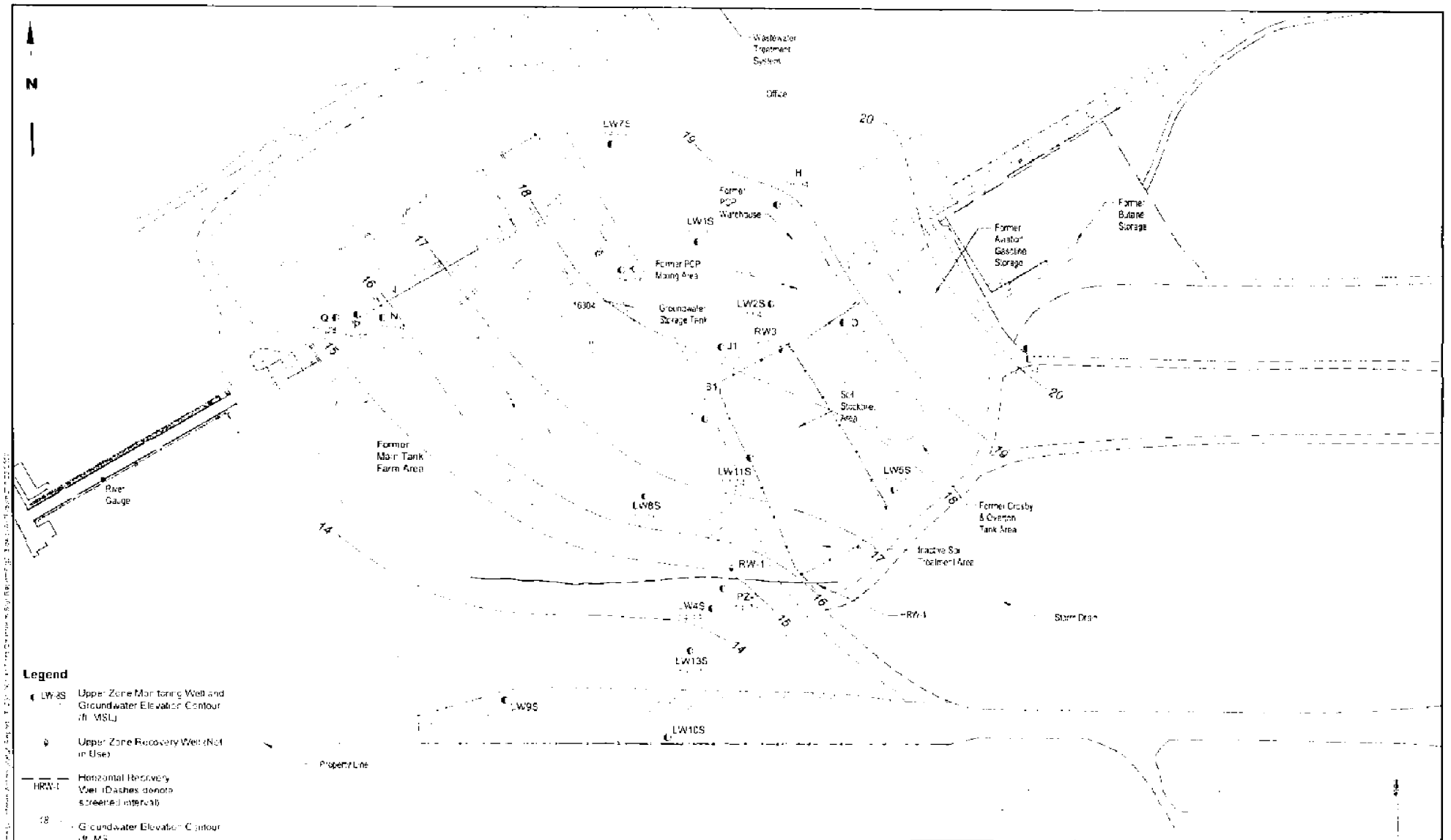

Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours
Upper Zone,
February 27, 2002

Figure
2

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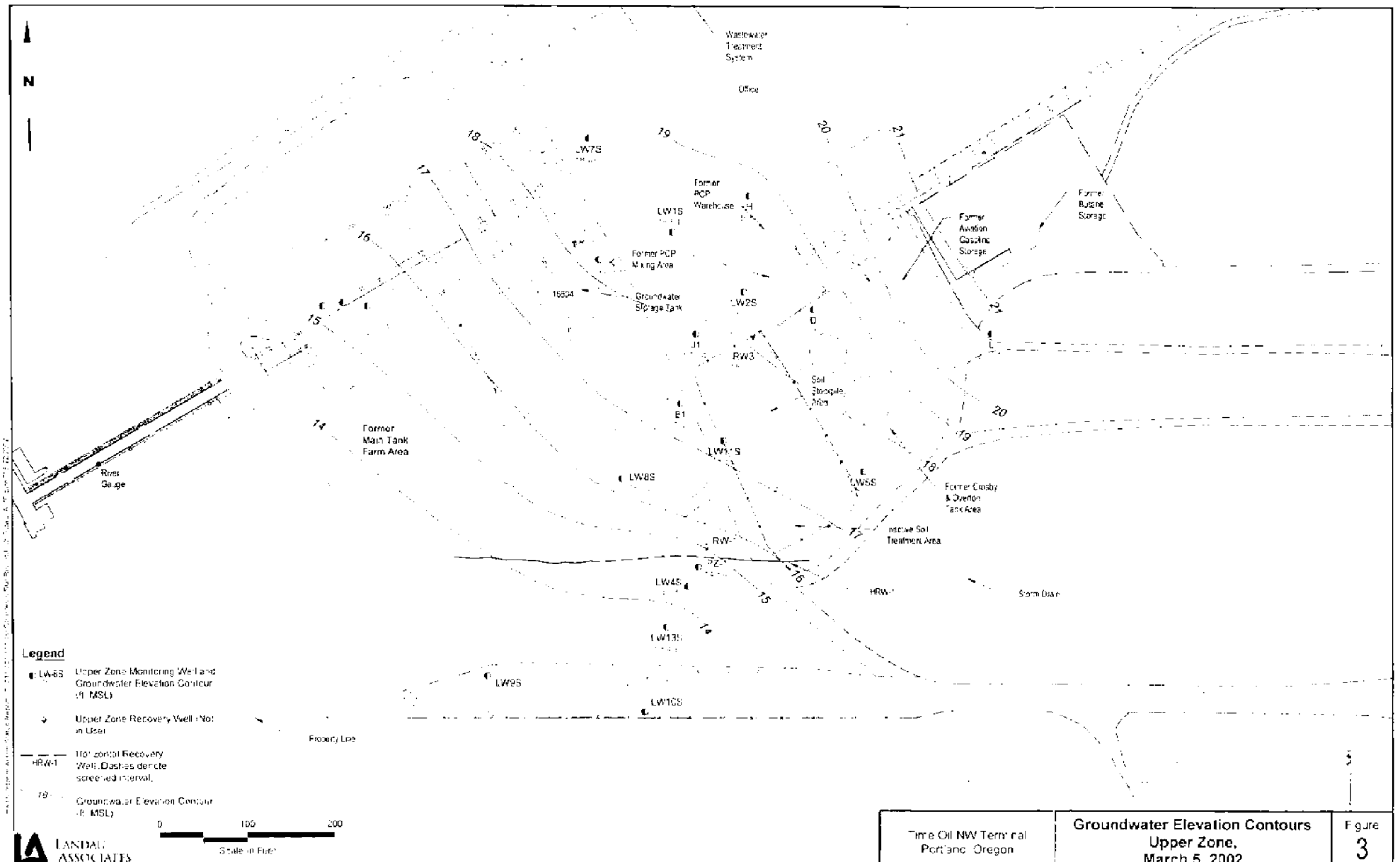

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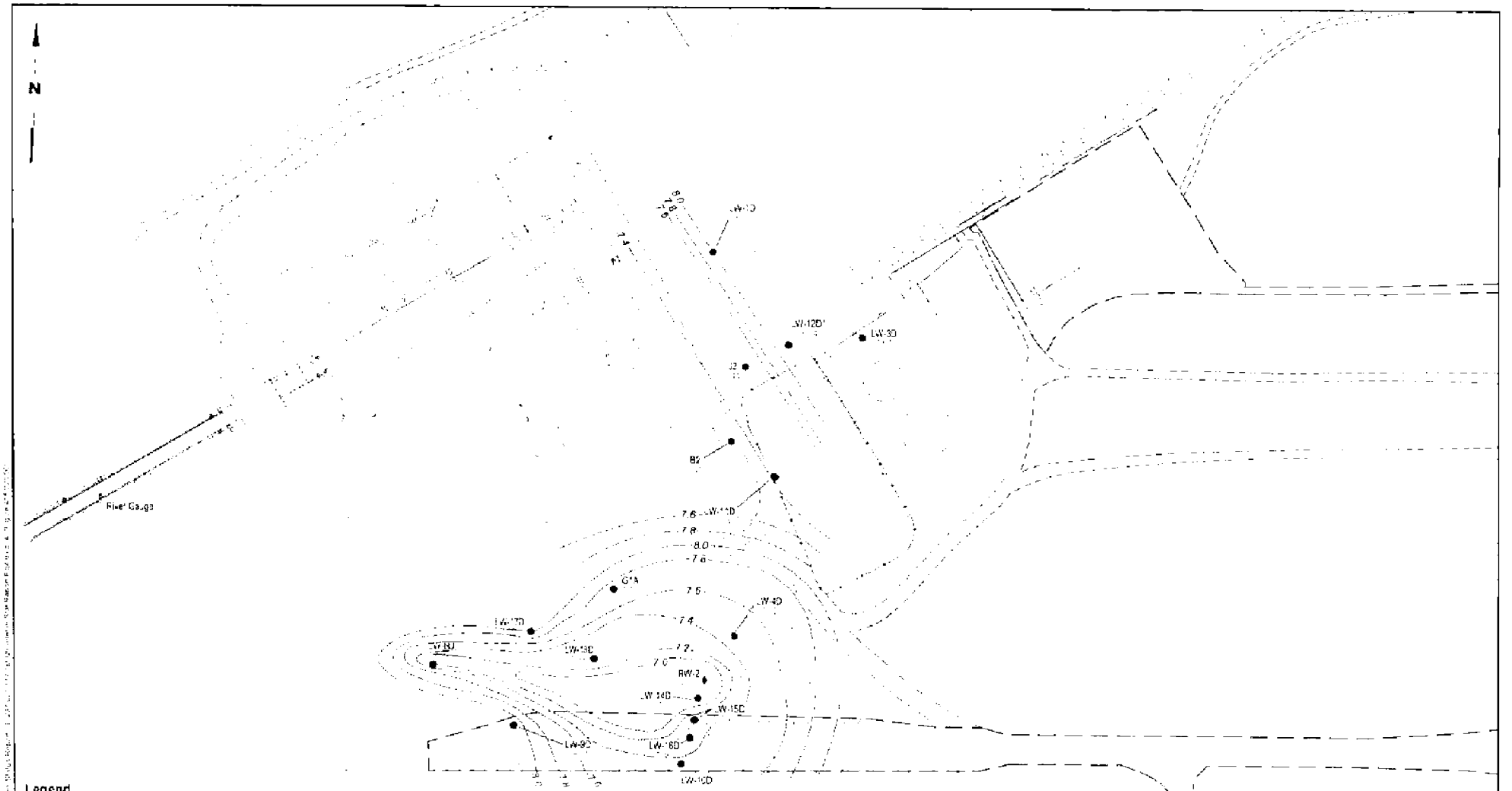

Legend

- G1A — Lower Zone Monitoring Well and Groundwater Elevation (ft MSL)
- Lower Zone Recovery Well
- 7.8 — Groundwater Elevation Contour (ft MSL)

0 100 200
Scale - Feet

LANDAU ASSOCIATES

Note

Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.

Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Lower Zone, February 27, 2002**	Figure 4

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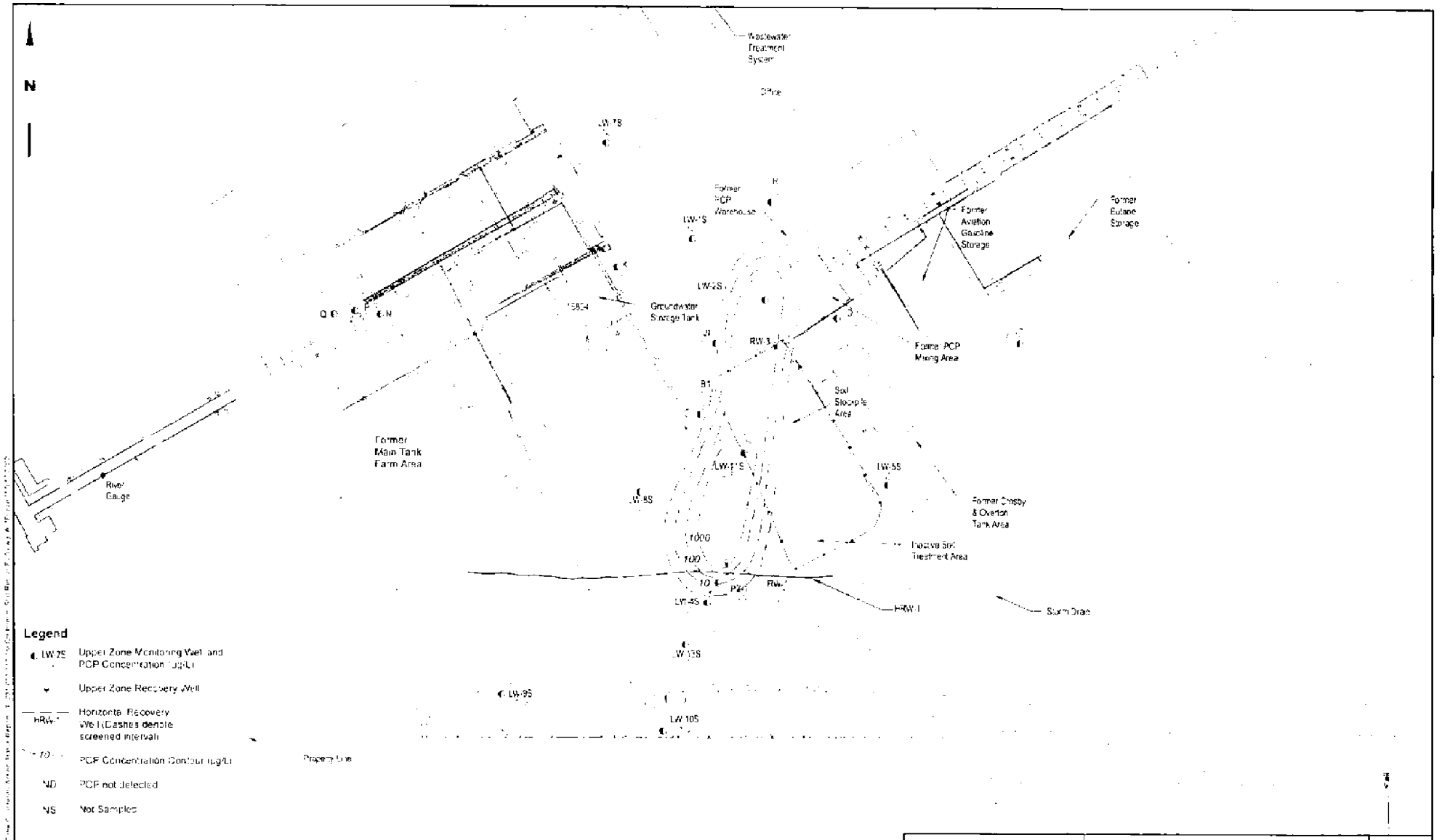

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Time Oil NW Terminal Portland, Oregon	PCP Concentrations in Groundwater Upper Zone, February 2002	Figure 5

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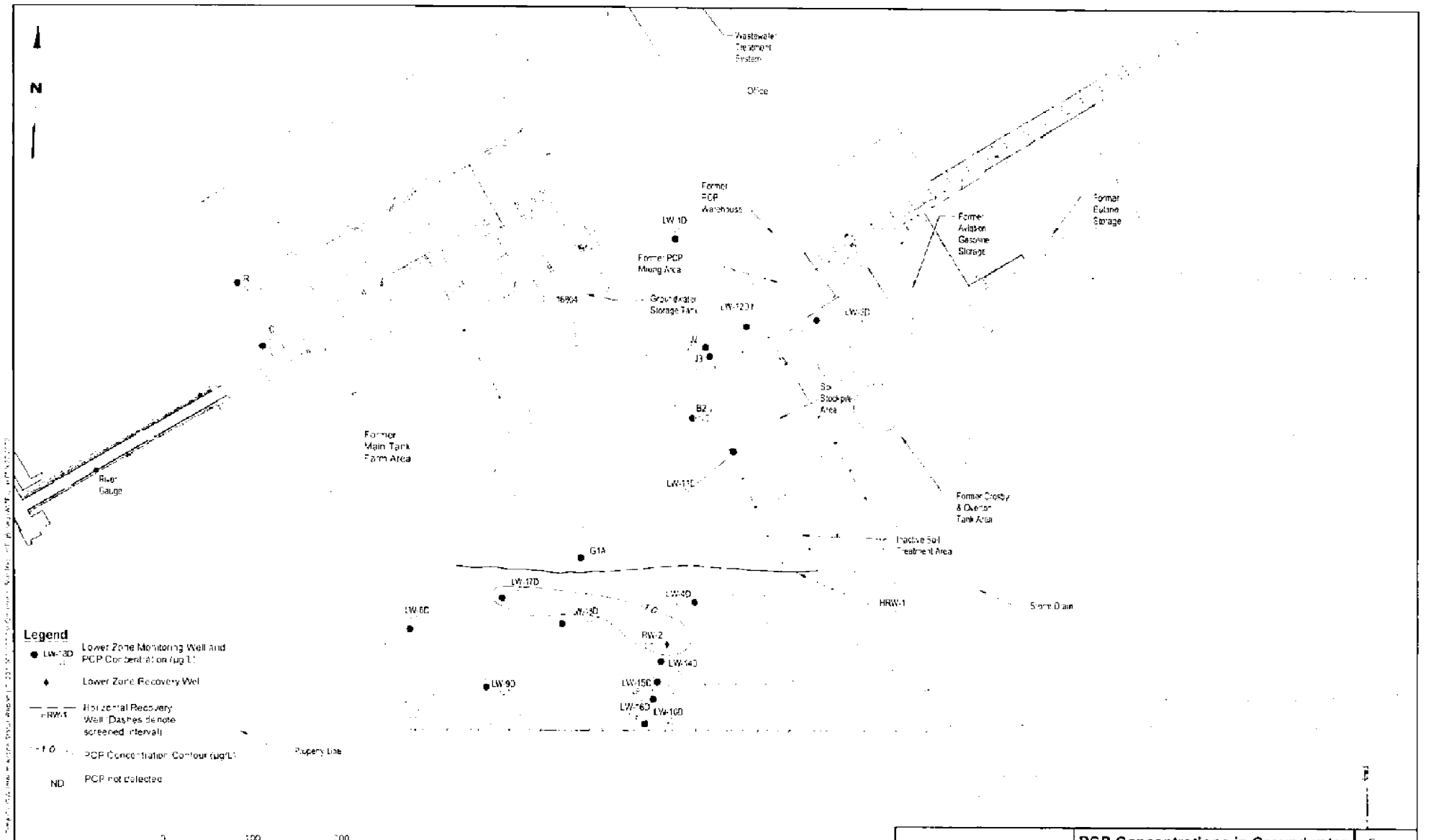

Time Oil NW Terminal Portland, Oregon	PCP Concentrations in Groundwater Lower Zone, February 2002	Figure 6

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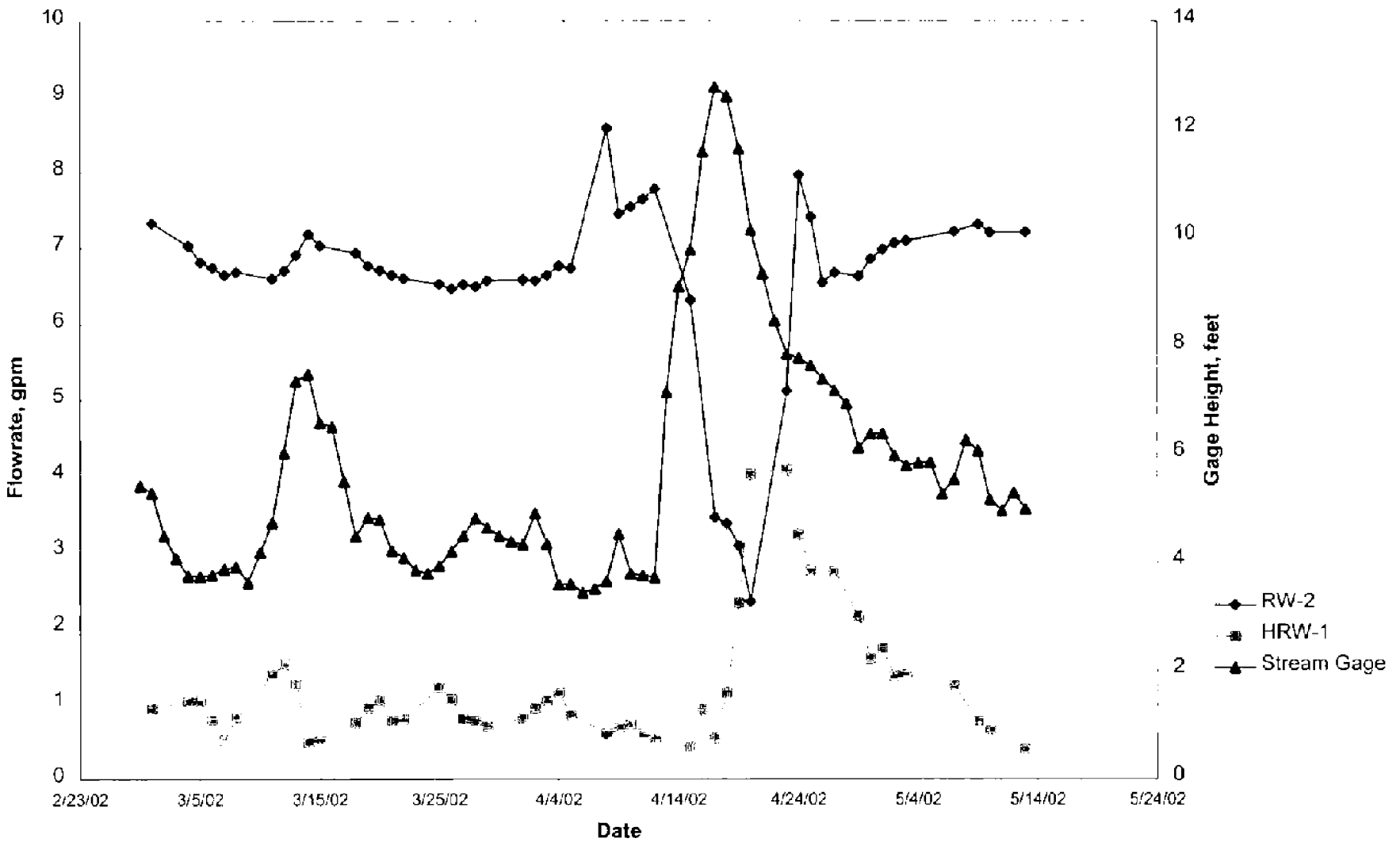

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Time Oil NW Terminal
Portland, Oregon

Relationship Between Groundwater Recovery and River Stage

Figure
7

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TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
UPPER AND LOWER WATER-BEARING ZONES
TIME OIL NORTHWEST TERMINAL

Monitoring Period	RW-2 Discharge				HRW-1 Discharge				Treatment System Discharge			Comments
	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	
Fourth Quarter 2000												
October 2000	439,003			0.35					0			Mass removal calculated using 11.00 PCP concentration
November 2000	305,601	11/9/00	86	0.24					467,478	11/7/00	ND (a)	
December 2000	348,720	12/20/00	39	0.11					497,656	12/6/00	5.89	
										12/20/00	9.73	
Quarterly Totals	*1,093,324*			*0.70*					*965,134*			
First Quarter 2001												
January 2001	416,140	1/15/01	38.8	0.15					239,207	1/13/01	14.3	
February 2001	335,008	2/13/01	30	0.08					184,192			
March 2001	332,863	3/7/01	ND (a)	0.03					517,332	3/7/01	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*					*940,731*			
Second Quarter 2001												
April 2001	377,931			0.04					275,519			
May 2001	344,252	5/22/01	12.3	0.04					195,622	5/22/01	5.29	
June 2001	361,846	6/4/01	0.68	0.04					563,653			
Quarterly Totals	*1,084,029*			*0.11*					*1,034,894*			
Third Quarter 2001												
July 2001	351,509			0.01					559,015			
August 2001	486,123	8/13/01	5	0.02					66,876			
Quarterly Totals	*837,632*			*0.03*					*625,891*			
Fourth Quarter 2001												
October 2001	363,168	10/11/01	ND (a)	0.01					464,168	10/11/01	ND (a)	
November 2001	316,798			0.01					116,780	11/1 & 11/15/01	ND (a)	
December 2001	361,058	12/6/01	ND (c)	0.01					717,769	12/6/01	ND (c)	
Quarterly Totals	*680,856*			*0.01*					*830,555*			
First Quarter 2002												
January 2002	331,224			0.02	1,812			0.01	340,686			Recovered groundwater from HRW-1 from January 22-29. Re-initiated groundwater recovery from HRW-1 on February 28
February 2002	282,480	2/27/02	8.6	0.02	59			0.00	457,945			HRW-1 mass removal estimates for January and February are based on the March 12 sample event
March 2002	280,814			0.02	40,294	3/12/02	786	0.26	234,816			RW-2 mass removal estimates for January and March are based on February 27 sample event
Quarterly Totals	*894,518*			*0.04*	*42,164*			*0.28*	*1,013,447*			

(a) PCP not detected above the detection limit of 5 µg/L, concentration-dependent calculations based on half the detection limit
(b) PCP not detected above the detection limit of 25 µg/L, concentration-dependent calculations based on half the detection limit
(c) PCP not detected above the detection limit of 5.25 µg/L, concentration-dependent calculations based on half the detection limit

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BZTO104(e)016637

TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
Deep Wells:							
B2	02/27/02	14:35	30.31	22.90	7.41	----	
G1A	02/27/02	13:39	29.72	21.96	7.76	----	
J2	02/27/02	14:31	29.65	22.21	7.44	----	
J3	02/27/02	14:32	29.58	21.52	8.06	----	
LW1D	02/27/02	14:17	28.31	20.31	8.00	----	
LW3D	02/27/02	14:20	30.80	23.13	7.67	----	
LW4D	02/27/02	12:04	30.17	22.65	7.52	----	
	03/05/02	11:36	30.17	22.94	7.23	----	
LW6D	02/27/02	13:35	30.84	23.62	7.22	----	
LW9D	02/27/02	13:47	30.98	22.97	8.01	----	
LW10D	02/27/02	13:49	31.12	23.58	7.54	----	
LW11D	02/27/02	14:57	29.04	21.80	7.24	----	
LW12D1	02/27/02	14:28	30.02	21.88	8.14	----	
LW12D2	02/27/02	14:29	29.24	22.38	6.86	----	
LW14D	02/27/02	13:55	30.54	23.57	6.97	----	
LW15D	02/27/02	13:52	30.85	23.42	7.43	----	
LW16D	02/27/02	13:54	28.40	20.94	7.46	----	
LW17D	02/27/02	13:37	27.82	19.82	8.00	----	
	03/05/02	11:30	27.82	20.46	7.36	----	
LW18D	02/27/02	13:43	27.82	20.44	7.38	----	
O	02/27/02	13:15	32.03	24.08	7.95	----	
R	02/27/02	13:17	30.47	22.50	7.97	----	
RW2	02/27/02	13:57	30.68	26.02	4.66	----	
Shallow Wells:							
B1	02/27/02	14:34	29.74	12.15	17.59	----	
	03/05/02	11:06	29.74	12.28	17.46	-	
B *	02/27/02	14:33	29.04	12.27	16.77	----	
C *	02/27/02	14:44	28.89	8.94	19.95	----	

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TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
D	02/27/02	14:21	30.04	11.37	18.67	----	
	03/05/02	11:00	30.04	11.51	18.53	----	
G*	02/27/02	13:38	30.24	dry	----	----	
H	02/27/02	14:18	27.08	8.14	18.94	----	
	03/05/02	10:58	27.08	8.28	18.80	----	
J1	02/27/02	14:30	29.70	11.62	18.08	----	
	03/05/02	11:04	29.70	11.76	17.94		
K	02/27/02	14:17	29.42	11.05	18.37	----	
	03/05/02	10:55	29.42	11.25	18.17	----	
I	02/27/02	14:42	28.10	7.16	20.94	----	
	03/05/02	11:12	28.10	7.39	20.71	----	
LW1S	02/27/02	14:19	27.96	9.31	18.65	----	
	03/05/02	10:56	27.96	9.45	18.51	----	
LW2S	02/27/02	14:19	29.56	11.02	18.54	----	
	03/05/02	10:59	29.56	11.17	18.39	----	
LW4S	02/27/02	14:01	30.26	15.82	14.44	----	
	03/05/02	11:35	30.26	15.95	14.31	----	
LW5S	02/27/02	14:39	30.79	13.48	17.31	----	
	03/05/02	11:13	30.79	13.62	17.17	----	
LW7S	02/27/02	14:15	28.10	9.47	18.63	----	
	03/05/02	10:52	28.10	9.62	18.48	----	
LW8S	02/27/02	14:37	31.28	15.12	16.16	----	No Product
	03/05/02	11:09	31.28	15.26	16.02	----	
LW9S	02/27/02	13:48	31.04	dry	----	----	
	03/05/02	11:15	31.04	dry	----	----	
LW10S	02/27/02	13:50	30.75	17.77	12.98	----	
	03/05/02	11:32	30.75	17.84	12.91	----	
LW11S	02/27/02	14:59	29.10	11.86	17.24	----	No Product
	03/05/02	11:40	29.10	11.96	17.14	----	
LW13S	02/27/02	13:58	30.17	16.60	13.57		
	03/05/02	11:33	30.17	16.68	13.49	----	
LW101S	02/27/02	14:52	29.41	5.70	23.71	----	
LW102S	02/27/02	14:48	25.77	2.14	23.63	----	
LW103S	02/27/02	14:50	29.07	5.26	23.81	----	
LW104S	02/27/02	14:46	26.57	4.07	22.50	----	

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TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
N	02/27/02	13:25	31.40	15.76	15.64	----	
P	02/27/02	13:22	29.96	14.60	15.44	0.10	Strong ethanol-like odor
PZ-1	02/27/02	14:02	28.04	13.28	14.76	----	
	03/05/02	11:34	28.04	13.40	14.64	----	
Q	02/27/02	13:20	30.36	15.07	15.29	----	Strong petroleum odor, no produ
RW1	02/27/02	14:03	31.46	16.12	15.34	----	
	03/05/02	11:38	31.46	16.33	15.13	----	
RW3	02/27/02	14:26	29.96	11.80	18.16	----	
	03/05/02	11:02	29.96	11.94	18.02	----	
Other Wells:							
River Gauge	02/27/02	14:12	28.13	22.27	5.86	----	
	03/05/02	11:25	28.13	21.42	6.71		

---- No measurable product or odor observed.
* Well Point

(a) Reference Elevation is the north side of the top of the 2-in well casing. Reference elevation surveys were conducted by Tec Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.

(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].

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86-102 (E) E'

MAY 13 2002

LANDAU ASSOCIATES

May 9, 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil Co, attached are the following items related to the Time Oil Northwest Terminal RI/FS:

- April 2002 monthly report to DEQ
- Revised schedule for Phase III RI activities; please note that the duration column on the Phase III schedule is in working days, not calendar days.
- Analytical data tables for the first quarter 2002 groundwater sampling event and for the stormwater sampling events.

You will notice that low level (less than 1 ug/L) pentachlorophenol (PCP) results were detected in each of the east property wells during this event. While there has been sporadic low level PCP concentrations detected in well LW-102S during previous events, this is the first PCP detection at each of the other east property wells. In our quality review of these data, it was determined that PCP was detected in laboratory method blanks within the specific data set containing these samples. This blank contamination could not be linked specifically to these samples, so the data were not qualified; however, it presents some doubt to the validity of the sample results. The laboratory indicated that the difference could be related to use of method 8270-SIM instead of method 8040 for the PCP analyses (sample reporting limits were equal for both methods). We will be resampling these wells for PCP as part of the second quarter 2002 event.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Senior Hydrogeologist

RB/tam
5/9/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr.doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
April 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the March 2001 monthly report to DEQ.

- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an average flow rate of 6.4 gpm. Continued implementation of the groundwater interim action in the upper zone at HRW-1, at an average flow rate of 1.6 gpm. Approximately a total of 6.88 million gallons of groundwater have been recovered, treated, and discharged, with a total of about 391,000 gallons treated in April 2002. Analytical results from samples collected from the treatment system effluent indicate pentachlorophenol (PCP) is degraded to nondetectable concentrations or concentrations less than the permitted discharge limitations.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.

- Conducted groundwater level measurements and collected influent/effluent samples as part of HRW-1 startup activities.

- Began preparation of a technical memorandum documenting HRW-1 startup activities.

- Completed client review on the *Fourth Quarter 2001 Groundwater Report* and submitted to DEQ.

- Submitted the *Fourth Quarter 2001Groundwater Interim Action Status Report* to DEQ.

- Completed data validation of the first quarter 2002 groundwater data and began preparation of the *First Quarter 2002 Groundwater Report*.

- Collected an additional stormwater sample from the storm drain manhole located closest to the river to confirm the PCP concentration for the sample collected in February 2002.

- Completed database conversion to a GIS format.

- Began an evaluation of methods to eliminate infiltration of groundwater to storm drain.

- Completed an updated wastewater discharge permit application with the City of Portland for discharge of treated water from the terminal treatment system into the sanitary sewer.

- Began preparation of a work plan for conducting a pilot test for remediation of upper zone groundwater using in situ chemical oxidation techniques.

- Continued evaluation of options for treatment/disposal of the stockpiled material.

- Completed client review of the *Phase III Preliminary Evaluation Report* and provided to DEQ.

- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.

BZTO104(e)016642

RESULTS COLLECTED

- The remainder of the first quarter 2002 groundwater data and stormwater data collected in February 2002. Tables containing these data are included with this report.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and in the upper zone at HRW-1. Continue full-scale treatment and discharge to POTW.
- Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.
- Conduct internal and client reviews of the *First Quarter 2002 Groundwater Report* and the *First Quarter 2002 Groundwater Interim Action Status Report.*
- Conduct internal and client review of a technical memorandum documenting startup activities at HRW-1.
- Complete preparation and conduct internal reviews of a work plan for conducting a pilot test for remediation of upper zone groundwater using in situ chemical oxidation techniques.
- Prepare a technical memorandum for assessing groundwater flow and for maximizing hydraulic capture from pumping at HRW-1 using a dye tracer and piezometers.
- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.
- Receive comments from DEQ on the *East Property Remedial Action Plan*. Begin preparation of a response to DEQ's comments/work plan addendum.
- Prepare a contractor scope of work for the east property remedial action activities.
- Receive DEQ comments on the *Phase III Preliminary Evaluation Report.*
- Continue evaluation of availability of options for treatment/disposal of the stockpiled material.

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

SHALLOW WELLS

Sample Identification	B1	D	H	J1	K	L	LW1S	LW2S	LW4S
Laboratory Identification:	ED23A	ED34G	ED16K	ED23C	ED16H	ED16E	ED16J	ED23E	ED30G
Date Collected.	2/26/2002	2/28/2002	2/25/2002	2/26/2002	2/25/2002	2/25/2002	2/25/2002	2/26/2002	2/27/2002
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	1 0	0 32	0.26 U	NA	NA	0 25 U	0.25 U	NA	2 0
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	15	2.0 U	NA	2 0 U	NA	2 0 U	2 0 U	2.0 U	2 1 U
Bis-(2-Chloroethyl) Ether	2.0 U	2 0 U	NA	2 0 U	NA	2 0 U	2 0 U	2 0 U	2.1 U
2-Chlorophenol	1.0 U	1 0 U	NA	1 0 U	NA	1.0 U	1 0 U	1.0 U	1 1 U
1,3-Dichlorobenzene	1 0 U	1.0 U	NA	1 0 U	NA	1 0 U	1.0 U	1.0 U	1.1 U
1,4-Dichlorobenzene	1 0 U	1.0 U	NA	1 0 U	NA	1.0 U	1 0 U	1.0 U	1 1 U
Benzyl Alcohol	5 0 U	5 0 U	NA	5 0 U	NA	5 0 U	5 0 U	5 0 U	5 3 U
1,2-Dichlorobenzene	1 0 U	1.0 U	NA	1 0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
2-Methylphenol	1.0 U	1 0 U	NA	1 0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1 0 U	NA	1 0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
4-Methylphenol	170	1 0 U	NA	1 0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
N-Nitroso-Di-N-Propylamine	2.0 U	2 0 U	NA	2 0 U	NA	2 0 U	2 0 U	2.0 U	2 1 U
Hexachloroethane	2 0 U	2 0 U	NA	2 0 U	NA	2.0 U	2 0 U	2 0 U	2 1 U
Nitrobenzene	1 0 U	1.0 U	NA	1.0 U	NA	1 0 U	1 0 U	1 0 U	1.1 U
Isophorone	1.0 U	1 0 U	NA	1 0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
2-Nitrophenol	5 0 U	5 0 U	NA	5.0 U	NA	5 0 U	5 0 U	5 0 U	5 3 U
2,4-Dimethylphenol	3 0 U	3.0 U	NA	3 0 U	NA	3 0 U	3 0 U	3 0 U	3 2 U
Benzoic Acid	50 U	50 U	NA	50 U	NA	50 U	50 U	50 U	53 U
bis(2-Chloroethoxy) Methane	1 0 U	1.0 U	NA	1 0 U	NA	1.0 U	1 0 U	1 0 U	1.1 U
2,4-Dichlorophenol	3 0 U	3.0 U	NA	3.0 U	NA	3.0 U	3 0 U	3 0 U	3.2 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1 0 U	1.0 U	1.0 U	1.1 U
Naphthalene	17	3	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1 1 U
4-Chloroaniline	3.0 U	3.0 U	NA	3 0 U	NA	3 0 U	3.0 U	3.0 U	3.2 U
Hexachlorobutadiene	2 0 U	2.0 U	NA	2 0 U	NA	2.0 U	2 0 U	2 0 U	2.1 U
4-Chloro-3-methylphenol	2 0 U	2 0 U	NA	2 0 U	NA	2 0 U	2 0 U	2.0 U	2 1 U
2-Methylnaphthalene	10	1.0 U	NA	1 0 U	NA	1 0 U	1.0 U	1.0 U	1 1 U
Hexachlorocyclopentadiene	5.0 U	5 0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5 3 U
2,4,6-Trichlorophenol	5 0 U	5 0 U	NA	5 0 U	NA	5.0 U	5 0 U	5.0 U	5.3 U
2,4,5-Trichlorophenol	5 0 U	5.0 U	NA	5.0 U	NA	5 0 U	5.0 U	5.0 U	5 3 U
2-Chloronaphthalene	1 0 U	1 0 U	NA	1 0 U	NA	1 0 U	1.0 U	1.0 U	1 1 U
2-Nitroaniline	5 0 U	5 0 U	NA	5 0 U	NA	5.0 U	5 0 U	5 0 U	5 3 U
Dimethylphthalate	1.0 U	1 0 U	NA	1.0 U	NA	1 0 U	1 0 U	1 0 U	1 1 U
Acenaphthylene	1 0 U	1.0 U	NA	1 0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
3-Nitroaniline	6 0 U	6 0 U	NA	6 0 U	NA	6.0 U	6 0 U	6.0 U	6 3 U
Acenaphthene	1.0 U	1 0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1 1 U
2,4-Dinitrophenol	25 U	25 U	NA	25 U	NA	25 U	25 U	25 U	26 U
4-Nitrophenol	5 0 U	5 0 U	NA	5 0 U	NA	5 0 U	5 0 U	5.0 U	5 3 U
Dibenzofuran	1.0 U	1 0 U	NA	1 0 U	NA	1.0 U	1.0 U	1 0 U	1 1 U
2,6-Dinitrotoluene	5 0 U	5.0 U	NA	5 0 U	NA	5 0 U	5 0 U	5.0 U	5 3 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification:	LW5S	LW7S	LW8S	Dup of LW8S X	LW10S	LW11S	LW13S	LW101S	LW102S
Laboratory Identification:	ED16F	ED16G	ED23J	ED23K	ED30B	ED34D	ED30F	ED16C	ED16B
Date Collected:	2/25/2002	2/25/2002	2/26/2002	2/26/2002	2/27/2002	2/28/2002	2/27/2002	2/25/2002	2/25/2002
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	NA	0.26 U	0.86 (f)	0.28
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.9	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	50 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	54	57	1.0 U	5.3	NA	1.0 U	1.0 U
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	69	74	1.0 U	1.7	NA	1.0 U	1.0 U
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	NA	25 U	25 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification	LW103S	LW104S	RW1
Laboratory Identification.	ED16D	ED16A	ED34A
Date Collected:	2/25/2002	2/25/2002	2/28/2002
CHLORINATED PHENOLS (µg/L)			
EPA Method SW8270SIM			
Pentachlorophenol	0.58 (f)	0.77 (f)	NA
SEMIVOLATILES (µg/L)			
EPA Method SW8270			
Phenol	2.0 U	2.0 U	66
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	4.6
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U
Benzoic Acid	50 U	50 U	50 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	6.7
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	6.9
4-Chloroaniline	3.0 U	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	2.3
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	25 U	25 U	25 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	B1	D	H	J1	K	L	LW1S	LW2S	LW4S
Laboratory Identification	ED23A	ED34G	ED16K	ED23C	ED16H	ED16E	ED16J	ED23E	ED30G
Date Collected.	2/26/2002	2/28/2002	2/25/2002	2/26/2002	2/25/2002	2/25/2002	2/25/2002	2/26/2002	2/27/2002
2,4-Dinitrotoluene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.3 U
Diethylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Fluorene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
4-Nitroaniline	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.3 U
4,6-Dinitro-2-Methylphenol	15 U	15 U	NA	15 U	NA	15 U	15 U	15 U	16 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Hexachlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Pentachlorophenol	5.0 U	5.0 U	NA	280	NA	5.0 U	5.0 U	320	5.3 U
Phenanthrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Carbazole	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Di-n-Butylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Pyrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Butylbenzylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.3 U
Benzo(a)anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	NA	4.0 U	NA	4.0 U	4.0 U	4.0 U	120
Chrysene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Di-n-Octyl phthalate	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.1 U
Benzo(b)fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Benzo(k)fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Benzo(a)pyrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.1 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	LW5S	LW7S	LW8S	Dup of LW8S X	LW10S	LW11S	LW13S	LW101S	LW102S
Laboratory Identification	ED16F	ED16G	ED23J	ED23K	ED30B	ED34D	ED30F	ED16C	ED16B
Date Collected	2/25/2002	2/25/2002	2/26/2002	2/26/2002	2/27/2002	2/28/2002	2/27/2002	2/25/2002	2/25/2002
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.3	1.2	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	15 U	15 U	15 U	15 U	15 U	15 U	NA	15 U	15 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	4700	NA	5.0 U	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	5.0	4.0 U	4.0 U	4.0 U	NA	4.0 U	4.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification	LW103S	LW104S	RW1
Laboratory Identification	ED16D	ED16A	ED34A
Date Collected	2/25/2002	2/25/2002	2/28/2002
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	15 U	15 U	15 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	1200
Phenanthrene	1.0 U	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	4.0 U	10	4.0 U
Chrysene	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthatate	2.0 U	2.0 U	2.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	B1	D	H	J1	K	L	LW1S	LW2S	LW4S
Laboratory Identification	ED23A	ED34G	ED16K	ED23C	ED16H	ED16E	ED16J	ED23E	ED30G
Date Collected	2/26/2002	2/28/2002	2/25/2002	2/26/2002	2/25/2002	2/25/2002	2/25/2002	2/26/2002	2/27/2002
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Acetone	250	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichlroethene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	54	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.2	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1000	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	2.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	2800	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	170	1.7	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	4.3	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	290	1.0 U	NA	1.5	NA	1.0 U	1.0 U	1.2	1.0 U
o-Xylene	210	1.0 U	NA	3.0	NA	1.0 U	1.0 U	3.0	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification.	LW5S	LW7S	LW8S	Dup of LW8S X	LW10S	LW11S	LW13S	LW101S	LW102S
Laboratory Identification	ED16F	ED16G	ED23J	ED23K	ED30B	ED34D	ED30F	ED16C	ED16B
Date Collected	2/25/2002	2/25/2002	2/26/2002	2/26/2002	2/27/2002	2/28/2002	2/27/2002	2/25/2002	2/25/2002
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Acetone	5.0 U	21 U	5.0 U	5.0 U	5.0 U	28	NA	5.0 U	7.9
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	13	NA	5.7	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	30	30	1.0 U	6.6	NA	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	9.1	NA	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Ethylbenzene	1.0 U	8.6	420 J	390	1.0 U	36	NA	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
m,p-Xylene	1.0 U	3.7	56	60	1.0 U	71	NA	1.0 U	1.0 U
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	77	NA	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification	LW103S	LW104S	RW1
Laboratory Identification	ED16D	ED16A	ED34A
Date Collected	2/25/2002	2/25/2002	2/28/2002
VOLATILES (µg/L)			
EPA Method SW8260			
Chloromethane	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U
Acetone	5.0 U	5.0 U	110 J
Carbon Disulfide	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	47 J
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	19 J
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	12 J
Chlorobenzene	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	81 J
Styrene	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	97 J
o-Xylene	1.0 U	1.0 U	170 J
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

SHALLOW WELLS

Sample Identification	B1	D	H	J1	K	L	LW1S	LW2S	LW4S
Laboratory Identification	ED23A	ED34G	ED16K	ED23C	ED16H	ED16E	ED16J	ED23E	ED30G
Date Collected	2/28/2002	2/28/2002	2/25/2002	2/26/2002	2/25/2002	2/25/2002	2/25/2002	2/26/2002	2/27/2002
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Acrolein	50 U	50 U	NA	50 U	NA	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	NA	3.0 U	NA	3.0 U	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	37	1.9	NA	6.4	NA	1.0 U	1.0 U	5.7	1.0 U
1,2,4-Trimethylbenzene	94	38	NA	50	NA	1.0 U	1.0 U	25	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	12	7.7	NA	3.5	NA	1.0 U	1.0 U	1.0 U	1.0 U
n-Propylbenzene	15	7.7	NA	4.0	NA	1.0 U	1.0 U	2.0	1.0 U
Bromobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	5.3	NA	1.0 U	NA	1.0 U	1.0 U	1.4	1.0 U
4-Isopropyltoluene	1.0	1.8	NA	1.2	NA	1.0 U	1.0 U	1.5	1.0 U
n-Butylbenzene	4.0 M	1.5	NA	1.0 U	NA	1.0 U	1.0 U	1.2	1.0 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	37	8.2	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	LW5S	LW7S	LW8S	Dup of LW8S X	LW10S	LW11S	LW13S	LW101S	LW102S
Laboratory Identification	ED16F	ED16G	ED23J	ED23K	ED30B	ED34D	ED30F	ED16C	ED16B
Date Collected	2/25/2002	2/25/2002	2/26/2002	2/26/2002	2/27/2002	2/28/2002	2/27/2002	2/25/2002	2/25/2002
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	62	64	1.0 U	29	NA	1.0 U	1.0 U
1,2,4-Trimethylbenzene	1.0 U	1.1	130	140	1.0 U	140	NA	1.0 U	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
Isopropylbenzene	1.0 U	6.1	240 J	240	1.0 U	14	NA	1.0 U	1.0 U
n-Propylbenzene	1.0 U	11	210 J	210	1.0 U	20	NA	1.0 U	1.0 U
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	10	10	1.0 U	1.4	NA	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	31	32	1.0 U	6.9	NA	1.0 U	1.0 U
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.9	NA	1.0 U	1.0 U
n-Butylbenzene	1.0 U	1.0	18	18	1.0 U	4.1	NA	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	180	100	5.0 U	12	NA	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification	LW103S	LW104S	RW1
Laboratory Identification	ED16D	ED16A	ED34A
Date Collected	2/25/2002	2/25/2002	2/28/2002
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	40 J
1,2,4-Trimethylbenzene	1.0 U	1.0 U	170 J
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	29 J
n-Propylbenzene	1.0 U	1.0 U	34 J
Bromobenzene	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.8 J
sec-Butylbenzene	1.0 U	1.0 U	8.9 J
4-Isopropyltoluene	1.0 U	1.0 U	4.5 U
n-Butylbenzene	1.0 U	1.0 U	6.8 J
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	21 J
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

SHALLOW WELLS

Sample Identification.	B1	D	H	J1	K	L	LW1S	LW2S	LW4S
Laboratory Identification.	ED23A	ED34G	ED16K	ED23C	ED16H	ED16E	ED16J	ED23E	ED30G
Date Collected:	2/26/2002	2/28/2002	2/25/2002	2/26/2002	2/25/2002	2/25/2002	2/25/2002	2/26/2002	2/27/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	12	NA	NA	2 1	NA	0 25 U	0.25 U	1 5	0.34
TPH-Motor Oil Range	0 50 U	NA	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	16	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT METALS (mg/L)									
Arsenic (7060)	0 006	0 014	0 021	0 012	0 001	0 001 U	0 023	0.015	0 001 U
Chromium (6010)	0 005 U	0 005 U	0.005 U	0.005 U	0 005 U	0 005 U	0.007	0 005 U	0 005 U
Copper (6010)	0.062	0.002	0.007	0 003	0 012	0.002 U	0 009	0.003	0 002 U
Lead (7421)	0.004	0 001 U	0 001	0 001 U	0.001	0 001 U	0 004	0.001 U	0 001 U
Nickel (6010)	0 08	0 01 U	0 01 U	0 01	0 03	0 01 U	0.01 U	0.01 U	0 01 U
Zinc (6010)	0 033	0 019	0.008	0 007	0 029	0 006 U	0.030	0.006	0 006 U
CONVENTIONALS (mg/L)									
Calcium (6010)	35.7	32.2	NA	29.4	NA	3.20	30.4	12.3	25 8
Magnesium (6010)	15.7	11.3	NA	10 1	NA	1.34	11 7	3.88	7 66
Potassium (6010)	4 6	2 0	NA	3 4	NA	0 8	3 4	2 0	3 5
Sodium (6010)	12.3	7 57	NA	8 36	NA	3.29	10 2	3 46	7 39
Alkalinity (mg/L CaCO3) (SM 2320)	140	140	NA	130	NA	21	120	67	80
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1 0 U	1 0 U	NA	1 0 U	NA	1 0 U	1 0 U	1.0 U	1 0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	140	140	NA	130	NA	21	120	67	80
Total Dissolved Solids (EPA 160.1)	430	200	NA	210	NA	57	160	120	300
Chloride (EPA 325.2)	3.2	2 9	NA	8.8	NA	2.4	3 2	4.1	6 7 J
N-Nitrate (mg-N/L) (Calculated)	0.010 U	0 020	NA	2 4	NA	0 36	0.91	0.010 U	8 4
N-Nitrite (mg-N/L) (EPA 354.1)	0 021	0 010 U	NA	0 018	NA	0 010 U	0 010 U	0.026	0 022
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353 2)	0.020 J	0 020	NA	2.4 J	NA	0.36	0 91	0 033 J	8 4
Sulfate (mg/L) (EPA 375.2)	2.5 U	12	NA	14	NA	3 6	5.7	4.3	18
FIELD PARAMETERS									
pH (avg)	4.97	6 58	6 29	6.42	5 05	5.89	6.22	4.96	5.64
Temperature (° C) (avg)	13 1	11 9	13 4	13.6	11 1	8.5	14 3	11 1	12.6
Conductivity (mS/cm) (avg)	501	260	292	284	78	37	257	124	253
Dissolved oxygen (mg/L) (avg)	5.92	7 74	4 89	6 41	5.92	7 55	4 77	7 98	7.53
Turbidity (NTU)	0	13	0	14	0	0	3	92	0

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	LW5S	LW7S	LW8S	Dup of LW8S X	LW10S	LW11S	LW13S	LW101S	LW102S
Laboratory Identification.	ED16F	ED16G	ED23J	ED23K	ED30B	ED34D	ED30F	ED16C	ED16B
Date Collected	2/25/2002	2/25/2002	2/26/2002	2/26/2002	2/27/2002	2/28/2002	2/27/2002	2/25/2002	2/25/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	0 25 U	0 25 U	7.1	7 6	0 25 U	7.4	NA	0 25 U	0.25 U
TPH-Motor Oil Range	NA	NA	0.50 U	0 50 U	NA	0 50 U	NA	NA	NA
TPH-Gasoline Range	NA	NA	12 J	12	NA	8 9	NA	NA	NA
PRIORITY POLLUTANT METALS (mg/L)									
Arsenic (7060)	0.003	0.017	0.027	0 030	0.002	0.006	NA	0.005	0.001 U
Chromium (6010)	0 005 U	0.005 U	0.005 U	0 005 U	0.005 U	0.005 U	NA	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	0.002 U	0.002 U	0 002 U	0 003	NA	0.008	0 002 U
Lead (7421)	0 001 U	0 001 U	0.001 U	0 001 U	0.001	0.001 U	NA	0 002	0.001 U
Nickel (6010)	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	NA	0 01 U	0.01 U
Zinc (6010)	0 006 U	0 006 U	0.006 U	0.006 U	0 008 J	0.006 U	NA	0 017	0.006 U
CONVENTIONALS (mg/L)									
Calcium (6010)	22.4	35 4	41.6	38.6	11 1	59 0	NA	7.22	8 93
Magnesium (6010)	6.49	13 3	9.98	9.30	3.27	18.2	NA	2.44	3.65
Potassium (6010)	3.4	3.5	4.2	4.0	2.5	4.0	NA	1.7	1 6
Sodium (6010)	11.4	19.4	9.95	9.31	5.27	8 55	NA	7.44	5 36
Alkalinity (mg/L CaCO3) (SM 2320)	100	180	220	230	34	230	NA	38	46
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1 0 U	1.0 U	1 0 U	1 0 U	1.0 U	1.0 U	NA	1.0 U	1 0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	100	180	220	230	34	230	NA	38	46
Total Dissolved Solids (EPA 160.1)	150	230	300	290	100	410	NA	72	80
Chloride (EPA 325.2)	1.1	3.6	4.2	3 6	1.4 J	58	NA	1 0	2.5
N-Nitrate (mg-N/L) (Calculated)	1 6	0 010 U	0.010 U	0.012	3.4	0 010 U	NA	0 098	0 21
N-Nitrite (mg-N/L) (EPA 354.1)	0 010 U	0.010 U	0 059	0.054	0 014	0 031	NA	0.010 U	0.010 U
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	1.6	0 010 U	0 044 J	0.066 J	3.4	0.040	NA	0 098	0 21
Sulfate (mg/L) (EPA 375 2)	9 0	7.9	2.5 U	3 2	12	13	NA	5 2	5 1
FIELD PARAMETERS									
pH (avg)	5.91	6 21	6.37	6.37	6.09	6 29	6 35	6.00	6 13
Temperature (° C) (avg)	12 4	14 1	13 6	13.6	12 6	13 6	11 2	9 0	9 1
Conductivity (mS/cm) (avg)	221	351	489	490	109	460	89	73	90
Dissolved oxygen (mg/L) (avg)	5 42	4.55	6.71	6 75	8 85	7 46	9 57	5 49	7 06
Turbidity (NTU)	0	0	0	0	0	20	0	68	0

BZTO104(e)016657

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification	LW103S	LW104S	RW1
Laboratory Identification	ED16D	ED16A	ED34A
Date Collected	2/25/2002	2/25/2002	2/28/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)			
Method OR-DEQ			
TPH-Diesel Range	0 25 U	0 25 U	4.9
TPH-Motor Oil Range	NA	NA	0.50 U
TPH-Gasoline Range	NA	NA	12
PRIORITY POLLUTANT METALS (mg/L)			
Arsenic (7060)	0.013	0.002	0 008
Chromium (6010)	0.005 U	0 005 U	0 015
Copper (6010)	0.003	0 002 U	0.028
Lead (7421)	0 001 U	0 001 U	0 006
Nickel (6010)	0 01 U	0 01 U	0.02
Zinc (6010)	0 006 U	0.006 U	0 054
CONVENTIONALS (mg/L)			
Calcium (6010)	17.0	9.25	152
Magnesium (6010)	6 51	2 88	51.9
Potassium (6010)	1.7	1.8	6 7
Sodium (6010)	5.57	7.09	12 0
Alkalinity (mg/L CaCO3) (SM 2320)	83	53	480
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0 U	1.0 U	1.0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	83	53	480
Total Dissolved Solids (EPA 160.1)	110	99	1100
Chloride (EPA 325 2)	2 3	2.8	11
N-Nitrate (mg-N/L) (Calculated)	0 093	0.010 U	0.044
N-Nitrite (mg-N/L) (EPA 354 1)	0.010 U	0.010 U	0.010 U
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353 2)	0.093	0 010 U	0 044
Sulfate (mg/L) (EPA 375 2)	2 9	9 3	5.7
FIELD PARAMETERS			
pH (avg)	6 17	6 15	6 15
Temperature (° C) (avg)	10 7	11 1	12 8
Conductivity (mS/cm) (avg)	170	111	878
Dissolved oxygen (mg/L) (avg)	5 73	5.18	7 27
Turbidity (NTU)	0	0	88

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	ED23B	ED23D	ED23F	ED23G	ED23I	ED16I	ED34F	ED30H	ED23H
Date Collected:	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/25/2002	2/28/2002	2/27/2002	2/26/2002
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	0 25 U	0 25 U	NA	NA	0 25 U	0 26	0 76	0 25 U	0 25 U
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2 0 U	2 0 U	2 0 U	2 0 U	2.0 U	2.0 U	2 0 U	2.0 U	2 0 U
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2 0 U	2.0 U	2 0 U	2 0 U	2 0 U	2 0 U
2-Chlorophenol	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U
1,3-Dichlorobenzene	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U	1.0 U	1.0 U	1 0 U
1,4-Dichlorobenzene	1 0 U	1.0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U
Benzyl Alcohol,	5.0 U	5 0 U	5.0 U	5.0 U	5.0 U	5 0 U	5 0 U	5 0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1 0 U	1.0 U	1.0 U	1 0 U	1.0 U	1 0 U	1 0 U	1 0 U
2-Methylphenol	1.0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1 0 U	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methylphenol	1.0 U	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U	1 0 U	1.0 U	1 0 U
N-Nitroso-Di-N-Propylamine	2 0 U	2.0 U	2 0 U	2 0 U	2 0 U	2 0 U	2 0 U	2 0 U	2 0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2 0 U	2.0 U	2.0 U	2 0 U	2.0 U	2 0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U
Isophorone	1 0 U	1.0 U	1 0 U	1 0 U	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Nitrophenol	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U	5.0 U	5.0 U	5 0 U	5 0 U
2,4-Dimethylphenol	3.0 U	3 0 U	3.0 U	3 0 U	3.0 U	3.0 U	3.0 U	3 0 U	3 0 U
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy) Methane	1 0 U	1 0 U	1.0 U	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 0 U
2,4-Dichlorophenol	3.0 U	3 0 U	3.0 U	3.0 U	3 0 U	3 0 U	3 0 U	3 0 U	3 0 U
1,2,4-Trichlorobenzene	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U	1.0 U	1 0 U
Naphthalene	1 0 U	1 0 U	1 0 U	1.0 U	1.0 U	1 0 U	1 0 U	1 0 U	1.0 U
4-Chloroaniline	3.0 U	3 0 U	3.0 U	3.0 U	3.0 U	3 0 U	3 0 U	3.0 U	3 0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	2 0 U	2 0 U	2 0 U	2 0 U	2 0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2 0 U	2 0 U	2 0 U	2.0 U	2.0 U	2 0 U	2.0 U
2-Methylnaphthalene	1.0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 8	1.0 U
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5 0 U	5 0 U	5 0 U	5.0 U	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5 0 U	5 0 U	5 0 U	5.0 U	5 0 U	5.0 U	5 0 U	5.0 U
2,4,5-Trichlorophenol	5 0 U	5.0 U	5.0 U	5 0 U	5 0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1 0 U	1.0 U	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Nitroaniline	5 0 U	5.0 U	5.0 U	5 0 U	5 0 U	5 0 U	5 0 U	5.0 U	5 0 U
Dimethylphthalate	1 0 U	1 0 U	1.0 U	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 0 U
Acenaphthylene	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U	1 0 U
3-Nitroaniline	6 0 U	6 0 U	6 0 U	6 0 U	6 0 U	6.0 U	6 0 U	6 0 U	6.0 U
Acenaphthene	1 0 U	1 0 U	1 0 U	1 0 U	1.0 U	1.0 U	1 0 U	1.0 U	1 0 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
4-Nitrophenol	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U	5.0 U	5 0 U	5 0 U	5 0 U
Dibenzofuran	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U
2,6-Dinitrotoluene	5.0 U	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U	5 0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification.	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	ED34J	ED30C	ED34E	ED34H	ED34I	ED30E	ED34B	ED34C
Date Collected.	2/28/2002	2/27/2002	2/28/2002	2/28/2002	2/28/2002	2/27/2002	2/28/2002	2/28/2002
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8270SIM								
Pentachlorophenol	0 25 U	0.25 U	0 76	0.25 U	NA	0.25 U	6 8	0 44
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	2 0 U	2 0 U	2.0 U	2 0 U	2.0 U	NA	NA	NA
Bis-(2-Chloroethyl) Ether	2 0 U	2.0 U	2 0 U	2.0 U	2 0 U	NA	NA	NA
2-Chlorophenol	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U	NA	NA	NA
1,3-Dichlorobenzene	1 0 U	1 0 U	1 0 U	1.0 U	1 0 U	NA	NA	NA
1,4-Dichlorobenzene	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	NA	NA	NA
Benzyl Alcohol	5.0 U	5 0 U	5 0 U	5 0 U	5 0 U	NA	NA	NA
1,2-Dichlorobenzene	1 0 U	1.0 U	1.0 U	1 0 U	1.0 U	NA	NA	NA
2-Methylphenol	1 0 U	1 0 U	1.0 U	1.0 U	1 0 U	NA	NA	NA
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1 0 U	1 0 U	1.0 U	NA	NA	NA
4-Methylphenol	1.0 U	1.0 U	1 0 U	1 0 U	1.0 U	NA	NA	NA
N-Nitroso-Di-N-Propylamine	2 0 U	2.0 U	2.0 U	2 0 U	2 0 U	NA	NA	NA
Hexachloroethane	2 0 U	2.0 U	2 0 U	2.0 U	2 0 U	NA	NA	NA
Nitrobenzene	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	NA	NA	NA
Isophorone	1 0 U	1.0 U	1 0 U	1 0 U	1.0 U	NA	NA	NA
2-Nitrophenol	5 0 U	5.0 U	5.0 U	5 0 U	5.0 U	NA	NA	NA
2,4-Dimethylphenol	3.0 U	3 0 U	3.0 U	3 0 U	3 0 U	NA	NA	NA
Benzoic Acid	50 U	50 U	50 U	50 U	50 U	NA	NA	NA
bis(2-Chloroethoxy) Methane	1.0 U	1 0 U	1.0 U	1 0 U	1 0 U	NA	NA	NA
2,4-Dichlorophenol	3 0 U	3.0 U	3.0 U	3 0 U	3.0 U	NA	NA	NA
1,2,4-Trichlorobenzene	1.0 U	1 0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Naphthalene	1.0 U	1.0 U	1 0 U	1 0 U	1.0 U	NA	NA	NA
4-Chloroaniline	3.0 U	3 0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA
Hexachlorobutadiene	2 0 U	2 0 U	2.0 U	2 0 U	2 0 U	NA	NA	NA
4-Chloro-3-methylphenol	2 0 U	2 0 U	2.0 U	2 0 U	2.0 U	NA	NA	NA
2-Methylnaphthalene	1.0 U	1.0 U	1 0 U	1 0 U	1 0 U	NA	NA	NA
Hexachlorocyclopentadiene	5 0 U	5.0 U	5.0 U	5.0 U	5 0 U	NA	NA	NA
2,4,6-Trichlorophenol	5.0 U	5 0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
2,4,5-Trichlorophenol	5.0 U	5 0 U	5.0 U	5.0 U	5 0 U	NA	NA	NA
2-Chloronaphthalene	1 0 U	1 0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
2-Nitroaniline	5 0 U	5.0 U	5 0 U	5 0 U	5 0 U	NA	NA	NA
Dimethylphthalate	1 0 U	1.0 U	1.0 U	1 0 U	1.0 U	NA	NA	NA
Acenaphthylene	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U	NA	NA	NA
3-Nitroaniline	6 0 U	6.0 U	6 0 U	6.0 U	6.0 U	NA	NA	NA
Acenaphthene	1 0 U	1 0 U	1 0 U	1 0 U	1 0 U	NA	NA	NA
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	NA	NA	NA
4-Nitrophenol	5 0 U	5.0 U	5.0 U	5 0 U	5 0 U	NA	NA	NA
Dibenzofuran	1 0 U	1.0 U	1 0 U	1 0 U	1.0 U	NA	NA	NA
2,6-Dinitrotoluene	5 0 U	5.0 U	5 0 U	5 0 U	5.0 U	NA	NA	NA

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2
Laboratory Identification:	ED30D	W ED30A
Date Collected:	2/27/2002	2/27/2002
CHLORINATED PHENOLS (µg/L)		
EPA Method SW8270SIM		
Pentachlorophenol	NA	NA
SEMIVOLATILES (µg/L)		
EPA Method SW8270		
Phenol	10	10
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U
4-Methylphenol	3.8 J	1.0 UJ
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U
Benzoic Acid	50 U	50 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U
Naphthalene	74	70
4-Chloroaniline	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U
2-Methylnaphthalene	18	17
Hexachlorocyclopentadiene	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U
2,4-Dinitrophenol	25 U	25 U
4-Nitrophenol	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification	ED23B	ED23D	ED23F	ED23G	ED23I	ED16I	ED34F	ED30H	ED23H
Date Collected	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/25/2002	2/28/2002	2/27/2002	2/26/2002
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	26	5.0 U	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	ED34J	ED30C	ED34E	ED34H	ED34I	ED30E	ED34B	ED34C
Date Collected	2/28/2002	2/27/2002	2/28/2002	2/28/2002	2/28/2002	2/27/2002	2/28/2002	2/28/2002
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
4,6-Dinitro-2-Methylphenol	15 U	15 U	15 U	15 U	15 U	NA	NA	NA
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	NA	NA	NA
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Di-n-Octyl phthalate	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification	RW2	Dup of RW2
Laboratory Identification.	ED30D	W ED30A
Date Collected	2/27/2002	2/27/2002
2,4-Dinitrotoluene	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	15 U	15 U
N-Nitrosodiphenylamine	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U
Pentachlorophenol	8.6	8.2
Phenanthrene	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U
Chrysene	1.0 U	1.0 U
Di-n-Octyl phthalate	2.0 U	2.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	ED23B	ED23D	ED23F	ED23G	ED23I	ED16I	ED34F	ED30H	ED23H
Date Collected	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/25/2002	2/28/2002	2/27/2002	2/26/2002
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Acetone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	6.9	10	14	5.0 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	7.5	5.0 U	5.0 U	14	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	41	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	ED34J	ED30C	ED34E	ED34H	ED34I	ED30E	ED34B	ED34C
Date Collected.	2/28/2002	2/27/2002	2/28/2002	2/28/2002	2/28/2002	2/27/2002	2/28/2002	2/28/2002
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA
Acetone	37	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
2-Butanone	5.0 U	5.0 U	5.0 U	8.6	5.0 U	NA	NA	NA
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2
Laboratory Identification:	ED30D	W ED30A
Date Collected:	2/27/2002	2/27/2002
VOLATILES (µg/L)		
EPA Method SW8260		
Chloromethane	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U
Acetone	5.0 U	5.0 U
Carbon Disulfide	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U
Benzene	2.5	2.5
trans-1,3-Dichloropropene	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U
Toluene	1.6	1.7
Chlorobenzene	1.0 U	1.0 U
Ethylbenzene	27	28
Styrene	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U
m,p-Xylene	59	62
o-Xylene	14	14
1,2-Dichlorobenzene	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U

BZTO104(e)016667

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	ED23B	ED23D	ED23F	ED23G	ED23I	ED16I	ED34F	ED30H	ED23H
Date Collected	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/25/2002	2/28/2002	2/27/2002	2/26/2002
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	10 U	1.0 U	10 U	10 U	10 U	10 U	10 U	1.0 U	10 U
Bromoethane	20 U	20 U	2.0 U	2.0 U	20 U	2.0 U	20 U	20 U	20 U
Acrylonitrile	1.0 U	1.0 U	1.0 U	10 U	1.0 U	1.0 U	10 U	1.0 U	10 U
1,1-Dichloropropene	10 U	10 U	1.0 U	1.0 U	10 U	1.0 U	10 U	10 U	10 U
Dibromomethane	10 U	1.0 U	1.0 U	10 U	10 U	1.0 U	10 U	10 U	10 U
1,1,1,2-Tetrachloroethane	10 U	1.0 U	10 U	1.0 U	1.0 U	10 U	10 U	10 U	10 U
1,2-Dibromo-3-chloropropane	50 U	50 U	5.0 U	5.0 U	50 U	50 U	50 U	50 U	50 U
1,2,3-Trichloropropane	30 U	3.0 U	3.0 U	30 U	3.0 U	3.0 U	3.0 U	3.0 U	30 U
trans-1,4-Dichloro-2-butene	5.0 U	50 U	50 U	5.0 U	5.0 U	50 U	50 U	50 U	50 U
1,3,5-Trimethylbenzene	10 U	10 U	1.0 U	10 U	1.0 U	1.0 U	10 U	2.4	10 U
1,2,4-Trimethylbenzene	10 U	1.0 U	10 U	1.0 U	10 U	10 U	1.0 U	48	1.0 U
Hexachlorobutadiene	5.0 U	50 U	5.0 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	50 U
Ethylene Dibromide	1.0 U	1.0 U	10 U	1.0 U	1.0 U	1.0 U	10 U	1.0 U	10 U
Bromochloromethane	1.0 U	10 U	1.0 U	10 U	1.0 U	10 U	10 U	10 U	10 U
2,2-Dichloropropane	1.0 U	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	1.0 U	10 U
1,3-Dichloropropane	10 U	1.0 U	10 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	10 U	31	2.6	140	10 U	10 U	14	7.0
n-Propylbenzene	1.0 U	10 U	19	10 U	120	10 U	10 U	14	10 U
Bromobenzene	1.0 U	10 U	1.0 U	10 U	1.0 U	10 U	10 U	10 U	10 U
2-Chlorotoluene	10 U	10 U	1.0 U	10 U	1.0 U	10 U	10 U	1.0 U	1.0 U
4-Chlorotoluene	10 U	1.0 U	10 U	1.0 U	10 U	10 U	10 U	10 U	10 U
tert-Butylbenzene	1.0 U	10 U	1.0 U	10 U	3.6	1.0 U	10 U	10 U	3.1
sec-Butylbenzene	10 U	10 U	6.6	2.3	16	10 U	10 U	2.8	3.4
4-Isopropyltoluene	10 U	10 U	1.0 U	10 U	1.0 U	10 U	10 U	1.0 U	10 U
n-Butylbenzene	1.0 U	10 U	2.9	10 U	12	1.0 U	10 U	2.3	1.2 M
1,2,4-Trichlorobenzene	50 U	50 U	5.0 U	50 U	50 U	50 U	50 U	50 U	5.0 U
Naphthalene	5.0 U	50 U	5.0 U	50 U	5.0 U	50 U	50 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	50 U	50 U	5.0 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	50 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	ED34J	ED30C	ED34E	ED34H	ED34I	ED30E	ED34B	ED34C
Date Collected:	2/28/2002	2/27/2002	2/28/2002	2/28/2002	2/28/2002	2/27/2002	2/28/2002	2/28/2002
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Acrolein	50 U	50 U	50 U	50 U	50 U	NA	NA	NA
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA
Acrylonitrile	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
1,3,5-Trimethylbenzene	1.0 U	1.0 U	1.0 U	1.5	1.0 U	NA	NA	NA
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.0 U	8.5	1.0 U	NA	NA	NA
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Isopropylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
n-Propylbenzene	1.0 U	1.0 U	1.0 U	1.1	1.0 U	NA	NA	NA
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
sec-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
n-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification.	RW2	Dup of RW2
Laboratory Identification	ED30D	W ED30A
Date Collected	2/27/2002	2/27/2002
1,4-Dichlorobenzene	1.0 U	1.0 U
Acrolein	50 U	50 U
Methyl Iodide	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U
1,3,5-Trimethylbenzene	44	44
1,2,4-Trimethylbenzene	150	150
Hexachlorobutadiene	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U
Isopropylbenzene	54	51
n-Propylbenzene	76	73
Bromobenzene	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U
tert-Butylbenzene	2.0	1.9
sec-Butylbenzene	9.6	9.5
4-Isopropyltoluene	4.4	4.3
n-Butylbenzene	9.0	9.0
1,2,4-Trichlorobenzene	5.0 U	5.0 U
Naphthalene	15	16
1,2,3-Trichlorobenzene	5.0 U	5.0 U

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification.	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification	ED23B	ED23D	ED23F	ED23G	ED23I	ED16I	ED34F	ED30H	ED23H
Date Collected.	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/26/2002	2/25/2002	2/28/2002	2/27/2002	2/26/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	0.25 U	0.41	NA	NA	4.3	0 25 U	NA	4 0	1.9
TPH-Motor Oil Range	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT METALS (mg/L)									
Arsenic (7060)	0.011	0.012	NA	NA	0.035	0 006	0.016	0 040	0.016
Chromium (6010)	0.005 U	0 005 U	NA	NA	0 005	0.005 U	0 010	0 005 U	0.005 U
Copper (6010)	0.002 U	0 002	NA	NA	0 005	0.005	0 004	0.004	0 002 U
Lead (7421)	0 001 U	0 001 U	NA	NA	0.002	0 001 U	0 001 U	0.001 U	0 001 U
Nickel (6010)	*0.01 U*	*0.01 U*	*NA*	NA	0.01 U	0 01 U	0 01 U	0 01 U	0.01 U
Zinc (6010)	0 006 U	0.006 U	NA	NA	0.008	0 011	0 008	0 010 J	0 008
CONVENTIONALS (mg/L)									
Calcium (6010)	43.3	55 8	NA	NA	62.8	51.6	60.9	67 1	42.5
Magnesium (6010)	14 5	31.7	NA	NA	21.1	34 0	27.6	31.9	17 6
Potassium (6010)	5.2	2.8	NA	NA	3 2	1 8	3 9	1.0	2 7
Sodium (6010)	9 84	15.9	NA	NA	13 0	14 4	14.5	15 9	11 1
Alkalinity (mg/L CaCO3) (SM 2320)	240	370	NA	NA	290	280	350	430	220
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0 U	1 0 U	NA	NA	1.0 U	1 0 U	1.0 U	1 0 U	1 0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	240	370	NA	NA	290	280	350	430	220
Total Dissolved Solids (EPA 160.1)	240	340	NA	NA	380	320	390	400	260
Chloride (EPA 325.2)	3 3	5 3	NA	NA	26	3 0	3 7	14 J	2 8
N-Nitrate (mg-N/L) (Calculated)	0 73	0 010 U	NA	NA	0 010 U	0 010 U	NA	0 012	0 010
N-Nitrite (mg-N/L) (EPA 353 2)	0.021	0 013	NA	NA	0.074	0 010	NA	0 012	0 023
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0 75 J	0 019 J	NA	NA	0 057 J	0 017	NA	0 024	0 033 J
Sulfate (mg/L) (EPA 375.2)	2.6	3 5	NA	NA	2.5	6 1	5.5	9 5	2 5 U
FIELD PARAMETERS									
pH (avg)	6.90	6 62	6.27	5 95	6.64	6 36	6.50	6 48	6 54
Temperature (° C) (avg)	13 1	13 8	15 3	14.5	14 3	14.1	12 5	14 2	15 7
Conductivity (mS/cm) (avg)	362	592	500	170	578	445	617	705	381
Dissolved oxygen (mg/L) (avg)	7 72	6 76	7.41	7 80	7.50	4.78	7 98	7 10	7 27
Turbidity (NTU)	0	0	58	284	0	0	69	0	0

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification.	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification.	ED34J	ED30C	ED34E	ED34H	ED34I	ED30E	ED34B	ED34C
Date Collected:	2/28/2002	2/27/2002	2/28/2002	2/28/2002	2/28/2002	2/27/2002	2/28/2002	2/28/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0.25 U	0 25 U	0 87	1 2	0 25 U	NA	NA	NA
TPH-Motor Oil Range	NA	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT METALS (mg/L)								
Arsenic (7060)	0 030	0.019	0.007	0.016	0 020	NA	NA	NA
Chromium (6010)	0.005 U	0.005 U	0.005 U	0 015	0.005 U	NA	NA	NA
Copper (6010)	0 004	0 009	0 007	0 020	0.002 U	NA	NA	NA
Lead (7421)	0.001 U	0 002	0 002	0 006	0.001 U	NA	NA	NA
Nickel (6010)	0 01 U	0 01 U	0 01 U	0 01 U	0.01 U	NA	NA	NA
Zinc (6010)	0 009	0.015 J	0 022	0.032	0.006 U	NA	NA	NA
CONVENTIONALS (mg/L)								
Calcium (6010)	40 0	19.0	60.0	55 1	39 1	NA	NA	NA
Magnesium (6010)	13 8	9.55	31 3	25.4	17 3	NA	NA	NA
Potassium (6010)	2 0	1 0	2 2	1.5	2.8	NA	NA	NA
Sodium (6010)	7.23	9.06	17 6	12.5	16 8	NA	NA	NA
Alkalinity (mg/L CaCO3) (SM 2320)	180	100	370	260	230	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1 0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	180	100	370	260	230	NA	NA	NA
Total Dissolved Solids (EPA 160 1)	260	100	340	330	330	NA	NA	NA
Chloride (EPA 325 2)	2 4	1.3 J	9 8	5.2	24	NA	NA	NA
N-Nitrate (mg-N/L) (Calculated)	0 010 U	0.012	0 024	0 027	0 010 U	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 353 2)	0 018	0.013	0 025	0 010 U	0.042	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0 025	0 025	0.049	0 027	0.048	NA	NA	NA
Sulfate (mg/L) (EPA 375 2)	5 3	7.5	7.6	5 1	6.5	NA	NA	NA
FIELD PARAMETERS								
pH (avg)	6.52	6.50	6 52	6.80	6 50	6 35	6.49	6 26
Temperature (° C) (avg)	14.1	13.5	12 8	13.8	13.1	13.6	13.7	14.5
Conductivity (mS/cm) (avg)	361	164	576	431	439	356	62	422
Dissolved oxygen (mg/L) (avg)	7 46	7.74	8.44	7 61	7.16	7.36	7.82	7.60
Turbidity (NTU)	54	0	30	189	2	5	14	71

BZTO104(e)016672

PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification.	RW2	Dup of RW2 W
Laboratory Identification	ED30D	ED30A
Date Collected	2/27/2002	2/27/2002
TOTAL PETROLEUM HYDROCARBONS (mg/L)		
Method OR-DEQ		
TPH-Diesel Range	1 9 J	0.89 J
TPH-Motor Oil Range	0.50 U	0 50 U
TPH-Gasoline Range	4.0 J	3 8
PRIORITY POLLUTANT METALS (mg/L)		
Arsenic (7060)	0.020	0 022
Chromium (6010)	0.005 U	0 005 U
Copper (6010)	0.002 U	0 002 U
Lead (7421)	0 001 U	0 001 U
Nickel (6010)	0.01 U	0.01 U
Zinc (6010)	0.043 J	0.016 J
CONVENTIONALS (mg/L)		
Calcium (6010)	38.9	37.5
Magnesium (6010)	16.2	15.3
Potassium (6010)	2.5	2 2
Sodium (6010)	11.2	10.9
Alkalinity (mg/L CaCO3) (SM 2320)	220	200
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0 U	1.0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	220	200
Total Dissolved Solids (EPA 160.1)	270	290
Chloride (EPA 325 2)	24 J	4.1 J
N-Nitrate (mg-N/L) (Calculated)	0.019	0 010 U
N-Nitrite (mg-N/L) (EPA 353 2)	0.014 J	0 038 J
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353 2)	0 033	0 028
Sulfate (mg/L) (EPA 375 2)	6 3 J	9 8 J
FIELD PARAMETERS		
pH (avg)	6 27	6 27
Temperature (° C) (avg)	13.5	13 5
Conductivity (mS/cm) (avg)	422	422
Dissolved oxygen (mg/L) (avg)	7.06	7.05
Turbidity (NTU)	0	0

BZTO104(e)016673

KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS

Footnotes.

NA = Not analyzed.

NM = Not measured.

U = Indicates compound was analyzed for, but was not detected at the reported sample detection limit.

UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

M = Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match.

J = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

R = The sample results are rejected due to serious deficiencies in the ability to analyze the samples and meet quality control criteria. The presence or absence of the analyte cannot be verified.

[ ] = Detected constituent.

(a) The laboratory reported that hydrocarbon patterns that eluted in the gas range were detected; however the elution patterns do not match available standards.

(b) The laboratory reported that these samples have a pattern in the mineral spirits and diesel standard pattern range that does not resemble the standard patterns. This could possibly be a weathered mixture of mineral spirits and diesel.

(c) The laboratory reported that these samples have a pattern in the diesel and motor oil range that do not resemble the diesel or motor oil standard pattern. This could possibly be a weathered fuel.

(d) The laboratory reported that these samples show a pattern in the diesel range that does not resemble the diesel standard pattern. This could possibly be a weathered diesel.

(e) The laboratory reported that these samples show a pattern in the gas and diesel range that does not resemble either of the typical peak patterns for these standards.

(f) *These results are questionable because of laboratory blank contamination within this data set and the lack of PCP detections in these wells* historically. However, the results were not qualified because the method blank contamination could not be linked directly to the sample results.

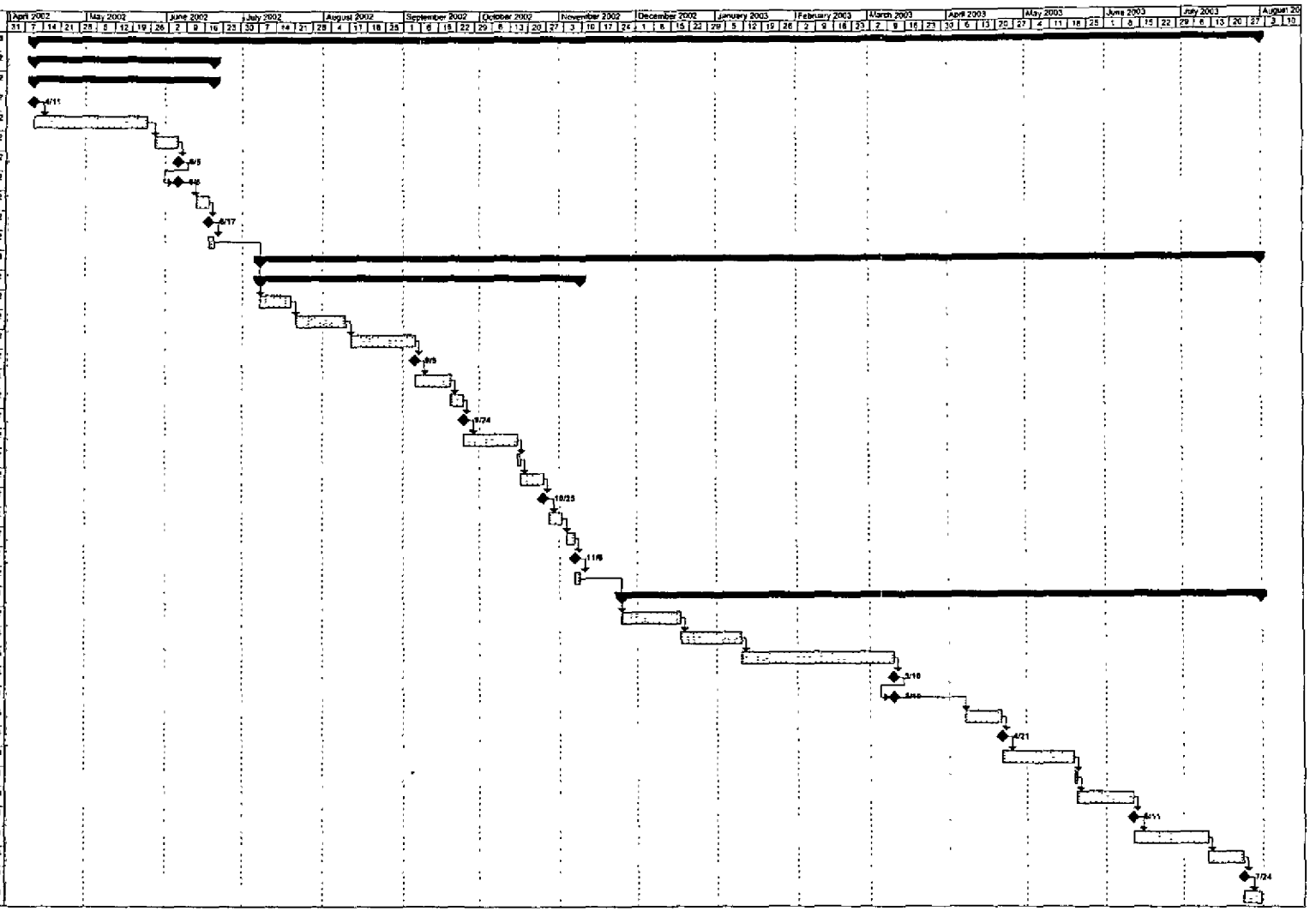
SUPPLEMENTAL PHASE II REMEDIAL INVESTIGATION
SUMMARY OF STORM DRAIN MANHOLE LOCATION ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

			TOTAL PETROLEUM HYDROCARBONS (a)					
Location	Lab ID	Date Collected	Gasoline (mg/L)	Mineral Spirits (mg/L)	Kerosene (mg/L)	Diesel (mg/L)	Lube Oil (mg/L)	PENTACHLOROPHENOL (µg/L)
SDM-1	0109005-02	9/4/2001	0.250 U	0.250 U	0.630 U	0.630 U	0.630 U	**11.5**
	0111183-02	11/30/2001	NA	NA	NA	0.250 U	0.500 U	**0.700**
	ED34K	2/28/2002	NA	NA	NA	**0.3**	0.50 U	**100**
	EG43A	4/5/2002	NA	NA	NA	NA	NA	**82**
SDM-2	0109005-01	9/4/2001	0.250 U	0.250 U	0.630 U	0.630 U	0.630 U	0.500 U
	0111183-01	11/30/2001	NA	NA	NA	**0.261**	0.500 U	0.500 U
	ED34L	2/28/2002	NA	NA	NA	0.25 U	0.50 U	**0.46**

U = Indicates compound was analyzed for, but was not detected at the reported sample detection limit.
NA = Not Analyzed
(a) Samples collected in September, 2001 were analyzed using total petroleum hydrocarbon (TPH) method, NWTPH-HCID. Samples collected in November 2001 were analyzed using NWTPH-Dx.

PROPOSED SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
PHASE III RI	330 days	Thu 4/11/02	Thu 7/31/03
Phase III Preliminary Evaluation	49 days	Thu 4/11/02	Wed 6/19/02
Technical Memorandum	49 days	Thu 4/11/02	Wed 6/19/02
Technical Memo to DEQ	0 days	Thu 4/11/02	Thu 4/11/02
DEQ Review/Comment	32 days	Thu 4/11/02	Fri 5/24/02
Prepare Response to DEQ Comments	7 days	Tue 5/28/02	Wed 6/5/02
Response Letter to Client	0 days	Wed 6/5/02	Wed 6/5/02
Client Review/Comment	5 days	Thu 6/6/02	Wed 6/12/02
Incorporate Client Comments	3 days	Thu 6/13/02	Mon 6/17/02
Response Letter to DEQ	0 days	Mon 6/17/02	Mon 6/17/02
DEQ Approval of CPT Investigation	2 days	Tue 6/18/02	Wed 6/19/02
Phase III RI	276 days	Mon 7/8/02	Thu 7/31/03
CPT Investigation	89 days	Mon 7/8/02	Fri 11/8/02
Field Investigation	10 days	Mon 7/8/02	Fri 7/19/02
Laboratory Analyses	15 days	Mon 7/22/02	Fri 8/9/02
Technical Memo Preparation	18 days	Mon 8/12/02	Thu 9/5/02
Draft Tech Memo to client	0 days	Thu 9/5/02	Thu 9/5/02
Client Review/Comment	10 days	Fri 9/6/02	Thu 9/19/02
Incorporate Client Comments	3 days	Fri 9/20/02	Tue 9/24/02
Tech Memo to DEQ	0 days	Tue 9/24/02	Tue 9/24/02
DEQ Review/Comment	15 days	Wed 9/25/02	Tue 10/15/02
Meeting with DEQ to discuss comments/RI scope	1 day	Wed 10/16/02	Wed 10/16/02
Prepare Response to DEQ Comments	7 days	Thu 10/17/02	Fri 10/25/02
Response Letter to Client	0 days	Fri 10/25/02	Fri 10/25/02
Client Review/Comment	5 days	Mon 10/28/02	Fri 11/1/02
Incorporate Client Comments	3 days	Mon 11/4/02	Wed 11/6/02
Response Letter to DEQ	0 days	Wed 11/6/02	Wed 11/6/02
DEQ Approval of RI Scope	2 days	Thu 11/7/02	Fri 11/8/02
Phase III RI Report	171 days	Mon 11/25/02	Thu 7/31/03
Field Investigation	15 days	Mon 11/25/02	Tue 12/17/02
Laboratory Analyses	15 days	Wed 12/18/02	Fri 1/10/03
Report Preparation	40 days	Fri 1/10/03	Mon 3/10/03
Draft Report to Client	0 days	Mon 3/10/03	Mon 3/10/03
Client Review/Comment	20 days	Mon 3/10/03	Mon 4/7/03
Incorporate Client Comments	10 days	Mon 4/7/03	Mon 4/21/03
Draft Report to DEQ	0 days	Mon 4/21/03	Mon 4/21/03
DEQ Review/Comment	20 days	Mon 4/21/03	Mon 5/19/03
Meeting with DEQ	1 day	Mon 5/19/03	Tue 5/20/03
Prepare Response to DEQ Comments	15 days	Tue 5/20/03	Wed 6/11/03
Response Letter to Client	0 days	Wed 6/11/03	Wed 6/11/03
Client Review/Comment	20 days	Wed 6/11/03	Thu 7/10/03
Incorporate Client Comments and Finalize Report	10 days	Thu 7/10/03	Thu 7/24/03
Response Letter and Final Report to DEQ	0 days	Thu 7/24/03	Thu 7/24/03
DEQ Approval of Phase III RI	5 days	Thu 7/24/03	Thu 7/31/03



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LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TRANSMITTAL

To: Time Oil Co.
2737 W. Commodore Way
Seattle, WA 98100-1233

Date: June 27, 2002

Attn: Mr. Kevin Murphy

Project No.: 231001.179

RE: **TIME OIL NORTHWEST TERMINAL**

Copies	Description
1	Draft Warehouse Demolition and Soil Excavation Removal Action Plan

The above-noted draft work plan is enclosed for your review and comment. The appendices will be provided with the final version.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Senior Hydrogeologist

RB/tam
6/27/02 S:\WPROC\231\TRANSMIT.FAX\murphy tm.doc
Enclosure

cc: Patty Dost, Schwabe, Williamson & Wyatt
✓ Mike Tischuk, Beazer East, Inc.

130 2nd Avenue South • Edmonds, WA 98020 • (425) 778-0907 • fax (425) 778-6409 • www.landauinc.com

Draft Removal Action Plan
Warehouse Demolition and Soil Excavation
Time Oil Northwest Terminal
Portland, Oregon

June 27, 2002

Prepared for

Time Oil Co.
2737 Commodore Way
Seattle, WA 98199-1233

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

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1.0 PROJECT DESCRIPTION

This removal action plan (RAP) describes activities to be conducted to demolish a warehouse and to excavate *in situ* soil that was formerly associated with a historical wood treatment formulation facility at the Time Oil Northwest Terminal in Portland, Oregon (Figure 1). The warehouse and soil removal area are referred to herein as the former pentachlorophenol (PCP) warehouse and the former PCP mixing area (Figure 2). Soil within these areas are impacted by PCP, dioxins/furans, and PCP degradation products (e.g., tri- and tetrachlorophenols). PCP concentrations in the soil range from less than 1 milligram per kilogram (mg/kg) to more than 1,000 mg/kg for most of the soil volume. A small volume of soil (approximately less than 50 yd^3) contains high concentrations of up to 11 percent PCP. Dioxins/furans have been detected in soil at concentrations up to 5 micrograms per kilogram (µg/kg). The warehouse and *in situ* soil removal action will be conducted in conjunction with and following the removal action for an adjacent soil stockpile, located directly southwest of the former PCP mixing area, as described in the Phase I – Soil Stockpile Removal Action Plan (Stockpile RAP; Landau Associates 2002) and revised in an addendum letter (Time Oil Co. 2002).

Time Oil has requested approval from Environment Canada and from the United States Environmental Protection Agency (EPA) to dispose of the excavated soil and stockpile at the Swan Hills incineration and landfill facility in Swan Hills, Alberta, Canada. The Swan Hills facility is a hazardous waste incineration and land disposal facility owned by the Government of Alberta and operated by Sensor Environmental. Copies of the application were provided with the afore-mentioned addendum letter. The removal action will be completed under the provisions of a voluntary cleanup program (VCP) agreement between the Oregon Department of Environmental Quality (DEQ) and Time Oil (DEQ No. WMCVC-NWR-96-07). The removal action will commence following DEQ review and approval of the plan described herein and receipt of approval of treatment/disposal of the soil at the Swan Hills facility by Environment Canada and EPA.

The remainder of this introductory section of the RAP provides information on the project background and a brief description of the remedial activities completed to date.

1.1 PROJECT BACKGROUND

The terminal is a former bulk petroleum storage and transfer facility currently owned by Time Oil. The facility is located in Township 2 North, Range 1 West, Sections 34 and 35, in the industrialized Rivergate area of north Portland, Oregon (Figure 1). The terminal is bordered to the east and south by heavy industrial complexes, to the north by heavy industrial complexes and Port of Portland undeveloped property, and to the west by the Willamette River (Figure 2). The terminal covers approximately 52 acres

and is generally flat with an average land surface elevation of about 28 ft above mean sea level (MSL). The entire terminal is enclosed by a chain-link fence and access to the terminal is through the main gate at the termination of Time Oil Road.

Between 1943 and 2001, the terminal was operated by Time Oil as the Northwest Terminal petroleum products facility. Since operations began, the terminal was used for the receipt, storage, and distribution of petroleum and petroleum-related products. From 1967 to 1984, PCP-containing products were formulated at the terminal under an agreement with the Koppers Company (currently Beazer East, Inc.). PCP-related operations included import of solid PCP, various carrier liquids (typically petroleum based) into which the PCP would be mixed, and various additives; interim storage of the chemicals in the former PCP warehouse and in product tanks located within the former PCP mixing area (Figure 3); transfer and mixture of the chemicals to formulations specified by the Koppers Company; interim storage of the PCP products; and transfer of the products to drums or containers for offsite transport. No PCP blending activities have occurred at the terminal since 1984. All other commercial activities at the terminal ceased in October 2001. Currently, environmental assessment and cleanup activities are ongoing at the terminal.

1.2 COMPLETED REMEDIAL ACTIVITIES

Releases of PCP, carriers, additives, and PCP formulations to soil in the former PCP mixing area and beneath the former PCP warehouse occurred during the mixing operations. Environmental investigations and removal actions conducted by and for Time Oil since 1984 resulted in the 1989 excavation and placement of PCP-containing soil from the former PCP mixing area into a stockpile, located just southwest of the mixing area and north of the inactive soil treatment (bioremediation) area (Figure 3). Approximately 3,000 yd^3 of PCP-contaminated soil were excavated to depths ranging from less than 4 ft to a maximum of 12 ft below original ground surface grade (approximately equivalent to the groundwater table) within the former PCP mixing area (Figure 4). The excavated soil was stockpiled onsite in a bermed and lined area. At the time the excavation activities were completed in 1989, additional PCP-impacted soil was left in place mainly because of access issues below the warehouse. The excavation area created in 1989 was backfilled to the present ground surface elevation with clean fill.

1.3 SUMMARY OF ANALYTICAL CONCENTRATIONS

Between 1984 and 1989, several soil sampling and remediation events were conducted within the former PCP mixing area, below the former PCP warehouse, and within the former Crosby and Overton tank area at the terminal. These areas, identified as source areas in the Phase II RI report, are shown on

Figure 3. The main focus of the historical investigations was to identify the extent of PCP contamination within and adjacent to the former PCP mixing area resulting from historical use of these areas for formulation of wood treatment products. Based on the analytical results, approximately 3000 yd^3 of soil was excavated from this area in 1989 (Figure 4) and placed into the current soil stockpile, as described earlier. A summary of the individual sampling events is provided in the Phase II RI report (Landau Associates 2001_). A summary of a reduced set of the analytical soil data from the historical events, containing data representing soil concentrations remaining within the former PCP mixing area after excavation, is included in Table 1.

As part of the Phase II RI in fall 1996 and spring 1997, soil samples were collected from fifteen soil borings, 5 surface soil samples, and four monitoring well boreholes in and adjacent to the former PCP mixing area and former PCP warehouse. In addition, in 1999, soil was collected from four cone penetrometer technique (CPT) locations and from a new monitoring well (RW-3) from these areas. The sample results are provided in Tables ____.

To further evaluate the extent of soil contamination within and adjacent to the identified Phase II source areas and to address data gaps identified by DEQ in their comments on the Phase II RI report, supplemental soil sampling was conducted within the former PCP mixing area and the adjacent Crosby and Overton area in September 2001. Fifteen soil borings were completed in and around the former PCP mixing area and soil was collected from the borings at depths ranging from 0.5 to 40.5 ft BGS for chemical analysis. A total of 65 soil samples were collected and analyzed for PCP using EPA method 8270- selected ion monitoring (SIM) and a total of 14 samples were analyzed for polycyclic aromatic hydrocarbons (PAH) using EPA method 8270 SIM. Table 2 presents the PCP soil results for the Phase II supplemental locations and Table 3 presents the PAH soil results.

PCP results for the historical investigations and for the Phase II supplemental sampling for soil currently in place within the former PCP mixing area after the 1989 excavation are shown on Figure 5. The results indicate that PCP concentrations remaining in the soil range from less than 1 milligram per kilogram (mg/kg) to more than 1,000 mg/kg for most of the impacted soil volume. A small volume of soil (approximately less than 50 yd^3) contains high concentrations of up to 11 percent PCP near the southwest corner of the former PCP warehouse. PCP-impacted soil exceeding about 5 mg/kg extends to approximately 15 to 16 ft BGS, but the majority of the impacted volume is located within the upper 10 ft of the ground surface. However, one historical data sample (sample no. 4) indicates PCP concentrations up to 62 mg/kg at a depth of 35 ft BGS.

Dioxins/furans have also been detected in each of four soil samples collected from within the former PCP mixing area and the former Crosby and Overton area. The four samples were collected from the following locations/depths: LW-2S at a depth of 12.5 to 14 ft BGS and 16.5 to 17 ft BGS, LB-4 at a

depth of 12 to 13.5 BGS, LB-5 at a depth of 0 to 0.5 ft BGS. The dioxin/furan concentrations at LW-2S, converted to 2,3,7,8, TCDD toxic equivalency quotient (TEQ) values, ranged from 1.54 µg/kg at 16.5 to 17 ft BGS to 5.11 µg/kg at 12 to 13.5 ft BGS. Dioxin/furan TEQ concentrations at LB-4 and LB-5 were approximately 2 µg/kg.

Few other chlorinated phenols or PCP degradation products were detected within the source areas and most were present at low concentrations. Other constituents, including PAH compounds and metals (predominantly copper and zinc), were mainly detected in surface soil samples (0 to 0.5 ft BGS) at relatively low concentrations. For the PAH compounds, the maximum concentration of 4,800 µg/kg was for pyrene at LB-5 (at 0 to 0.5 ft BGS). Carcinogenic PAH results were all approximately less than 2,000 µg/kg. Other constituents, including TPH compounds (gasoline and diesel range), ethylbenzene, and xylenes, were detected in soil samples near the groundwater table (12 to 14 ft BGS). Concentrations of up to 1,100 mg/kg of TPH compounds were detected, with the maximum concentrations occurring at LB-3 and LB-11. A single concentration of 59 mg/kg of total xylenes was detected at LB-14, but generally these compounds were not detected at locations where analyzed.

Because of the volume of soil impacted by PCP within the source areas and the high concentrations relative to other detected constituents, PCP will be used as the indicator compound for completion of the removal action. Based on the results of a pre-remedial action investigation (Section 2.3.1), dioxin-furan compounds may also be used as indicator compounds for the completion of the removal action and appropriate cleanup goals may be established.

2.0 DESCRIPTION OF PLANNED REMOVAL ACTIVITIES

The planned removal action for impacted soil associated with the former PCP mixing area and former PCP warehouse will include demolition and removal of the warehouse and other site features, excavation of impacted *in situ* soil, and removal of the material (soil, warehouse demolition debris, etc.) from the site for offsite treatment (soil only) and disposal. Oversight of removal activities will be provided by authorized employees of Time Oil or Landau Associates (project oversight personnel).

Several site features must be removed to gain unrestricted access to the soil to be excavated. The planned removal action will include the demolition and removal of the following features (Figure 6):

- Former PCP Warehouse (including timbers, metal supports, metal siding and roof, and concrete slab)
- Bulk Liquid (Water) Storage Tank 38009 (including metal tank and tank lining)
- Above Ground and Below Ground Piping
- Concrete Block Walls.

The listed items will be demolished onsite and disposed at construction landfills and/or metal recycling facilities, as appropriate. After the above listed items are demolished, PCP-impacted *in situ* soil will be excavated for offsite treatment/disposal to complete the removal activities.

Excavated soil will be placed into three separate onsite stockpiles referred to as "clean," "impacted," and "high PCP concentration" soil stockpiles. Clean soil will include overburden removed from the excavation area that was placed as backfill at the conclusion of the 1989 soil excavation effort and may include additional excavated soil determined by laboratory analysis to contain less than 5 mg/kg of PCP. Excavated soil that contains PCP concentrations approximately equal to or greater than 5 mg/kg and less than 1,000 mg/kg will be temporarily placed in the impacted soil stockpile. Excavated soil that contains PCP concentrations of approximately 1,000 mg/kg or more will be temporarily placed in the high PCP concentration soil stockpile. The PCP-impacted soil will be segregated into high PCP concentration and impacted soil stockpiles in response to a request from the treatment and disposal facility. The soil in the impacted and high PCP concentration stockpiles will be loaded into dump trucks for transport to the Swan Hills facility. Upon approval, the soil will be transported to the Swan Hills incinerator facility in Alberta, Canada, for treatment, followed by disposal at the Swan Hills Landfill in accordance with Canadian regulations. The Swan Hills facility is operated by Sensor Environmental. HAZCO Environmental Services, LLC (HAZCO) will be the remediation contractor. Following the completion of excavation activities and subsequent verification sampling and analysis of soil left in place, the extent of the excavation area will be recorded on a survey and backfilled with clean material.

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The objectives for the RAP are:

- To reduce exposure of impacted soil to human and ecological receptors during future terminal use
- To minimize migration of contamination from the *in situ* soil to groundwater
- To eliminate the need for a long-term remedial action for the *in situ* soil.

It is anticipated that these objectives will be achieved with the physical removal of the *in situ* soil impacted by PCP at concentrations in excess of 5 mg/kg. In the absence of a site-specific risk analysis at this time, the 5 mg/kg cleanup goal for the soil excavation activities was established as a conservative action level. The 5 mg/kg cleanup goal for PCP may be revised, and a cleanup goal for dioxin-furan compounds may be established, based on the results of the pre-removal action investigation.

A terminal-wide risk assessment will be conducted following completion of Phase III remedial investigation activities. The risk assessment will be used to establish site-specific cleanup levels that are protective of human health and the environment for all remaining constituents of concern, including PCP present in residual soil, for use in conducting a terminal-wide feasibility study (FS) and for recommending for a terminal-wide remedial action.

2.1 REMOVAL ACTION ACTIVITIES

Removal action activities will primarily be completed by demolition and remediation contractors with oversight by project oversight personnel. Various site preparation, demolition, and site restoration activities may be completed by other contractors (e.g., electrical) under direct contract to Time Oil with oversight provided by project oversight personnel. The removal action will consist of the following items:

- Pre-mobilization activities (Section 2.2) – Includes the acquisition of necessary permits, preparation of a site-specific health and safety plan, receipt of import/export approvals, and preparation of manifest documents. The remediation and demolition contractors and other contractors will be responsible for the completion of pre-mobilization tasks, subject to approval of project oversight personnel.

- Mobilization and site preparation (Section 2.3) – Includes the removal of a soil stockpile currently located to the south-southwest of the PCP warehouse, protection of existing site features, set up of work zones, abandonment of groundwater monitoring wells within the work zone, disconnection/rerouting of electrical service for the PCP warehouse and surrounding area, completion of an asbestos inspection of the building, removal of a large bulk liquid above ground storage tank, abandonment/removal of pipelines in the area to be excavated, and removal of two separate concrete block walls. The remediation contractor will be responsible for the soil stockpile removal, protection of existing site features, and setting up work zones. Time Oil will contract with others for the completion of the remaining

mobilization and site preparation activities. Project oversight personnel will provide direction in the completion of mobilization and site preparation activities.

- Warehouse demolition (Section 2.4) – Includes the decontamination, demolition, and disposal of the PCP warehouse building, including timbers located inside the building, metal supports, metal siding and roof, and concrete slab floor and loading dock. Time Oil will arrange for an independent demolition contractor (not the remediation contractor) to be responsible for activities related to the demolition of the warehouse, subject to the approval of project oversight personnel.

- Excavation and disposal of *in situ* soil (Section 2.5) - Includes the completion of a horizontal survey to identify the anticipated lateral extent of the excavation area, removal and staging of *in situ* soil, collection and analysis of soil verification samples, loading of soil into dump trucks, decontamination of dump trucks prior to exiting the site, and transport of contaminated soil for incineration and disposal. With the exception of the completion of the horizontal survey and the collection and analysis of verification samples, the remediation contractor will be responsible for activities related to the excavation and disposal of *in situ* soil, subject to the approval of project oversight personnel.

- Site demobilization (Section 2.6) – Includes removal of heavy equipment used for the removal action and assessing and restoring the site egress route, as necessary. The remediation contractor will be responsible for site demobilization activities, subject to the approval of project oversight personnel.

- Backfill (Section 2.7) – Includes a final survey of the soil excavation area, installation of a geotextile material at the extent of the excavation, placement of clean fill into the excavation, compaction of the fill material, and implementation of erosion control measures at completion. Time Oil will arrange for a contractor to be responsible for backfill activities.

2.2 PRE-MOBILIZATION ACTIVITIES

Prior to the initiation of removal activities at the site, documentation must be prepared to indicate that the activities will be completed in compliance with applicable construction standards and health and safety guidelines. In addition, final approvals for export of the soil from the United States and import into the Alberta province of Canada for treatment/disposal at the Swan Hills facility must be obtained and proper manifests must be prepared. An explanation of these details follows.

2.2.1 PERMITTING

The remediation contractor will be responsible for the acquisition of all permits associated with the excavation and treatment/disposal of *in situ* soil, including, but not limited to, land disturbance permits and transportation permits. The demolition contractor will be responsible for other permits required, including, but not limited to, electrical and building demolition permits.

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2.2.2 HEALTH AND SAFETY PLAN

A health and safety plan was prepared by Landau Associates for the completion of site investigation and supervisory activities to be performed by Landau Associates at the terminal (Landau Associates 2001). The health and safety plan, presented in Appendix A of the Stockpile RAP identifies potential generic health and safety issues at the site; however, the plan does not specifically address potential health and safety issues that may arise during activities to be performed by the remediation contractor for the activities described herein. The remediation contractor and demolition contractor will be required to prepare site-specific health and safety plans that are to be reviewed and signed by the contractors' onsite personnel and approved by Time Oil prior to mobilization to the site. The contractors will each provide a representative to serve as site safety coordinator who will be responsible for implementing the safety measures contained in the site-specific health and safety plan. The health and safety plans prepared by the contractors will include, at a minimum, discussion of potential exposure routes, criteria for personal protective equipment (PPE), emergency procedures, exposure mitigation procedures, air monitoring equipment required in the work zones, identification of a site safety coordinator, and provisions for daily tailgate safety meetings to be conducted by the site safety coordinator.

All contractor personnel with the exception of the electrical contractor and truck drivers, must have completed Hazardous Waste Operation Worker (HAZWOPER) training in accordance with Occupational Safety and Health Administration (OSHA) guidelines. Evidence of HAZWOPER training and annual 8-hour refresher training must be provided prior to the commencement of work to the Time Oil representative for all contractor personnel to be onsite.

In addition to remediation and demolition contractor personnel, other personnel anticipated to be present onsite during the removal action include project oversight personnel; truck drivers; and regulatory agency personnel. Personnel present onsite that are not involved with the removal of the *in situ* soil material will be restricted to the "clean zone" as defined in Section 2.3.3. Truck drivers whose trucks are being loaded in the "removal action zone" will be instructed to remain in their vehicles with the windows rolled up while loading and decontamination activities are taking place. Truck drivers will be permitted to exit their vehicle and inspect the security of their load after re-entering the "clean zone" from the "truck decontamination zone".

2.2.3 IMPORT/EXPORT APPROVAL OF WASTE

Time Oil and Beazer East, Inc. have applied for approvals from the EPA and Environment Canada to import the excavated soil for treatment by incineration and disposal at the Swan Hills facility in

Swan Hills, Alberta, Canada. Written approvals from these agencies must be received and submitted to DEQ prior to the commencement of *in situ* soil excavation. Other pre-mobilization, mobilization, site preparation (with the exception of the removal of the existing soil stockpile), and warehouse demolition activities may be completed prior to receiving the agency approvals for import/export.

2.2.4 MANIFEST DOCUMENTATION

Manifest documents for the transport and disposal of up to 2,500 yd^3 of soil from the former PCP mixing area will be prepared by the remediation contractor and will be combined with the manifests for the existing soil stockpile. The manifest documentation will be prepared as described in Sections 2.2.3 of the Stockpile RAP. United States and Canadian waste manifests will be generated for each load of material transported from the site. Generator copies of all manifests and associated certificates of destruction must be provided to Time Oil.

2.3 MOBILIZATION AND SITE PREPARATION

Mobilization and site preparation activities to be completed in advance of the warehouse demolition and excavation of *in situ* soil include the following:

- Pre-removal action investigation
- Removal of the current soil stockpile
- Protection of existing site features
- Definition of work zones
- Setup of the truck loading area and decontamination stations (dry and wet)
- Preparation of the personnel decontamination areas
- Abandonment of monitoring wells
- Removal/re-routing of electrical utilities
- Completion of an asbestos inspection of the warehouse
- Removal of an aboveground storage tank
- Abandonment of pipelines intersecting the work area
- Removal of concrete block walls.

These activities are discussed in further detail in the following sections.

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2.3.1 PRE-REMOVAL ACTION INVESTIGATION

Before initiation of removal action activities, a pre-removal investigation will be conducted within the former PCP mixing area. The purpose of the investigation will be to obtain analytical data for the "clean fill" or overburden that was used to backfill the 1989 excavation and that will be removed from during excavation of the *in situ* soil and segregated from the impacted soil for possible reuse as backfill. In addition, soil samples will be collected in an area near the proposed horizontal extent of the *in situ* excavation boundary to determine whether the soil action level proposed for PCP (5 mg/kg) will be adequate for protection of groundwater and to determine whether it is appropriate to establish soil action levels for any other constituents, including dioxins/furans **(KEVIN/PATTY, we need to discuss this)**.

The "clean fill" originated from a several small areas located on the far western portion of the east property. To determine whether the "clean fill" can be reused as backfill, soil samples will be collected from 6 locations within the area identified as containing approximately 12 ft of backfill from the 1989 excavation (Figure XXX; **WE'LL PREPARE AFTER WE DISCUSS**), prior to initiation of the removal action. Soil samples will be collected from three depths at each location: 4, 8, and 12 ft BGS. Samples collected from these depths are expected to be representative of soil concentrations within each 5-ft lift used for excavation of the impacted *in situ* soil. Each sample will be analyzed for PCP, PAHs, and TPH by HCID.

To demonstrate that groundwater concentrations will not be adversely impacted by the soil concentrations left in place following the removal action, soil samples will be collected at five locations/depths where current PCP concentrations in soil are expected to be in the range of 5 to 50 mg/kg (Figure XXX). Sample depths will range from 0 to 10 ft BGS. Samples will initially be analyzed for PCP and for dioxins/furans using EPA methods 8270 and 8290, respectively using a 1 week turn-around time. Based on these results, additional samples will be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP; EPA method 1311) to determine the leachate concentrations from the representative samples. Based on these results, the proposed soil action level for PCP (5 mg/kg) may be revised and an evaluation will be conducted to determine whether a action level for dioxins/furans should be established.

This pre-removal investigation will be conducted in conjunction with field activities for the Phase III RI, currently scheduled for the week of July 9, 2002. Establishment of final soil action levels will be discussed and approved by DEQ prior to initiation of *in situ* soil removal activities.

2.3.2 REMOVAL OF SOIL STOCKPILE

Prior to the initiation of warehouse demolition and *in situ* soil excavation removal action activities, the soil stockpile located to the south of the former PCP warehouse and soil excavation areas will be removed as described in the stockpile RAP. The liner underneath the stockpile and the stockpile cover will be retained for use during temporary stockpiling of the *in situ* soil following excavation and prior to loading of trucks for transport to the Swan Hills facility.

2.3.3 PROTECTION OF EXISTING SITE FEATURES

Prior to the initiation of removal activities, project oversight personnel will identify site features that will require protection during remediation activities. These features include building structures, monitoring wells, roadways, fences, and overhead utilities. In addition, the remediation contractor will be required to contract an underground utility locating service to identify potential underground utilities that will require protection during the removal action.

2.3.4 DEFINITION OF WORK ZONES

Prior to commencement of removal activities, work zones will be established to designate areas for specific tasks associated with the removal action. The work zones will include: the RA zone, the truck decontamination zone, the personnel decontamination zone, and the clean zone. Preliminary identification of these various zones is indicated on Figure 5. Definitions of these work zones are as follows:

- *Removal Action Zone* – The area encompassing the PCP warehouse, the *in situ* excavation area, the current soil stockpile area, and the truck loading area. Only site personnel with proper training and equipped in appropriate PPE will be permitted to enter the RA Zone after reviewing and signing the health and safety plan. This area is comparable to the exclusion zone defined in the health and safety plan prepared by Landau Associates (Landau Associates 2002a).

- *Truck Decontamination Zone* – The area located adjacent to and east of the truck loading area that will include the truck decontamination station. The Truck Decontamination Zone will be used for decontaminating trucks after they have been loaded with material for disposal. Only site personnel with proper training and equipped in appropriate PPE will be permitted to enter this area after reviewing and signing the health and safety plan. This area is comparable to the contaminant reduction zone defined in the health and safety plan prepared by Landau Associates (Landau Associates 2002a).

- *Personnel Decontamination Zone* – Two personnel decontamination stations will be designated for the completion of the removal action. The two personnel decontamination stations comprise the Personnel Decontamination Zone. Only site personnel with proper training and equipped in appropriate PPE will be permitted to enter this area after reviewing

and signing the health and safety plan. This area is comparable to the contaminant reduction zone defined in the health and safety plan prepared by Landau Associates.

- *Clean Zone* – The remainder of the site to be utilized for truck staging, ingress and egress for the site, sanitary facilities, and an office. As indicated on Figure 6, the Clean Zone is a restricted area within the boundaries of the terminal property. No personnel will be permitted to enter the portion of the site beyond the clean zone without permission from project oversight personnel. This area is comparable to the support zone defined in the health and safety plan prepared by Landau Associates.

2.3.5 TRUCK LOADING AREA SETUP

A truck loading area will be prepared by the remediation contractor on the southeastern side of the stockpile in conjunction with stockpile removal activities, as indicated on Figure 7. The truck loading area will be prepared using the methods described in Section 2.3.3 of the stockpile RAP. The purpose of the loading area will be to minimize the spreading of spills that may occur during the loading of the trucks by limiting loading activities to a single area that is properly prepared for truck access. If any spills inadvertently occur, the soil will be cleaned up during decommissioning of the truck loading area at the completion of the removal action (see Section 2.6.1)

2.3.6 TRUCK DECONTAMINATION STATION SETUP

The remediation contractor will prepare a truck decontamination station immediately east-northeast of the truck loading area (Figure 7). The truck decontamination station will include an asphalt pad and curbing installed around all sides of the truck decontamination area while decontamination activities are taking place. If at all possible, dry decontamination techniques will be utilized to remove stockpile material from the exterior truck body and wheels prior to exiting the decontamination station. Dry decontamination techniques will consist of utilizing brooms and dry brushes to remove the stockpile material from truck exteriors and tires, manual collection of the material accumulating on the asphalt, and incorporation of the collected material into the soil to be transported to the Swan Hills facility. When necessary (e.g., inclement weather), wet decontamination methods will be utilized to remove the stockpile material from the truck exteriors and tires. Wet decontamination techniques will include removal of soil from the truck exteriors and tires using a pressure washer and collection of the wastewater from the decontamination station using a vacuum pump. The truck decontamination water will be pumped to an existing aboveground storage tank (AST, Tank 16804; see Figure 7) to be treated in the existing onsite wastewater treatment system and the solid material will be incorporated into the materials for transportation to the offsite treatment/disposal facility.

2.3.7 PERSONNEL DECONTAMINATION STATIONS SETUP

The remediation contractor will prepare two personnel decontamination stations. One personnel decontamination station will be located adjacent to the northwestern corner of the PCP warehouse and the second personnel decontamination station will be located adjacent to the southeastern corner of the Truck Decontamination Zone (Figure 7). The Personnel Decontamination Zone will be utilized for decontaminating site personnel who are exiting the RA Zone or the Truck Decontamination Zone and prior to entrance into the Clean Zone. The Personnel Decontamination Zone will also be used for the donning and doffing of PPE as personnel enter and exit the Clean Zone. Upon exiting the RA Zone or Truck Decontamination Zone, personnel must pass through the personnel decontamination area to remove PPE, which will be placed into trash bags for disposal at an appropriate facility. The remediation contractor will be responsible for setting up a boot wash station and eye wash station in each personnel decontamination station. The boot wash water will be changed at least once per day and, as needed, when the water becomes excessively dirty. Dry personnel decontamination techniques will be used when feasible, to minimize the generation of decontamination waste water.

2.3.8 WELL ABANDONMENT

Prior to building demolition activities, Time Oil will contract directly with a local well drilling contractor for the permanent abandonment of groundwater monitoring/recovery wells located within the warehouse demolition and soil excavation work area. These wells will include: LW-2S, RW-3, D, LW-12D1, LW-12D2, and LW-3D (Figure 8). Wells will be abandoned in accordance with OAR 690-240-0135. Well construction logs are provided in Appendix A.

2.3.9 ELECTRICAL UTILITIES

Prior to warehouse demolition activities, Time Oil will contract a local electrician to identify the electrical service supplying or routed through the PCP warehouse structure and the former PCP mixing area. Based on the identification of electrical utilities, Time Oil will contract directly with the electrician to re-route necessary electrical service and abandon unnecessary electrical service.

2.3.10 ASBESTOS INSPECTION

Prior to warehouse demolition activities, the demolition contractor will arrange to have an asbestos inspection conducted of the warehouse building materials. Based on the type of warehouse construction (corrugated metal building built on a concrete slab foundation), asbestos is not expected to be present.

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2.3.11 ABOVEGROUND TANK REMOVAL

Time Oil will arrange for the removal of the water present in a 38,000-gal (approximate) metal bulk water storage tank (Tank 38009) located south-southeast of the warehouse to be demolished (Figure 6). The contents of the tank will be transferred to Tank 16804, a large water storage tank located approximately 150 ft west of the warehouse building. Following removal of the water, the demolition contractor will use a hot water pressure washer to decontaminate the inside of Tank 38009 and transfer the decontamination water to Tank 16804. Personnel decontaminating the interior of Tank 38009 must be certified for working in confined spaces and must comply with a confined space entry permit prepared by the demolition contractor and reviewed by Time Oil. After Tank 38009 has been decontaminated, the tank will be demolished by the demolition contractor, cut into transportable pieces onsite, and transported offsite to a metal recycling facility. The metal tank is coated with an epoxy or fiberglass material. (Kevin – Please verify no asbestos coating). Disposal fees incurred for Tank 38009 will be paid by the demolition contractor.

2.3.12 PRODUCT PIPELINE ABANDONMENT

The demolition contractor will decommission approximately six (6) former product pipelines located approximately 60 to 70 ft south of the warehouse. The pipelines are located above and below ground surface and range in diameter from 2 to 8 inches. The pipelines will be decommissioned by removing the pipelines from a point approximately northeastern corner of the current soil stockpile to a point approximately 120 ft to the east (Figure 6). The portions of the pipelines that are left in place will be permanently decommissioned by grouting the lines with concrete. The petroleum product pipelines were reportedly cleaned during terminal closure activities completed in 2001. However, the removed product pipelines must be visually inspected for residual petroleum and decontaminated (if necessary) with a hot water pressure washer prior to being cut up into transportable pieces and disposed of at an offsite metal recycling facility. Decontamination water will be contained in a decontamination sump and transferred to Tank 16804 by the demolition contractor. Disposal fees incurred for the metal piping will be paid by the demolition contractor. One of the underground pipelines is a 2- or 3-inch diameter water line that will be re-installed during the backfill of the soil excavation. The water line will be re-installed by a backfill contractor under the supervision of project oversight personnel.

2.3.13 CONCRETE WALL REMOVAL

Following demolition of Tank 38009 and decommissioning of pipelines, the demolition contractor will remove the concrete block walls located east of the current soil stockpile and southeast of the warehouse building (Figure 6). Each of these walls is approximately 3 ft high by 8 inches thick and the total linear footage of the two walls combined is approximately 250 ft. The concrete block walls will be broken into transportable pieces onsite and transported offsite for disposal at a construction debris landfill or concrete recycling facility. Disposal fees for the concrete block wall material will be paid by the demolition contractor.

As necessary, the demolition contractor will decontaminate a portion of the concrete block walls expected to be impacted by PCP with a hot water pressure washer following removal. Project oversight personnel will identify any walls requiring decontamination prior to removal. The demolition contractor will contain the decontamination water and transfer the water to Tank 16804.

2.4 WAREHOUSE DEMOLITION

The demolition contractor will conduct the warehouse demolition, including building decontamination and physical removal/demolition of the building materials.

Following building decontamination, project oversight personnel will collect samples of two of the wooden timbers to verify adequacy of the decontamination procedure. The wood samples will be analyzed for PCP by Specialty Analytical in Tualatin, Oregon.

Building decontamination will be conducted prior to physical demolition of the PCP warehouse. The demolition contractor will decontaminate wooden timbers, metal supports, the interior of the corrugated metal siding, and the concrete floor of the warehouse building using a hot water pressure washer. Decontamination water will be contained in a low area of the concrete floor and/or the interior building perimeter should be lined with a temporary berm to contain decontamination water. The decontamination water will be collected from the building floor by the demolition contractor using a vacuum truck and transferred to Tank 16804.

Following the decontamination of the materials identified, the demolition contractor will remove/demolish the building materials, as follows:

- Remove the corrugated metal roofing and siding (and associated structural supports) from the building. Estimated roof area is 5,600 ft^2 and the siding measures approximately 300 linear ft by 12 ft high. Metal will be cut into transportable pieces onsite and removed by the demolition contractor for disposal at an offsite metal recycling facility. Disposal fees incurred for the siding and roof materials will be paid by the demolition contractor.

- Remove the wooden timbers from the building. Pending the receipt of analytical results from the sampling of the timbers, the timbers will be disposed by the demolition contractor at an offsite facility. At this time, it is anticipated that the demolition contractor will cut the timbers into transportable pieces onsite and dispose of them at an offsite construction debris landfill. However, if analytical results indicate that the timbers must be disposed at an alternative disposal facility, the demolition contractor will be notified by project oversight personnel. Disposal fees incurred for the timbers will be paid by the demolition contractor.

- Remove the concrete flooring foundation from the warehouse and loading dock area. The concrete is anticipated to be approximately 4 to 6 inches thick and may contain reinforcement bars. The total area of the concrete to be removed is approximately 6,900 ft^2. Concrete will be broken by the demolition contractor into transportable pieces onsite and disposed at an offsite concrete recycling facility or construction debris landfill. Disposal fees incurred for the concrete will be paid by the demolition contractor.

2.5 *IN SITU* SOIL EXCAVATION

Following the demolition and removal of the PCP warehouse, the remediation contractor will begin the excavation of soil from within the former PCP mixing area and beneath the footprint of the PCP warehouse. The maximum extent of the excavation area is anticipated to measure approximately 100 to 110 ft (measured west to east) by approximately 110 to 115 ft (measured south to north). Soil excavated from an approximate 10- by 25-ft area near the southwest corner of the warehouse footprint will be segregated from the other excavated soil because of elevated PCP concentrations in the soil within this area (up to about 11 percent PCP). The excavation effort should result in the excavation of approximately 2,500 yd^3 of PCP-impacted soil (including approximately less than 50 yd^3 of high PCP concentration soil from beneath the southwest corner of the PCP warehouse) and up to 2,500 yd^3 of clean fill material from above the PCP-impacted soil. Project oversight personnel will assist the contractor in segregating the "clean," "impacted" and "high PCP-concentration" soil as the excavation is being conducted.

2.5.1 EXCAVATION AREA SURVEY

Prior to initiation of soil excavation, the boundaries of the excavation area and the high PCP concentration excavation area (Figure 9), as described below, will be surveyed and visibly marked by Landau Associates with surveyor stakes for use in identification of excavation boundaries during soil removal.

2.5.2 EXCAVATION STAGING

The excavation will be completed as a tiered excavation in an effort to limit the need for shoring of the excavation area. The excavation work will be completed in approximate 5-ft lifts as follows:

- Soil located within the entire excavation area (Figure 9) will be removed to a depth of approximately 5 ft below ground surface (BGS). This will result in the removal of approximately 1,700 yd^3 of soil. Approximately 800 yd^3 of the soil removed from the 5-ft lift is anticipated to be "clean fill" material from a previous excavation effort.

- Excavation will continue to a depth of 5 to 10 ft BGS in an area measuring approximately 90 ft (west to east) by 70 ft (south to north) (Figure 10). This will result in the removal of approximately 1,100 to 1,300 yd^3 of soil. Approximately 400 yd^3 of the soil removed from the 10-ft lift is anticipated to be clean fill material.

- Excavation will continue to a depth of 10 to 15 ft BGS in an area measuring approximately 70 ft (west to east) by 40 ft (south to north) (Figure 11). This will result in the removal of approximately 600 to 700 yd^3 of PCP-impacted soil. The excavation lift from 10 to 15 ft BGS will likely intercept the groundwater table (anticipated to be located at approximately 12.5 to 13.5 ft BGS). The maximum excavation depth will be the maximum depth that can be achieved without the need to dewater or shore the excavation.

- Excavation completed near the southwestern corner of the PCP warehouse may result in the removal of approximately 25 to 50 yd^3 of high PCP-concentration (>1,000 mg/kg) soil (Figure 11). Project oversight personnel will use field screening instruments (e.g., photoionization detector) and laboratory analytical results from soil samples to direct the remediation contractor on the removal and segregation of high PCP-concentration soil.

- The tiered method of excavation is intended to allow for reasonable segregation of PCP-impacted soil and clean fill and also to attempt to minimize sloughing of clean ground surface and sidewall soil into the excavation area. The soil to be excavated is primarily a loose and unconsolidated material that may be prone to sloughing. In the event that sloughing of the soil into the excavation area becomes problematic, the remediation contractor will be prepared to widen the excavation to achieve an angle of repose for the overburden or to implement temporary shoring measures, subject to approval by project oversight personnel.

- If large rocks or debris, pipelines, or conduit are encountered during the excavation activities, the material will be decontaminated and disposed at a recycling facility or appropriate landfill, subject to the approval of project oversight personnel.

- The clean fill material removed from the excavation will be stockpiled by the contractor in an onsite area designated by Time Oil. The PCP-impacted soil will be temporarily stockpiled on the southern portion of the liner that is beneath the current soil stockpile located adjacent to the southern side of the excavation area. The hot spot soil will also be temporarily stockpiled on the liner, but will be kept segregated from the lower concentration soil. Temporary stockpile locations are indicated on Figure 12.

- The remediation contractor must effectively manage potential stormwater encountered during the completion of the project. At a minimum, the remediation contractor will keep stockpiled material covered with the current stockpile cover with a minimum 4-mil thick polyethylene sheeting at times when the material is not being loaded on trucks. In addition, the remediation contractor will use a portion of the clean fill material removed from the excavation and to create a berm around the perimeter of the excavation area to divert stormwater around the excavation area. Stormwater diversion and handling will be conducted in accordance with Section 2.5.3 of the stockpile RAP.

2.5.3 VERIFICATION SAMPLING

Following completion of soil excavation, Landau Associates personnel will collect soil verification samples from the extent of the excavation of each of the three lifts (tiers). Soil analytical samples will be analyzed using onsite field screening techniques and/or offsite laboratory analysis. Soil samples will be collected from the sidewalls and base of each excavation tier. The samples will be collected from approximately 0 to 6 inches below surface at each sample location using a stainless-steel spoon or a hand auger. Approximately one soil sample will be collected per every 100 linear ft of sidewall and every 1,000 square feet (ft^2) of base area of each tier. The proposed verification sample locations are presented on Figure 12. Actual sample locations may vary depending on conditions encountered and the approval of the sampling plan by DEQ. The final sample collection locations will be recorded on a map prepared by personnel collecting the soil samples.

Each of the verification samples will be collected into clean sample containers provided by the laboratory. Each of the sample jars collected at each location will be labeled and packed in ice in a cooler. The samples will be submitted to analytical laboratories with appropriate chains of custody accompanying the samples. The samples will be analyzed using onsite mobile laboratory techniques and/or offsite laboratory analysis with results provided on a 24-hour turnaround for PCP and ___ weeks for dioxins/furans. The samples will be analyzed for PCP using EPA Method 8270C at Specialty Analytical Inc., in Tualatin, Oregon. Approximately 10 percent of the samples collected within the excavation will be analyzed for dioxin/furan compounds using EPA Method 8290 at Pace Analytical Laboratory in St. Paul, Minnesota. Further explanation of the quality assurance/quality control (QA/QC) procedures used during collection of the verification samples are provided in the QA project plan and sampling and analysis plan provided in the Phase III remedial investigation work plan (Landau Associates 2001). Sample equipment decontamination will be conducted as described in Section 3.2 of the stockpile RAP. If a verification soil sample analysis indicates an exceedance of the cleanup goals, additional excavation and verification sampling will be completed in the localized area determined to contain the exceedance(s).

2.5.4 MATERIAL LOADING

Material loading operations will be conducted in an organized manner at the terminal. Trucks will be routed through a truck staging area, truck loading area, and truck decontamination station as the material loading processes are completed (Figure 14). In conjunction with the loading of material, the remediation contractor will be responsible for the proper management of decontamination water, as well as implementing dust control methods, as necessary. The PCP-impacted soil that is excavated and

stockpiled on the liner will be loaded by the remediation contractor onto dump trucks for transportation to the Swan Hills facility. After the soil has been loaded, the stockpile liner and cover material will be cut into pieces and loaded for transport to the Swan Hills facility for disposal. The following procedures apply to truck loading, decontamination and dust suppression.

2.5.4.1 Truck Loading

Trucks entering the terminal will be directed to a truck staging area. A preliminary location for the truck staging area is just inside the terminal gate within the Clean Zone, as shown on Figures 7 and 14. At the entrance to the truck staging area, the trucks will be weighed and the tare weight of each truck will be recorded. If multiple roundtrips are made by the same truck, the tare weight may not be collected every trip. After entering the truck staging area, truck drivers will be permitted to exit their trucks to make preparations for loading, including installation of a trailer bed liner. Trailer bed liner material will consist of at least one layer of 4-mil thick polyethylene sheeting attached to the trailer bed and covering the bottom of the trailer bed and the interior sidewalls of the trailer. Project oversight personnel will examine trucks prior to entering the RA Zone to verify that the trucks are prepared for loading and remediation contractor personnel will direct trucks to the truck loading area for loading of soil material. After movement to the truck loading area, truck drivers will position their trucks as directed by the remediation contractor. The trucks will be loaded by remediation contractor personnel utilizing heavy equipment. The remediation contractor will limit the free-fall height of soil into the trucks to minimize dust generation. The weight of material present in each truck load will be measured and recorded using onboard electronic scales or jump scales provided by the remediation contractor. Truck drivers will remain in the cab of the truck with the windows closed while the truck is being loaded. After the truck is loaded with soil, remediation contractor personnel will direct the truck driver to pull forward into the truck decontamination station (Figure 13).

2.5.4.2 Truck Decontamination Procedures

Truck decontamination activities will be restricted to the designated truck decontamination station where remediation contractor personnel will decontaminate the exterior of the truck and the truck tires. Two methods of decontamination may be utilized in the truck decontamination station – dry decontamination and wet decontamination. A brief description of the two decontamination methods follows:

- *Dry Decontamination* For this method, remediation contractor personnel will use dry brooms and brushes to remove visual observations of soil or debris from the exterior of the

truck, trailer bed, and wheels. This method will be used whenever dry weather or soil conditions allow the soil or debris to be effectively removed by brooms and brushes.

- *Wet Decontamination* – For this method, remediation contractor personnel will use a pressure washer and brushes to remove visual observations of soil or debris from the exterior of the truck, trailer bed, and wheels. This method will be utilized whenever wet weather conditions prevent the soil or debris from being effectively removed by brooms and brushes.

Typically, dry decontamination will be the method of choice because it has the potential to produce less waste material. All personnel involved in the decontamination of trucks will be required to wear PPE as prescribed by the site-specific health and safety plan prepared by the remediation contractor. Truck drivers will remain in the cab of the truck with the windows closed while the truck is being decontaminated. After the truck is decontaminated, remediation contractor personnel will direct the truck driver to pull forward into the Clean Zone to receive waste manifest paperwork, cover the load, and to exit the site. Truck drivers can inspect the security of the load in the Clean Zone prior to exiting the site.

Decontamination water will be contained in the current area in the truck decontamination station. As necessary, decontamination water will be pumped by the contractor to Tank 16804, located within the main tank farm area at the terminal, where it will be subsequently treated at the onsite wastewater treatment system.

2.5.4.3 Dust Suppression

During soil excavation and loading activities, air particulates will be monitored using Mini-RAM meters worn by site personnel. The remediation contractor will implement dust suppression activities as dictated in the health and safety plan. Dust suppression activities will include misting water over the dust generating area to suppress the air particulates to levels below 2.0 mg/m^3. If dust suppression activities do not result in the suppression of air particulates to an acceptable level, site personnel will be required to wear negative pressure air purifying respirators to continue truck loading activities.

2.5.5 MATERIAL TRANSPORT

The transportation of soil from the site for offsite incineration and disposal will require that the remediation contractor use safe practices for transport of the materials by properly manifesting each truckload, in accordance with the requirements specified by EPA and Environment Canada, and designating safe truck routes for exiting the terminal and for the transport to the Swan Hills facility. The material will be transported according Department of Transportation requirements and guidelines of the states included in the transportation route, as well as regulations enforced in the applicable Canadian

province(s). All trucks must utilize a load cover to reduce the potential for soil material to be discharged during transport.

2.5.5.1 Truck Manifests

Each truck leaving the terminal will be accompanied by a proper manifest for crossing the USA-Canadian border and for transporting the material on USA and Canadian highways, as discussed in Section 2.2.4. The waste manifests will be issued to truck drivers prior to exit of the loaded trucks from the terminal. The waste manifest will include information related to the generator of the material, the transporter of the material, the point of departure and the destination of the material, the type of material being transported, the quantity of material, the loading date, and any approval codes (import/export and disposal) that may be necessary to properly track the waste.

2.5.5.2 Route of Site Egress

The proposed route of egress from the truck decontamination area to the terminal exit gate is provided on Figure 14. The route will be followed by all trucks leaving the site, unless otherwise directed by the project oversight personnel.

2.5.5.3 Route to Disposal Facility

The preferred truck route from the terminal to the Swan Hills facility is provided on Figure 15. The route identified includes a stop at HAZCO's transfer facility (name?) located in Calgary, Alberta, Canada. At the HAZCO transfer facility, a Canadian waste manifest will be generated with HAZCO identified as the "owner" of the waste material as required by the Swan Hills facility (Canadian regulations?) and the manifests will be transferred from HAZCO to Sensor Environmental. A change of driver may also take place at the HAZCO transfer facility, but must be documented in the waste manifest. The route identified will be followed by all trucks transporting material from the terminal to the Swan Hills facility, unless an alternate route is approved by Time Oil.

2.5.6 Disposal of Stockpile Material

Upon arrival at the Swan Hills facility, truck drivers will follow standard facility procedures to dispose of their loads. The trucks will be routed through an entrance gate and the truck drivers will present gate personnel with the manifest for their load. The gate personnel will record the weight of all trucks; sign the waste manifest and return the transporter and final generator copies to the driver; and provide direction to the proper deposition location. Trucks transporting soil will be directed to the soil

incinerator. Trucks transporting material other than soil (e.g., stockpile liner or cover material) may be directed to a disposal location in the landfill. After arrival at the Swan Hills facility, soil will be processed immediately.

2.5.6.1 Truck Decontamination

Prior to exiting the Swan Hills facility, trucks are to be decontaminated as directed by facility personnel. At a minimum, Swan Hills facility personnel will decontaminate the trucks prior to the trucks exiting the facility, and truck drivers should avoid tracking mud onto the road at the exit from facility. Truck drivers should remain in their cabs during the decontamination process at the Swan Hills facility.

2.5.6.2 Recordkeeping

Prior to exiting the Swan Hills facility, trucks will be weighed again. The truck driver is required to obtain copies of the truck weight tickets indicating gross weight (truck and soil weight at entry) and tare weight (truck at exit). In addition, the truck driver must have two copies of the waste manifest – one copy is the transporter's copy and the other copy is the generator's final copy. The weight tickets and the generator's final copy will be returned to the project oversight personnel at the terminal. The transporter's copy will be retained by the truck driver for contractor records.

2.6 SITE DEMOBILIZATION

This section provides details related to the removal of equipment from the terminal following the completion of stockpile removal activities.

2.6.1 TRUCK LOADING AREA

Following the loading of materials (soil, stockpile liner and cover), the truck loading area will be decommissioned. Spillage soil present in the loading area will be removed and will be loaded onto trucks for transport and disposal at the Swan Hills facility. The spillage soil will be loaded into trucks parked on top of the asphalt pad installed in the truck loading area. The asphalt pad will be cleaned with a power broom, as necessary, at the conclusion of the material loading operation. After cleaning, the asphalt pad will be left in place. Material collected from the cleaning of the pad will be incorporated with material to be disposed at the Swan Hills facility.

2.6.2 EQUIPMENT REMOVAL

Following the removal of the truck loading area, the remediation contractor will decontaminate all heavy equipment used during the removal action at the truck decontamination station. Following decontamination of the equipment, accumulated soil in the truck decontamination area will be added to material for offsite disposal at the Swan Hills facility. Decontamination water will be collected, to the extent possible, and pumped to Tank 16804. The asphalt pads used for truck loading and decontamination purposes will be broken into transportable pieces and disposed at an asphalt recycling facility.

2.6.3 SITE EGRESS ROUTE RESTORATION

During soil removal activities, the potential exists for trucks to track "clean" soil and rocks onto the truck egress route. The remediation contractor will clean the truck egress route with a power broom, as necessary, during the removal action and following the completion of soil loading activities. Water used in the operation of the power broom will be transferred into Tank 16804 and any dry material will be incorporated with the soil to be disposal at the Swan Hills facility.

2.7 BACKFILL OF EXCAVATION AREA

After receiving analytical data indicating that the excavation efforts are complete, Time Oil will give approval to the remediation contractor to backfill the excavation area. Prior to commencing the backfill of the excavation area, a survey of the excavation area (vertical and horizontal) will be completed and a non-woven geotextile fabric will be installed at the extent of the excavation area to serve as a visual barrier for potential future remedial or construction activities. The survey of the excavation area will be completed by a registered surveyor under contract to Time Oil. The survey results will be utilized to verify soil removal quantities and to delineate the extent of the excavation on site plans.

The remediation contractor will use the clean overburden material previously excavated and stockpiled on site and additional material from an offsite source to backfill the excavation area. Fill material brought in from an offsite source must be certified to be free of contamination according to representative laboratory analytical reports provided by the remediation contractor to Time Oil. Backfill material will be placed in 2 ft loose lifts and compacted to 95 percent dry density (ASTM D 1557-modified proctor) from the top of the water table to within approximately 6 inches BGS. Density gauge test results will be provided by the remediation contractor to Time Oil's representative onsite. Compaction of backfill soil will not be required at depths below the groundwater table.

Clean topsoil will be placed by the remediation contractor from approximately 6 inches BGS to the surface. Following the placement of topsoil, the remediation contractor will hydroseed the excavated area with a grass seed and fertilizer mixture. Erosion control measures (e.g., straw bales and/or silt fencing) will be installed by the remediation contractor around the perimeter of the excavated area following the hydroseeding of the area.

3.0 FIELD DOCUMENTATION

All field activities, including soil removal and soil verification sampling, will be documented and managed by project oversight personnel in appropriate forms and in field notebooks. Field documentation will include the following:

- Health and Safety Plan signed by all personnel within the work zone
- Well abandonment records to be completed by the drilling contractor
- Daily Tailgate Safety Meeting forms signed by personnel present
- Air Monitoring Data forms to be completed by remediation contractor personnel
- Final copies of waste manifests for asbestos containing materials removed from the warehouse and disposed offsite, if applicable
- Original generator waste manifests (U.S. and Canadian) for each load of material taken offsite for incineration/disposal
- Final copies of waste manifests returned by the truck drivers after each load of material has been deposited at the Swan Hills facility
- Copies of weight tickets returned by the truck drivers after each load of material has been deposited at an offsite disposal facility
- Daily logs indicating the identification of each loaded truck exiting the site
- Daily logs indicating the remediation contractor's daily activities
- Photographic log of the activities being completed at the terminal
- Sample collection forms for each verification soil sample collected from the extents of each excavation lift
- Chain-of-custody records for verification soil samples submitted to an offsite laboratory
- Field notes completed in field notebooks or on Field Report forms by project oversight personnel to document removal action activities, including problems encountered and methods of resolution.

Copies of Landau Associates' field documentation forms to be used are included in Appendix A.

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4.0 REMOVAL ACTION COMPLETION REPORT

Following the completion of demolition, excavation, and disposal activities and the receipt of verification soil sample analytical results, Landau Associates will prepare a Removal Action Completion Report on behalf of Time Oil. The Removal Action Completion Report will likely be combined with the report to be prepared to document removal activities related to the removal of the current soil stockpile at the site. At a minimum, the Removal Action Completion Report will provide the following information:

- Summary of work completed during removal activities
- Total quantity (mass) of the various waste streams (metal, concrete, soil, etc.) disposed
- Presentation of removal records including daily logs, waste manifests, and weight tickets
- Description of work area following the completion of removal activities and equipment demobilization
- Verification soil sample results.

5.0 SCHEDULE

Time Oil and its contractors are prepared to commence the soil removal actions on August 2, 2002, provided approval has been received from EPA and Environment Canada for incineration of soil at the Swan Hills facility and written authorization to proceed has been received from DEQ by early July. In order to meet a deadline being imposed by the Swan Hills facility, pre-mobilization and mobilization, site preparation, and warehouse demolition activities must be completed by August 2, 2002 and soil removal must begin on August 5, 2002. It is anticipated that pre-mobilization, mobilization, site preparation, and warehouse demolition activities can be completed in approximately 3 to 4 weeks. After demolition activities are complete, soil removal activities can begin. The terminal will be accessible by personnel and equipment for soil removal from 7:30 a.m. until 5:30 p.m., Monday through Friday. It is not anticipated that work will be conducted on Saturday or Sunday; however, working on those days may be an option, as authorized by Time Oil. Based on estimated volume of soil to be removed and the distance from the terminal to the Swan Hills facility, it is anticipated that approximately 28 loads of soil (approximately 30 tons per load for a total of approximately 3,750 tons) will be removed from the site per week resulting in the completion of soil removal activities including demobilization activities in about 4 to 5 weeks.

6.0 USE OF THIS REPORT

This RAP has been prepared by Landau Associates for the exclusive use of Time Oil Co. for specific application to the warehouse demolition and soil excavation at the Time Oil Northwest Terminal, in Portland, Oregon. Services for this project were conducted in accordance with the Environmental Services Contract between Time Oil Co. and Landau Associates, Inc. Landau Associates has performed our services in accordance with generally accepted engineering and consulting standards for environmental work in effect at the time and locality services were performed. The reuse of information, conclusions, and recommendations provided herein by Time Oil Co. or others in connection with any site other than the Northwest Terminal without Landau Associates written permission shall be at the sole risk of Time Oil Co. and without liability to Landau Associates.

This document was prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Project Manager

Martin T. Powers, P.E.
Senior Engineer

DRAFT

7.0 REFERENCES

EPA. 2001. *Region 9 Preliminary Remediation Goals*. January 29.

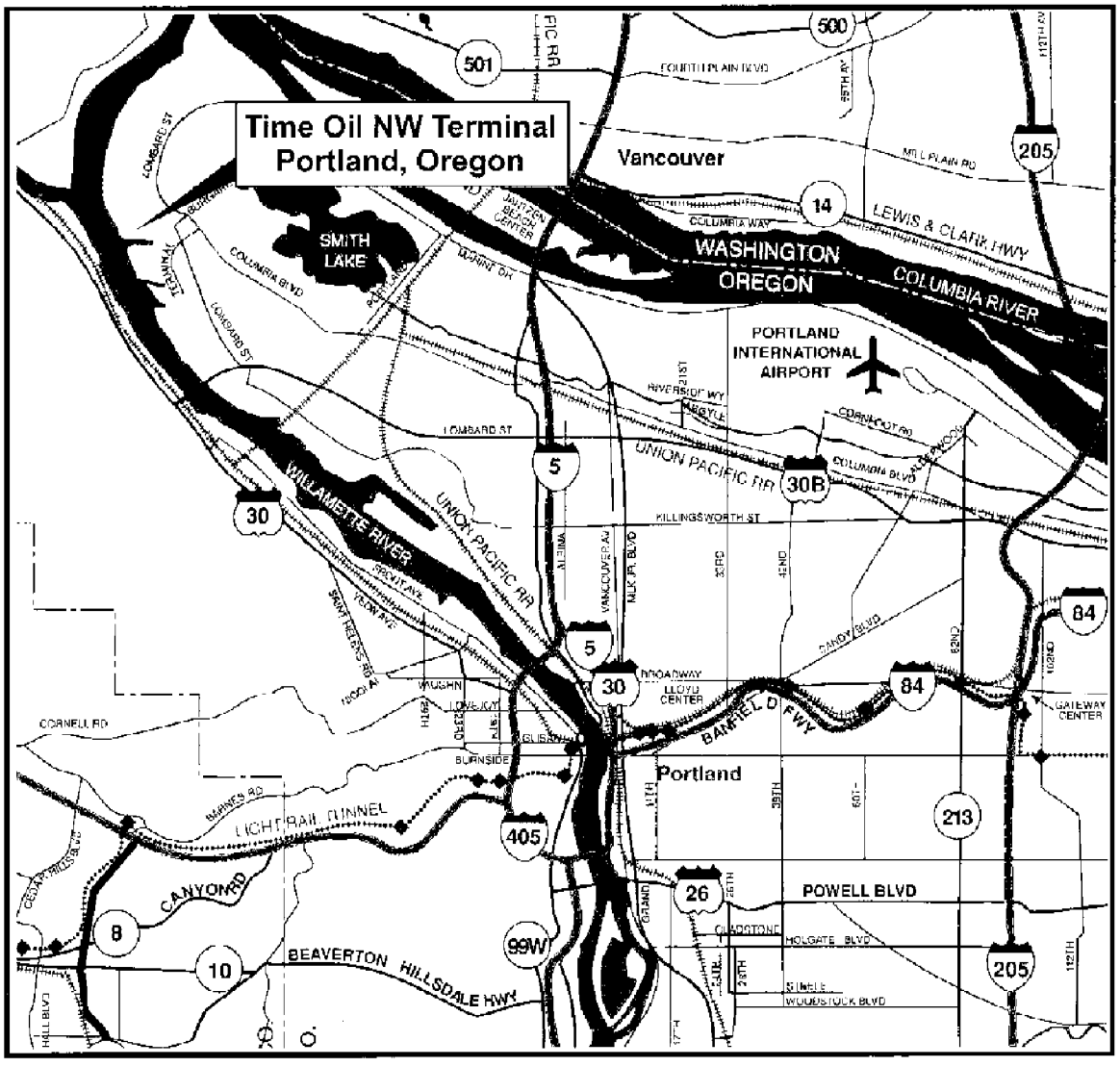
Landau Associates. 2002. *Phase I - Soil Stockpile Removal Action Plan, Time Oil Northwest Terminal, Portland, Oregon*. Prepared for Time Oil Co. February 7.

Landau Associates. 2001. Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon. Prepared for Time Oil Co. June 15.

Time Oil. 2002. (Addendum letter)

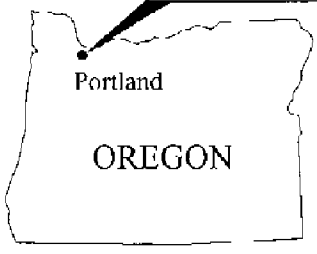
DRAFT

N



Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



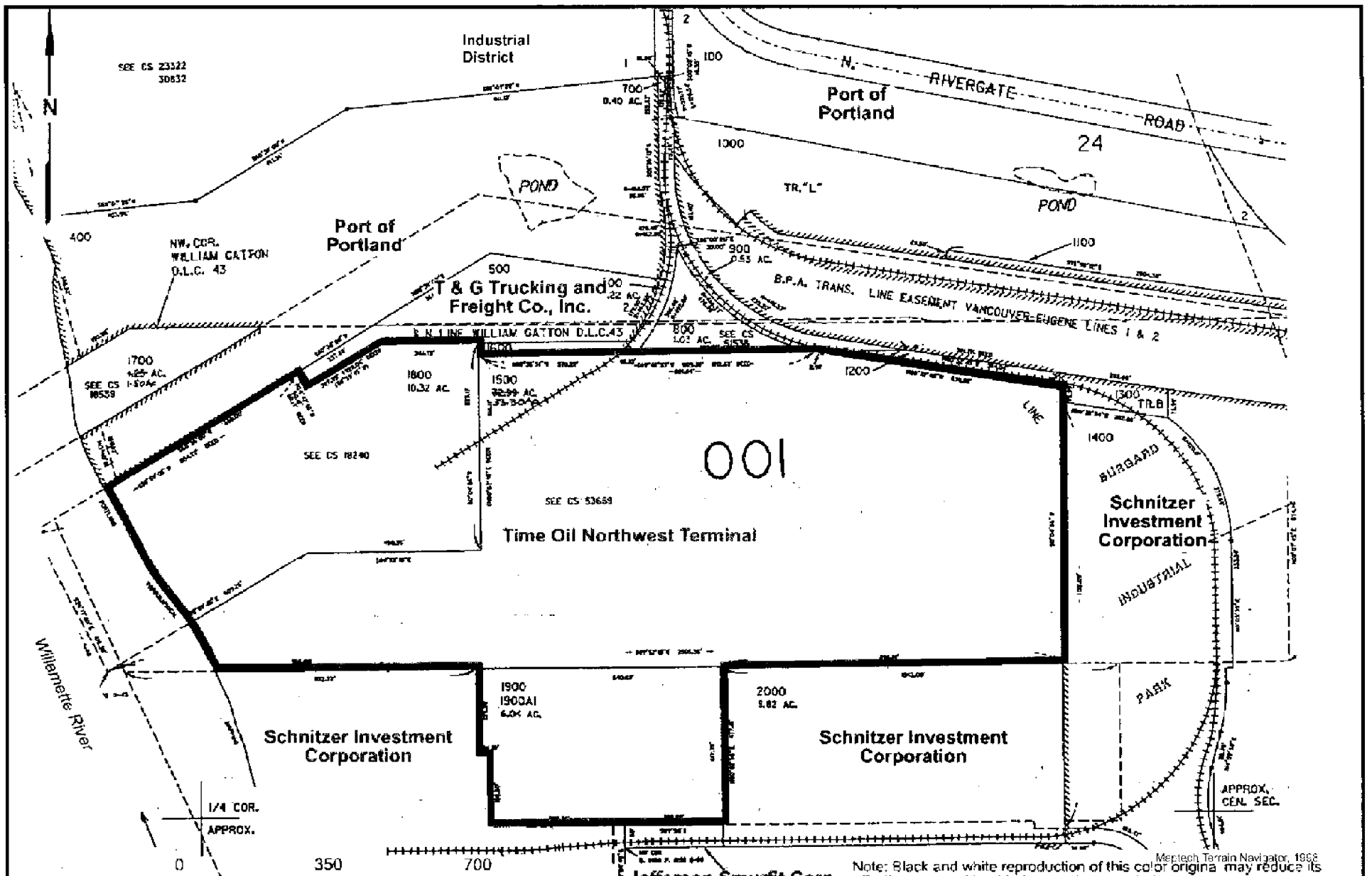
0 2 4
Approximate Scale in Miles

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

Time Oil/Tn Site Soil RAP Work Plan | T:\231\001\179\In Situ Soil RAP WP\Fig.1.cdr (C) 8/27/2002

BZTO104(e)016710



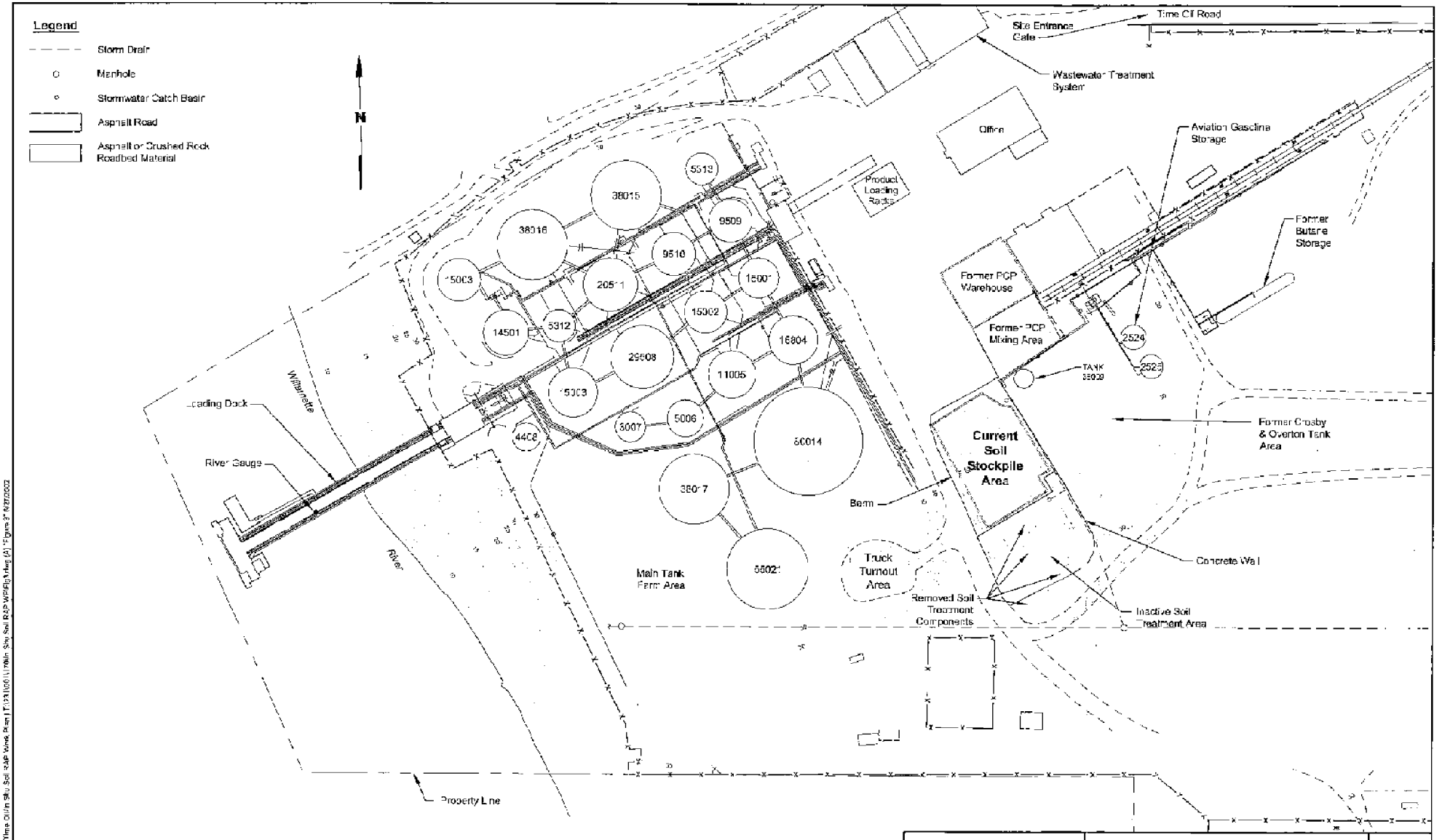
LANDAU ASSOCIATES

Source: Multnomah County Tax Plot Map, 1999
2N 1W 35B Portland

Time Oil NW Terminal
Portland, Oregon

Time Oil Northwest Terminal and Adjacent Properties

Figure 2

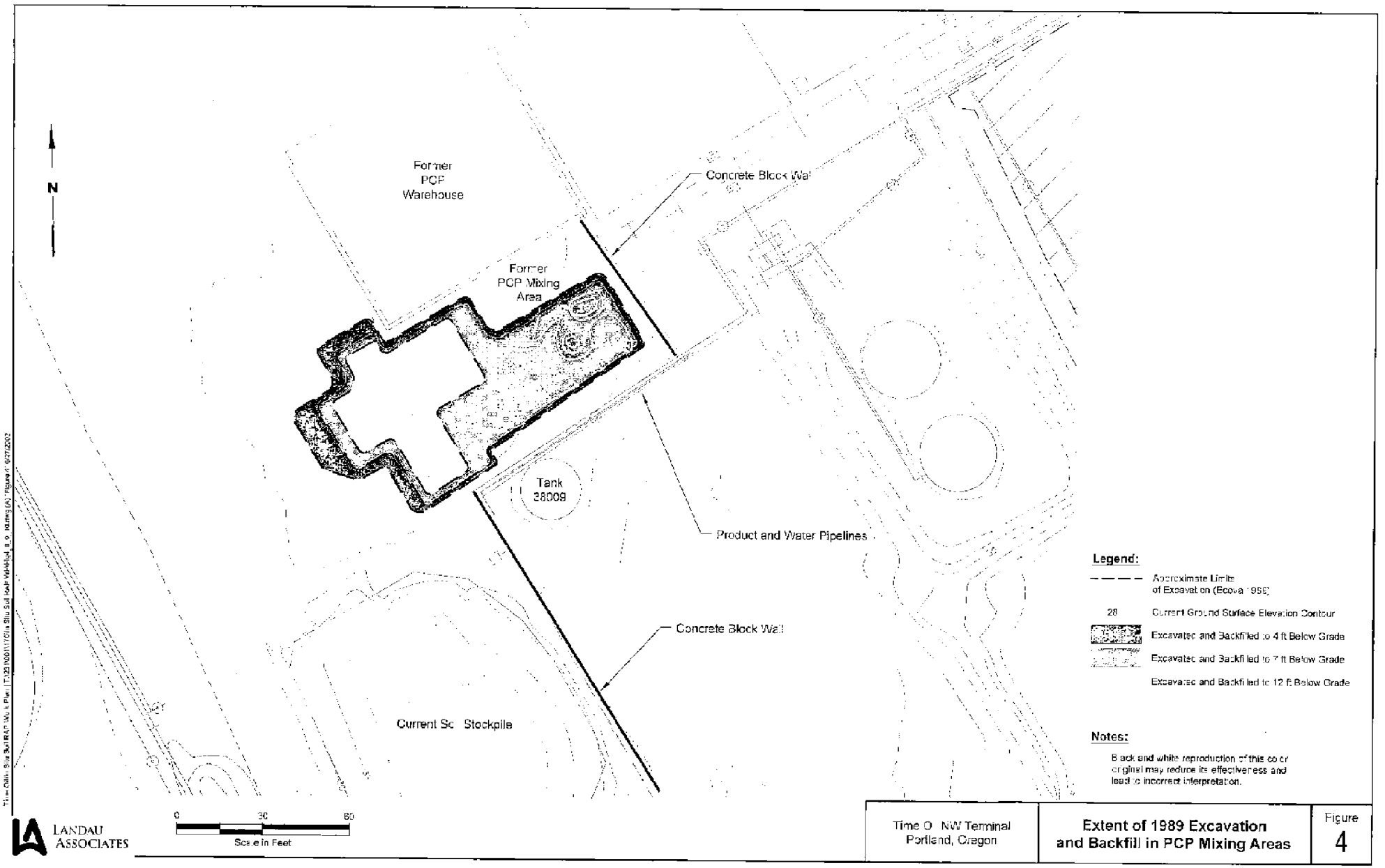


LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 3

Time Oil In Situ Soil RAP Work Plan | T:\31\000\1 Main Stg Soil RAP WP\Fig 1-Aug (4) Figure 3 8/27/2002

BZTO104(e)016712



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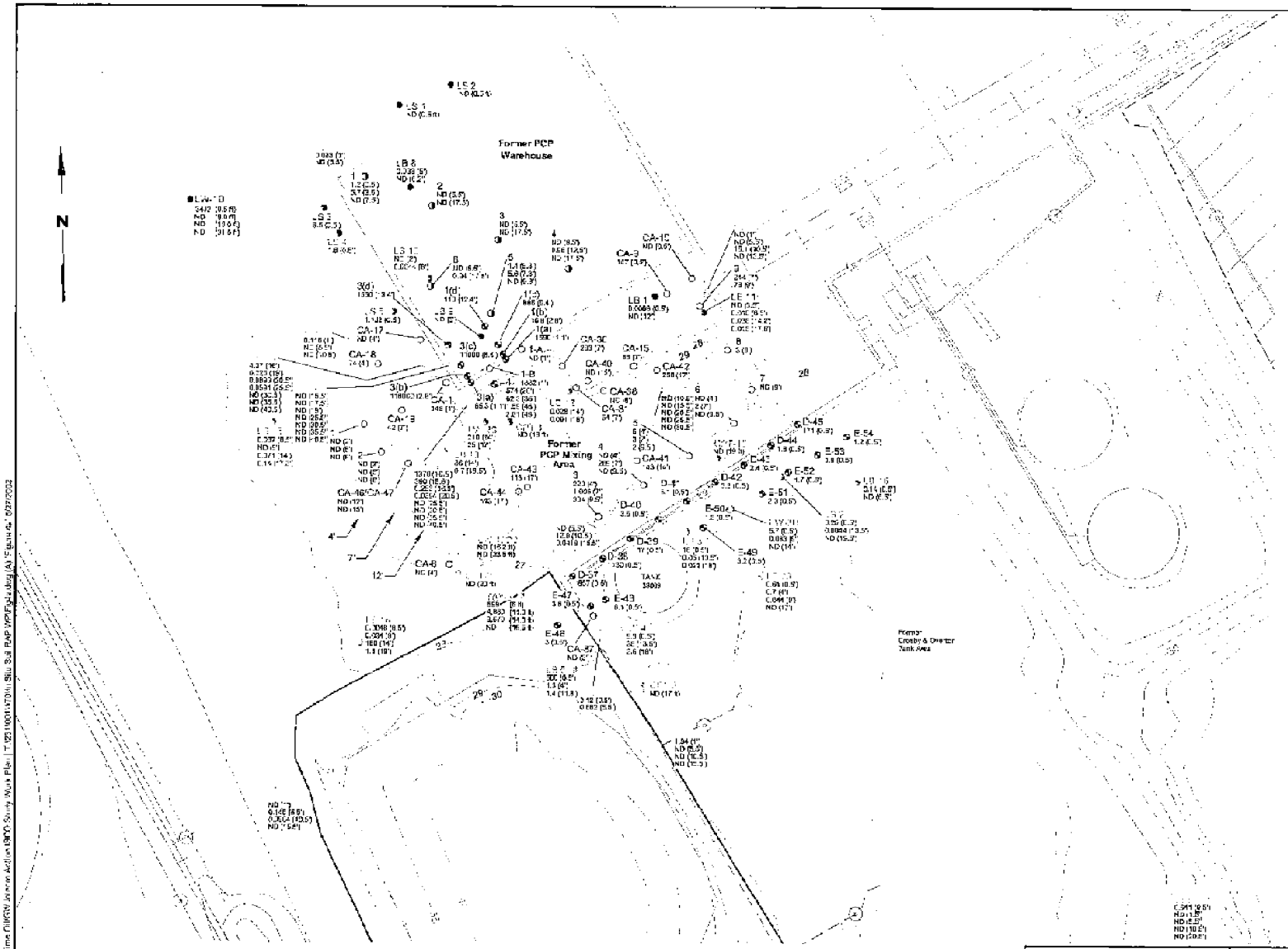

Legend:

- ■ Soil Data from Phase II RI
- C Historical Soil Data (Ecova 1989)
- G Historical Soil Data (Riedel 1985)
- Historical Soil Data (SRI 1989)
- Phase II Supplemental Sampling Data
- ND Not Detected

Location Identifier ——► LB 10

PCP Concentration (mg/kg) ND (2') / 0.0044 (5') — Depths Below Ground Surface in ft

Approximate Limits of Excavation (Ecova 1989)

26 Current Ground Surface Elevation Contour

Notes:

1. Samples 1(a), 1(b), 1(c), and 1(d) were collected from one angled well boring (Well 1)
2. Samples 3(a), 3(b), 3(c), and 3(d) were collected from one angled well boring (Well 3)
3. All concentration units are mg/kg.
4. The depth of sample is the base of the sample interval.
5. The sample results is the maximum concentration of field duplicates and analyses by EPA Methods 8040 and 8270.
6. Sample results are not shown for excavated soil
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Historical and Phase II RI Soil PCP Data**	Figure 4a

Time Oil/NW Interim Action DNAPL Survey Work Plan | T:\2510001\170\Site Soil RAP WP\Figure 4a.dwg (A) Figure 4a * 6/27/2002

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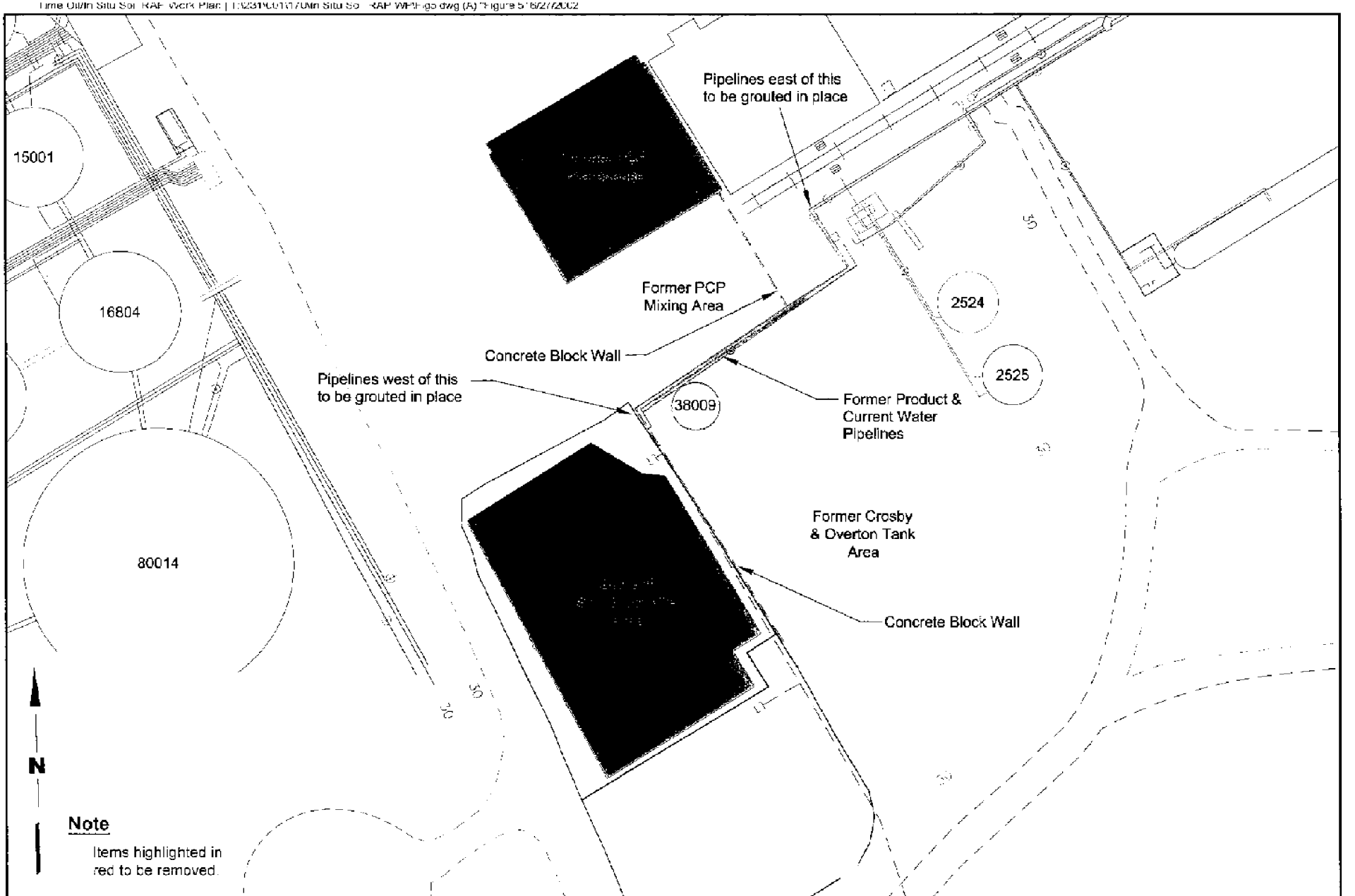
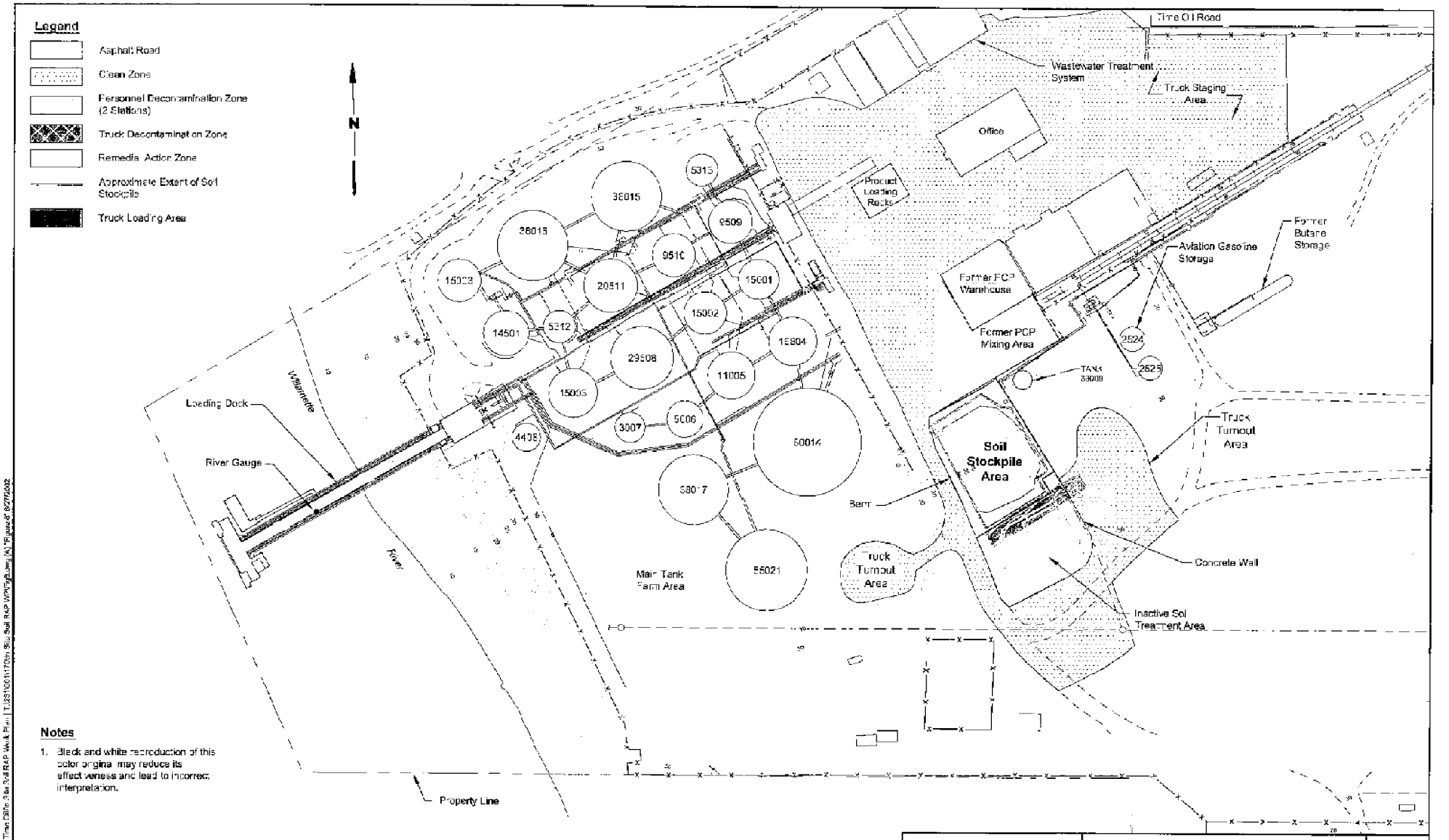


LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Identification of Features to be Demolished**	Figure 5



Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Definition of Work Zones	Figure 6

Time Oil/Fig. 3 Soil RAP Work Plan | T:\2910\01\170\In Situ Soil RAP WP\Fig6.dwg (A) "Figure 6" 8/27/2002

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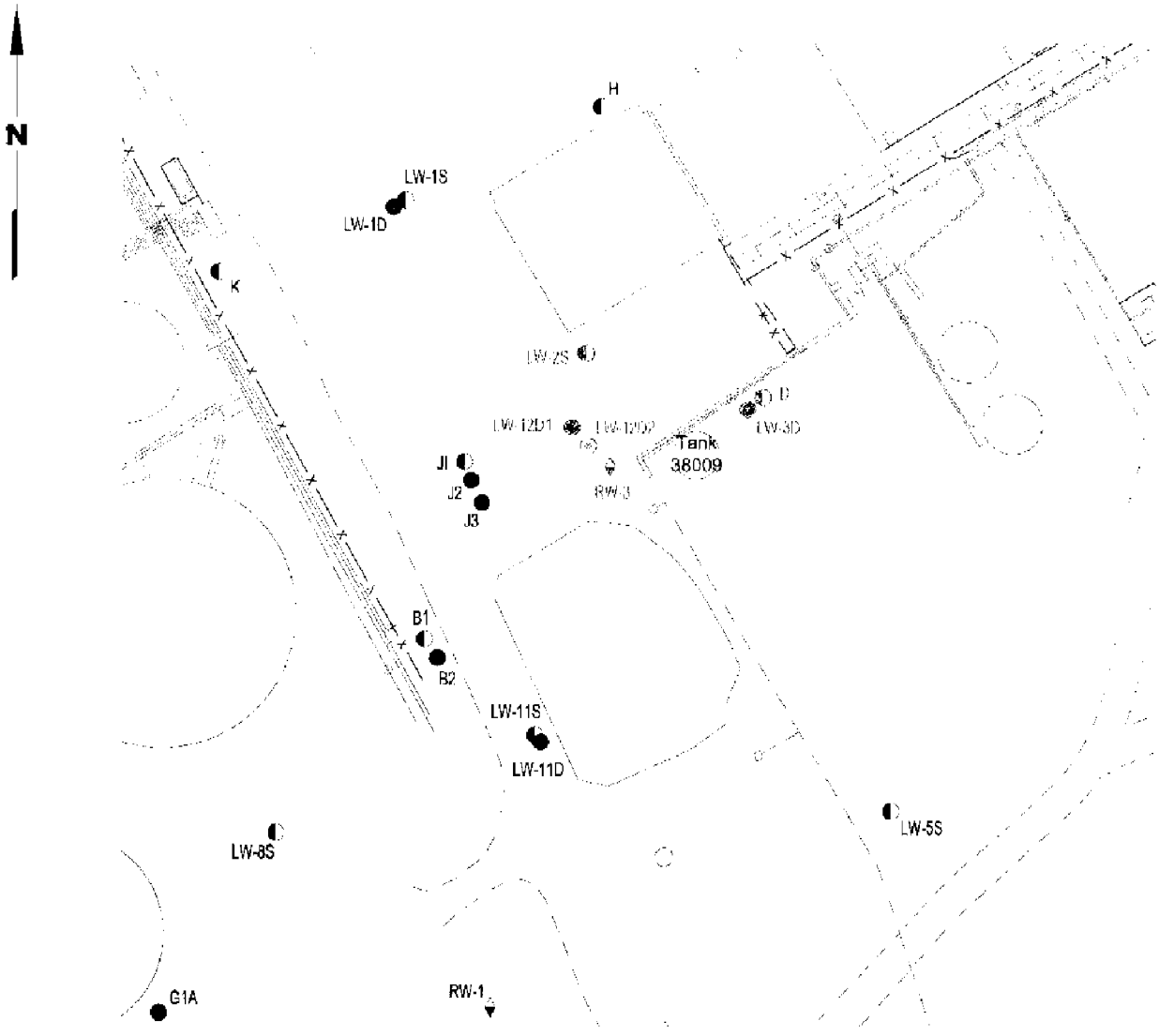

Legend

- Upper Zone Monitoring Well
- Lower Zone Monitoring Well
- Deep Sand Unit Monitoring Well
- Upper Zone Recovery Well
- Lower Zone Recovery Well
- Storm Drain
- Catch Basin
- Asphalt
- Gravel

Notes

1. Wells highlighted in red to be abandoned.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 60 120

Scale in Feet

Time Oil In Situ Soil RAP Work Plan | T:\231\001\170\In Situ Soil RAP WP\Fig7.dwg [A] "Figure 7" 6/27/2002

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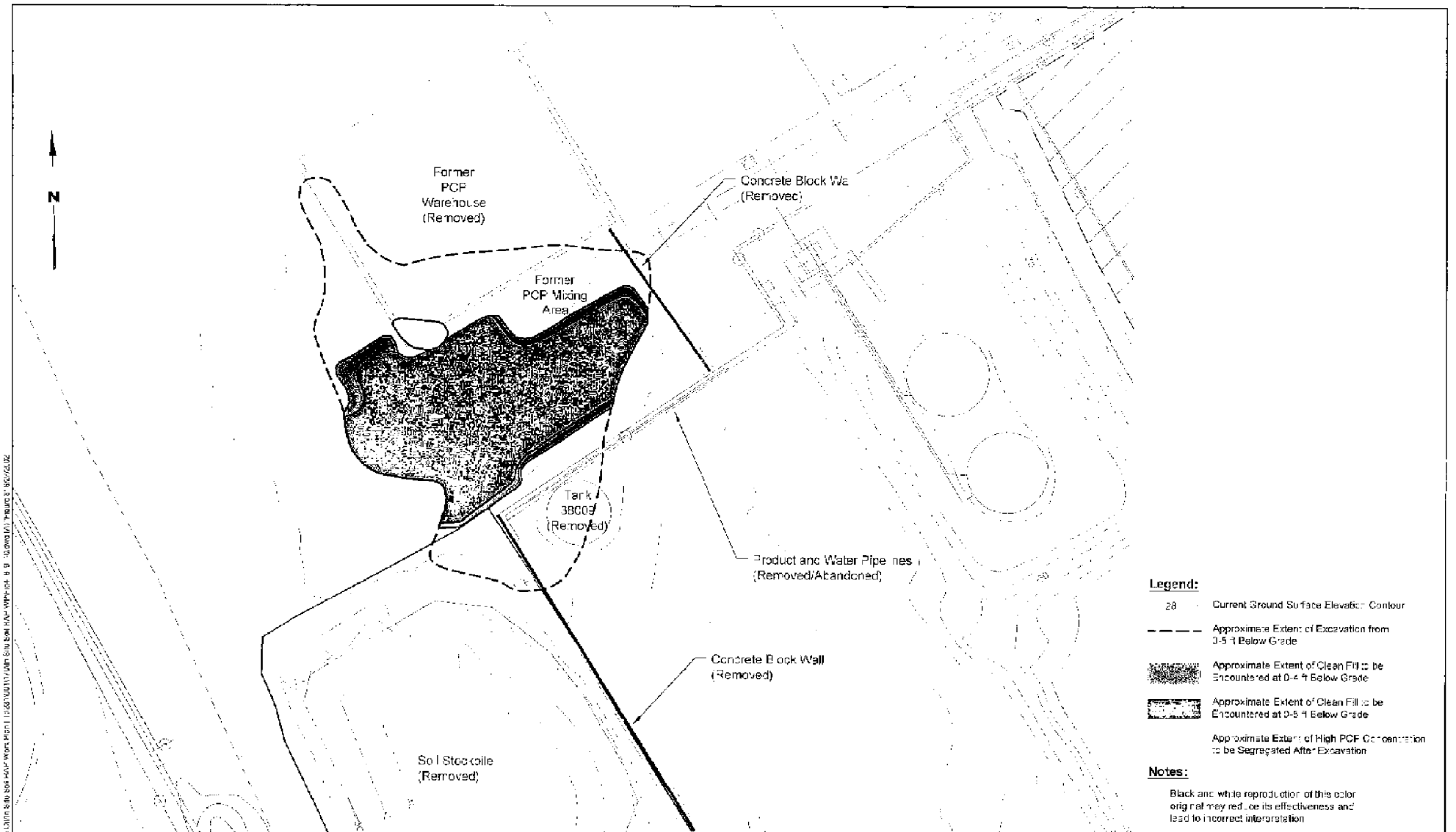
Time Oil NW Terminal Portland, Oregon	**Locations of Wells to be Abandoned**	Figure 7



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Time Oil NW Terminal
Portland, Oregon

Approximate Extent of 0-5 ft Excavation

Figure 8

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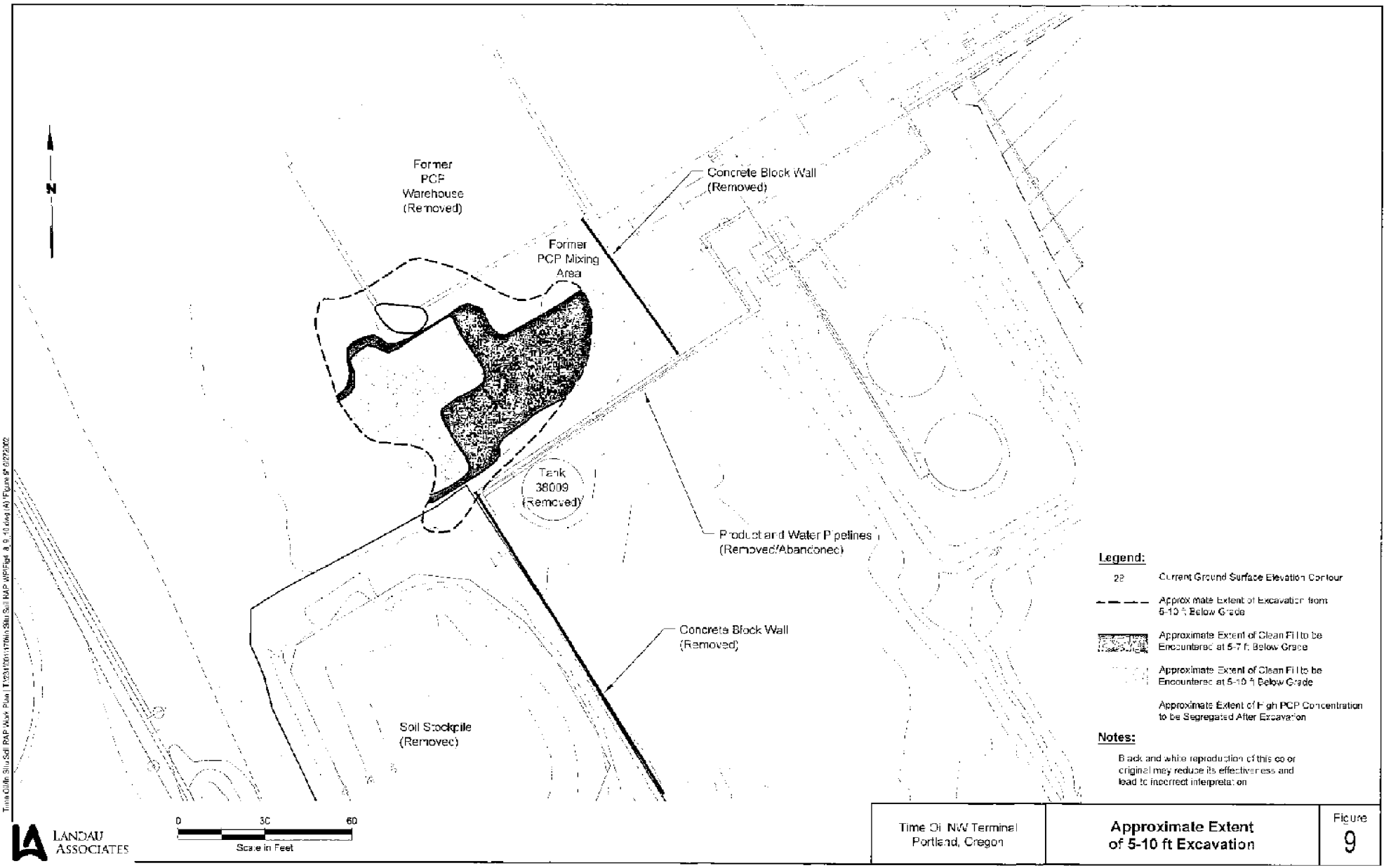

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Approximate Extent of 5-10 ft Excavation	Figure 9

Time Oil NW Soil RAP Work Plan | T:\231\001\170\Site Soil RAP-WP\Figs 8, 9, 10.dwg (A) Figure 9 8/22/02

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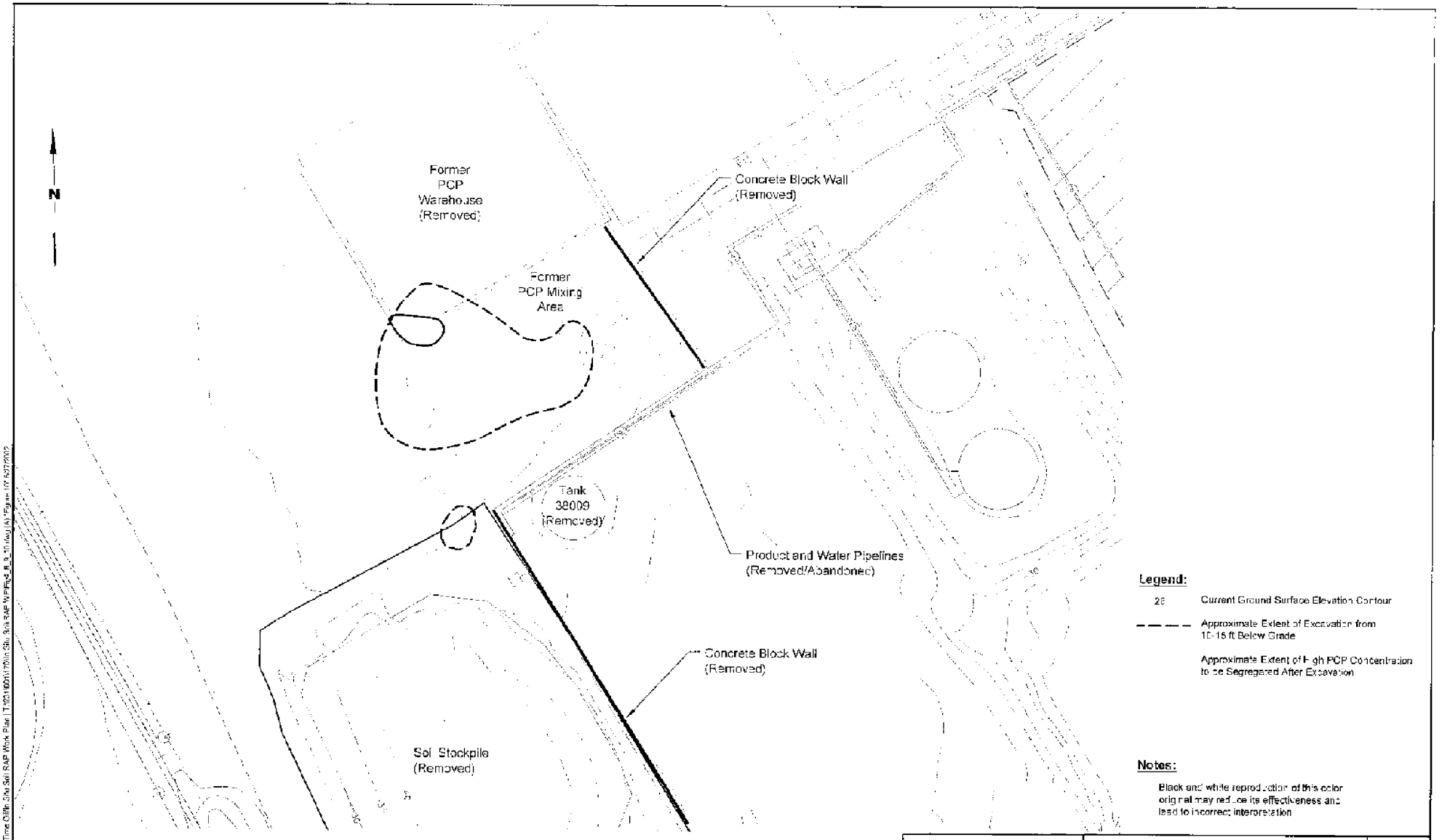

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Approximate Extent of 10-15 ft Excavation	Figure 10

Time Oil NW Site Soil RAP Work Plan | T:\2010\011\Site Soil RAP WP\Fig4_8_9_10.dwg (4) | Figure 10 | 5/27/2002

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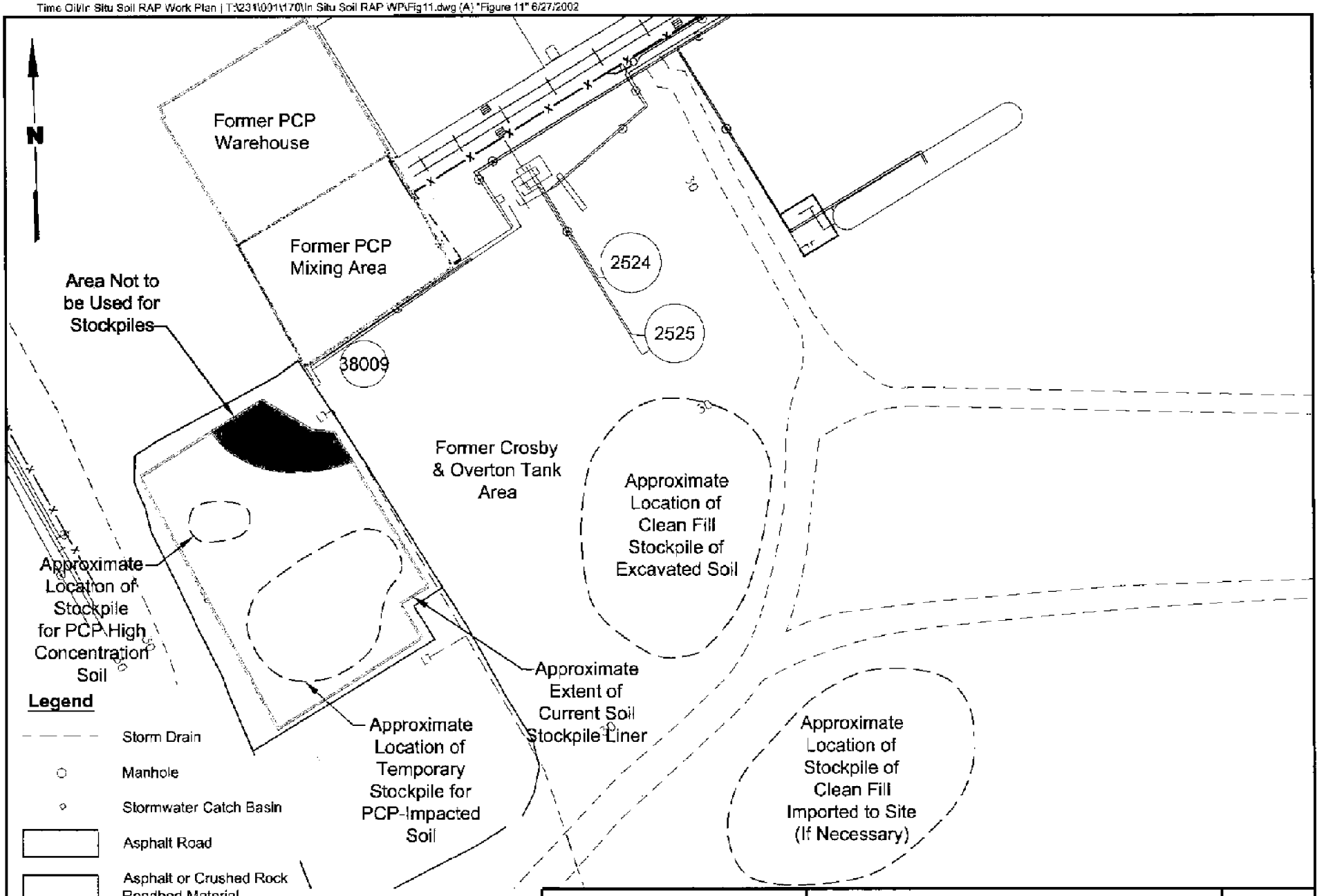
Time Oil/In Situ Soil RAP Work Plan | T:\231\001\170\In Situ Soil RAP WP\Fig11.dwg (A) "Figure 11" 6/27/2002



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Time Oil NW Terminal
Portland, Oregon

Temporary Soil Stockpile Locations

Figure 11

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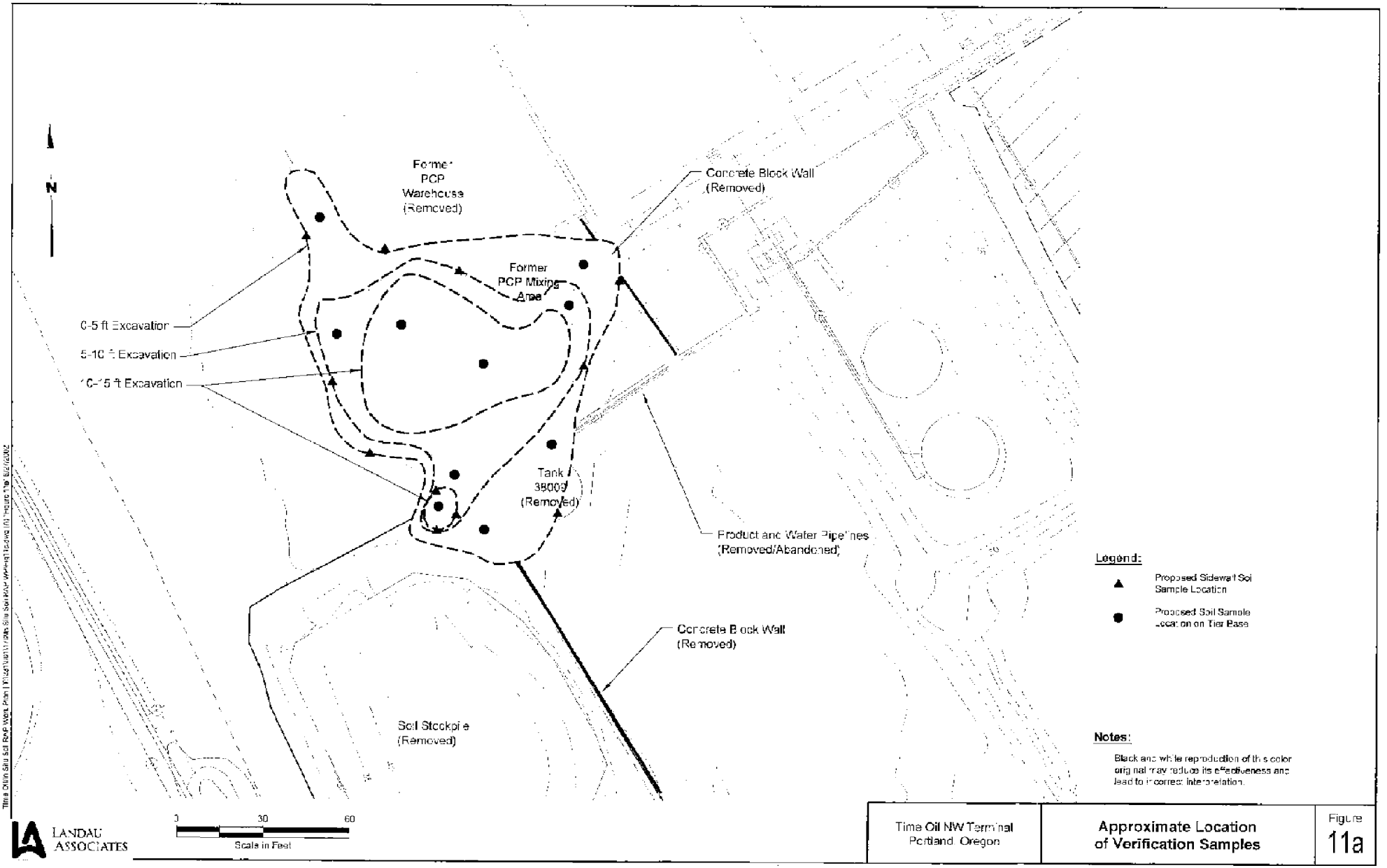

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Time Oil NW Terminal
Portland, Oregon

Approximate Location of Verification Samples

Figure 11a

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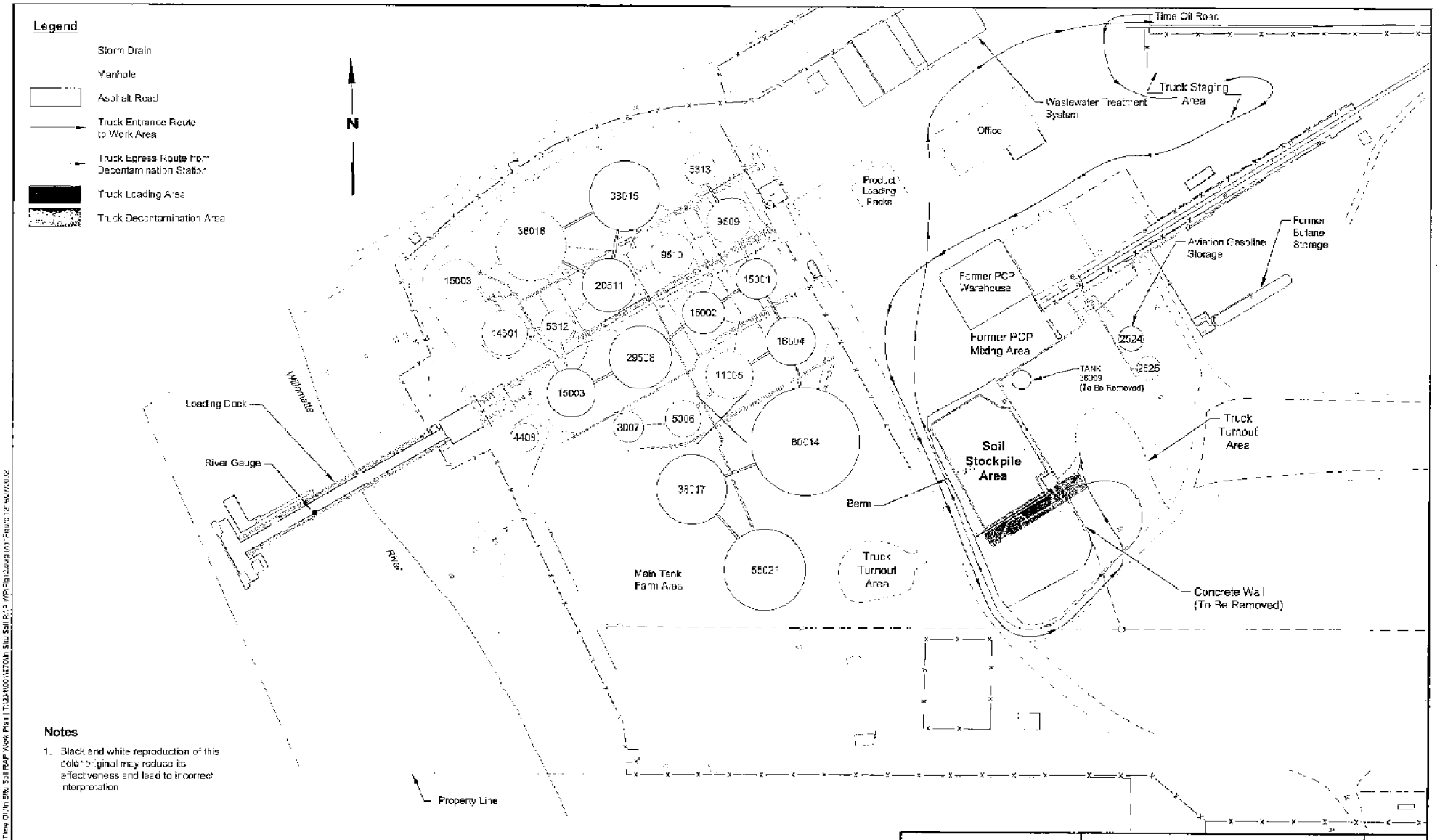

Notes

1. Black and white reproduction of this data original may reduce its effectiveness and lead to incorrect interpretation

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Truck Route on Site	Figure 12

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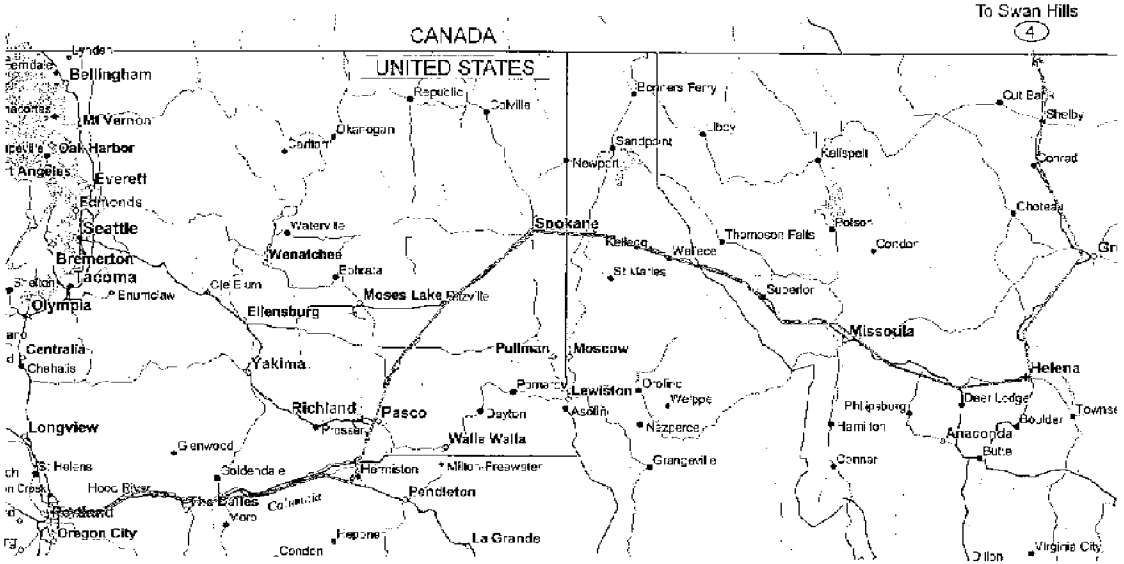
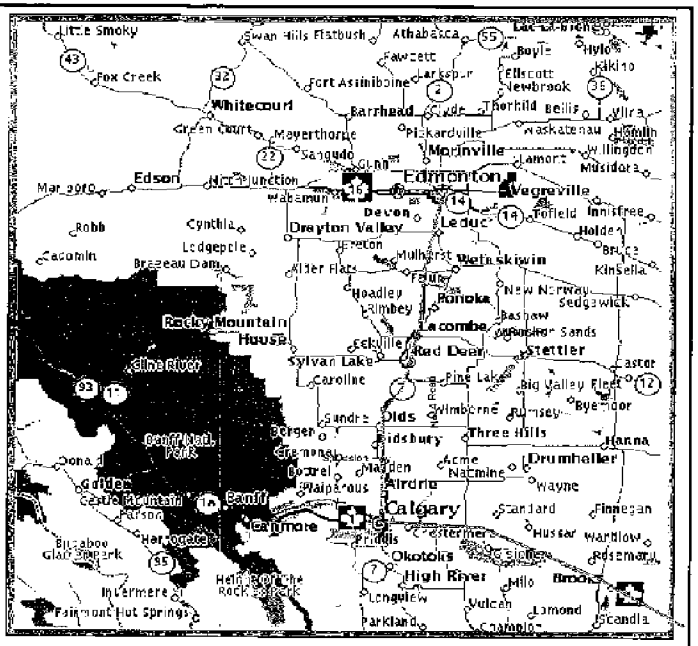
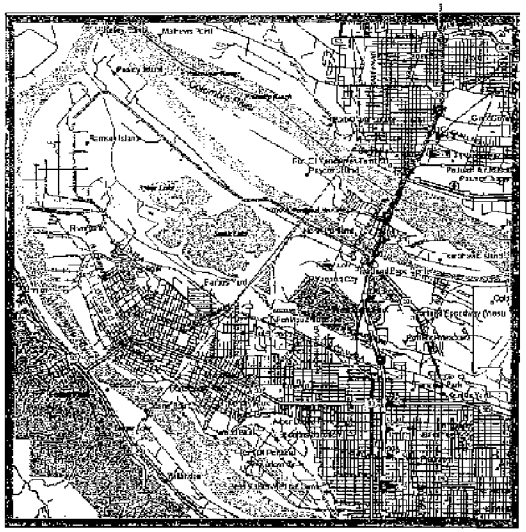


Portland, Oregon to Edmonton, AB



Provincial Highway 33 to Swan Hills Facility



Time Oil Northwest Terminal to I-5

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Truck Route Off-Site	Figure 13

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REC'D JUN 1 3 2002

LANDAU ASSOCIATES

June 7, 2002

86-102

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: **TIME OIL NORTHWEST TERMINAL**
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the May 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
6/7/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr.doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
May 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the April 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an average flow rate of 7.0 gpm. Continued implementation of the groundwater interim action in the upper zone at HRW-1, at an average flow rate of 0.52 gpm. Approximately a total of 7.12 million gallons of groundwater have been recovered, treated, and discharged, with a total of about 241,000 gallons treated in May 2002. Analytical results from samples collected from the treatment system effluent indicate pentachlorophenol (PCP) is degraded to nondetectable concentrations or concentrations less than the permitted discharge limitations.
- Received revised sanitary sewer discharge permit (Permit No. 400.121) from the City of Portland Environmental Services for continued discharge of treated groundwater from the bioreactor system at the terminal. The expiration date of the permit is February 15, 2007.
- Conducted groundwater level measurements and collected a sample of the groundwater recovered from HRW-1 as part of HRW-1 startup activities.
- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Assessed the performance of groundwater recovery operations from HRW-1. Due to an excessive number of pumping cycles recorded by the submersible pump control panel, the submersible pump was shut down on May 30, 2002, pending redevelopment of HRW-1 and an evaluation of the condition of the pump.
- Completed preparation and conducted internal review of a technical memorandum documenting HRW-1 startup activities.
- Completed internal reviews of the *First Quarter 2002 Groundwater Interim Action Status Report* and submitted to client.
- Conducted internal review of the *First Quarter 2002 Groundwater Report*.
- Conducted internal review of a work plan for conducting a pilot test for remediation of upper zone groundwater using in situ chemical oxidation techniques and provided to client.
- Continued evaluation of options for treatment/disposal of the stockpiled material.
- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.
- Received DEQ's comments on the *East Property Remedial Action Plan*. Begin preparation of response to comments from DEQ.

- Received DEQ's comments on the *Phase III Preliminary Evaluation Technical Memorandum* and their approval to proceed with the CPT investigation.

- Revised the Phase III schedule and provided to DEQ with the April 2002 monthly report.

RESULTS COLLECTED

- Concentration of dissolved-phase PCP in a groundwater sample collected from HRW-1 on May 29, 2002 was reported to be 452 micrograms per liter (µg/L).

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- The control panel for the submersible pump in HRW-1 indicated an excessive number of operational cycles after a motor was replaced on the pump on May 21, 2002. The pump was shut down on May 30, 2002 pending an evaluation of the condition of the pump and re-development of HRW-1.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Continue implementation of the groundwater interim action in the lower zone at RW-2. Continue full-scale treatment and discharge to POTW.

- Contact DEQ regarding use of well redevelopment at HRW-1 and the installation of piezometers to assess the performance of HRW-1. Redevelop HRW-1 and determine condition of the submersible pump. Replace the submersible pump, if necessary, and resume groundwater recovery from HRW-1. Install the piezometers.

- Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.

- Conduct client reviews of the *First Quarter 2002 Groundwater Interim Action Status Report* and the *First Quarter 2002 Groundwater Report* and provide to DEQ.

- Conduct the 2nd quarter 2002 groundwater sampling event, currently scheduled for the week of June 24, 2002.

- Conduct internal and client review of a technical memorandum documenting startup activities at HRW-1.

- Complete client reviews of a work plan for conducting a pilot test for remediation of upper zone groundwater using in situ chemical oxidation (ISCO) techniques and submit to DEQ.

- Following DEQ approval, install the new monitoring wells to be used for the ISCO pilot test and collect soil and groundwater samples to be used for the ISCO bench-scale treatability study.

- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.

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- Complete preparation of response to comments from DEQ on the *East Property Remedial Action Plan* and provide to client. Revise based on client comments and submit to DEQ.
- Prepare a contractor scope of work for the east property remedial action activities.
- Continue evaluation of availability of options for treatment/disposal of the stockpiled material.
- Contact subcontractors for conducting the Phase III CPT investigation and the east property remedial action, currently scheduled for July 2002.
- Provide DEQ with the Phase III laboratory data reports, data validation reports, and representative boring logs for the Phase III study area.

July 18, 2002

LANDAU ASSOCIATES

REC'D JUL 2 2 2002

Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Attn: Mr. Thomas E. Roick, Project Manager

RE: RESPONSE TO DEQ COMMENTS ON ISCO WORK PLAN
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

On June 12, 2002, Kevin Murphy of Time Oil Co. (Time Oil) received an e-mail from Tom Roick of the Oregon Department of Environmental Quality (DEQ) that included comments regarding a *Work Plan In Situ Chemical Oxidation Pilot Study* (ISCO Work Plan) prepared by Landau Associates. The ISCO Work Plan was submitted to the DEQ and dated June 7, 2002. On behalf of Time Oil, Landau Associates has prepared this correspondence to supplement the ISCO Work Plan and address the comments received via the June 12, 2002 e-mail. The DEQ comments (italicized type) and the associated responses are provided below:

1. *Since this is part of an interim action, we will submit a public notice (news release and legal notice). If the pilot is proposed for full scale implementation we will provide a 30-day comment period to be consistent with substantive requirements of a WQ WPCF permit.*

   On July 3, 2002, Landau Associates submitted a registration form to Ms. Barbara Priest of the Underground Injection Control (UIC) Division of DEQ. The submittal included the registration form, a copy of the ISCO Work Plan, and a map indicating the injection points. The ISCO Work Plan included site maps indicating concentrations of PCP in the groundwater. It is our understanding that the completion of the registration process by the UIC Division is dependent upon the receipt of our response to DEQ comments presented herein and the potential need for a public notice to be filed for the pilot study. As discussed in our meeting on July 3, 2002, if the DEQ determines that a public notice is necessary for the pilot study, Time Oil prefers that a public notice be issued through the cleanup program of DEQ. We also request that any public notice required be initiated by the end of July 2002 to enable the commencement of the pilot study in August 2002, if possible.

2. *A copy of the HASP addressing the injection of Fenton's Reagent should be submitted for DEQ records.*

   A Health and Safety Plan (HSP) developed by the remediation contractor [In Situ Oxidative Technologies, Inc. (ISOTEC)] for injection of Fenton's Reagent is attached.

3. *The work plan needs to discuss why the pilot test is not anticipated to have an adverse impact on groundwater quality. The groundwater quality monitoring program should be developed and implemented to verify no adverse impacts occur (i.e., meet the substantive requirements of a DEQ*

WPCF permit). The work plan should present the following information regarding the potential impacts to groundwater quality due to the injection of Fenton's reagent.

Prior to addressing each of the individual points presented in Comment No. 3, it should be noted that the bench scale treatability study is currently underway and results should be available after the first week of August 2002. The bench scale treatability results will provide results to identify potential breakdown products from adding Fenton's Reagent to soil and groundwater samples collected from the site and will provide information that will be used to evaluate any potential adverse impacts on groundwater quality. The bench scale treatability study will also be used to determine the appropriate dosage of Fenton's Reagent to be utilized and may also assist in the prediction of a mineralization pathway. The bench scale treatability results will be compiled and presented to DEQ in a technical memorandum prior to receiving final authorization from DEQ to commence with the pilot study at the site.

* *Discussion of complete chemical analysis or description of the contents of the Fenton's Reagent to assure that no harmful substances are introduced to groundwater that could impact groundwater quality.*

  The Fenton's Reagent utilized by ISOTEC consists of 12 percent hydrogen peroxide and an iron catalyst. The iron catalyst concentration of the Fenton's Reagent will be determined after the completion of the bench scale treatability study and is expected to be within the range from 1 to 100 parts per million (ppm). The iron catalyst is a mixture of ferrous iron and food-grade chelating agent. The actual chelating agent is proprietary and patented. MSDS sheets for all catalyst components are included in the attached HSP.

* *Evaluation of the toxicity of Fenton's reagent, associated anticipated contaminant break down products, and identified impurities.*

  Fenton's Reagent is short-lived in the environment, typically lasting a few days in the subsurface. The non-toxic end products are oxygen, water, and ferric iron. As stated above, the chelating agent is food grade, non-toxic, and consumed during the reaction. The ferric iron precipitates out of the groundwater. The potential production of contaminant breakdown products will be evaluated during the completion of the bench scale treatability study prior to commencement of the field pilot study.

* *Evaluation for any intermediate breakdown compounds to increase to concentrations that exceed acceptable risk concentrations or ecological benchmark values. Should a short-term or long-term adverse impact be predicted, an evaluation of the advantage of the proposed action relative to the predicted environmental degradation should be presented.*

  Any intermediate reaction compounds are short-lived since, according to stoichiometry, sufficient Fenton's Reagent will be added to drive the reactions to completion.

* *Presentation of the chemical equations showing the complete mineralization pathway should be provided. The potential for injected substances or their degradation elements to migrate beyond the current boundary of the PCP plume or to reach the Willamette River.*

  Modified Fenton's reagent produces oxidants (i.e., hydroxyl radicals) and reductants (i.e., superoxide). Therefore, simultaneous oxidation and reduction reactions occur. Speculating on the formation of short-lived intermediates under these conditions is difficult and most likely there will be several pathways to the final end products of carbon dioxide, water, and chloride ions. As stated above, the mineralization pathway will be evaluated based on the

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results of the bench-scale study. Also, the horizontal recovery well (HRW-1) will continue to operate for containment of upper zone groundwater from the remediation area.

* *The potential for native metals (e.g., arsenic, lead, cadmium, chromium, etc.) from the aquifer to be mobilized into groundwater.*

  The bench-scale study will assess metals concentrations in site samples before and after application of the Fenton's reagent. Based on the simultaneous oxidation and reduction conditions and ISOTEC's previous project experience metals mobilization is not expected.

* *The potential to adversely change aquifer properties such as conductivity, pH and water color beyond the boundary of the PCP plume.*

  Within the immediate treatment zones, groundwater turbidity will increase temporarily. Other groundwater properties should vary only slightly within the treatment areas and return to background conditions within a short timeframe. No changes should occur outside of the treatment area, which is well within the estimated extent of the PCP plume (see Figure 4 in ISCO Work Plan).

4. *The proposed groundwater monitoring proposal should demonstrate that the proposed monitoring wells are immediately downgradient of the treatment area and that the wells proposed for monitoring are in the predicted groundwater flow path. In addition, the estimated travel time of the Fenton's Reagent should be evaluated to determine if impacts to the monitoring wells would occur within the proposed monitoring schedule.*

As indicated on the attached figure, groundwater elevation contours for the upper groundwater zone based on data collected at the site since 1996 show that the groundwater flow direction is toward the south-southwest in this area, which places the monitoring wells downgradient or within the groundwater flow path of the injection wells. The number and position of the proposed injection points may be altered based on groundwater elevation and laboratory analytical data derived from the second quarter 2002 groundwater sampling event completed in June 2002.

Based on past experience, ISOTEC estimates that the injected Fenton's Reagent will be consumed and completely broken down within 3 days of injection. The initial post-injection groundwater monitoring event is scheduled for approximately 2 weeks after injection of the Fenton's Reagent. Given the estimated groundwater velocity of the upper zone of groundwater estimated to be 0.7 to 7 ft/day (see Section 2.7 of the Work Plan), the groundwater mixed with Fenton's Reagent would travel approximately 2.1 to 21 ft before the Fenton's Reagent was consumed and the groundwater would travel a maximum of approximately 100 ft in the 2 weeks following injection. As indicated above, all of the proposed monitoring wells are located within 50 ft downgradient of an injection point; therefore, the proposed monitoring wells should enable us to monitor the changes to the groundwater affected by the injection of Fenton's Reagent. Also, the horizontal recovery well (HRW-1) will continue to operate for containment of upper zone groundwater through the remediation area.

5. *How will effectiveness of the pilot test on the vertical distribution of contamination be assessed and evaluated? How will it be demonstrated that the deep zone is not being impacted?*

The proposed injection of Fenton's Reagent is primarily intended to address PCP contamination in the upper zone groundwater. The Fenton's Reagent will be injected through direct-push probes across the entire saturated thickness of the upper zone groundwater, estimated to be about 3 to 5 ft

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thick during the pilot study. The upper and lower zones are separated by a 2- to 10-ft silt layer within the remediation area. Deep groundwater monitoring wells located within the vicinity of the proposed injection points, including LW-4D, LW-11D, and B2, currently contain low level or nondetected concentrations of PCP. Of these three deep monitoring wells, LW-4D last exhibited detectable PCP in August 2000 (0.30 micrograms per liter), LW-11D last exhibited detectable PCP in February 2002 (0.76 micrograms per liter), and B2 last exhibited detectable PCP in July 1997 (0.17 micrograms per liter). Groundwater samples will continue to be collected from the deep wells for quarterly laboratory analysis. The next scheduled quarterly event will be conducted in late August early September 2002. Also, PCP contamination in the lower zone groundwater will continue to be contained through pumping of groundwater interim action recovery well, RW-2.

As indicated in the ISCO Work Plan, Time Oil intends to contract with ISOTEC of Englewood, Colorado to complete the injection of Fenton's Reagent into the upper zone groundwater after a bench scale (laboratory) study is completed to evaluate the potential effectiveness of treating PCP impacts using Fenton's Reagent. In only the last 2 years, the ISOTEC West office has completed remediation programs using modified Fenton's Reagent in Oregon, Washington, Colorado, Kansas, Utah, California, Florida, Indiana, and Texas without any adverse impacts to groundwater quality. Also, over 200,000 gallons of Fenton's Reagent was recently injected at a Vancouver, Washington project site without any adverse groundwater quality impacts.

The bench scale study has been initiated and results from the study are expected to be received by mid-August 2002. If the bench scale study indicates that the Fenton's Reagent was successful in treating PCP impacts, ISOTEC is currently scheduled to begin the injection of Fenton's Reagent into the upper zone groundwater in late August 2002.

LANDAU ASSOCIATES, INC.

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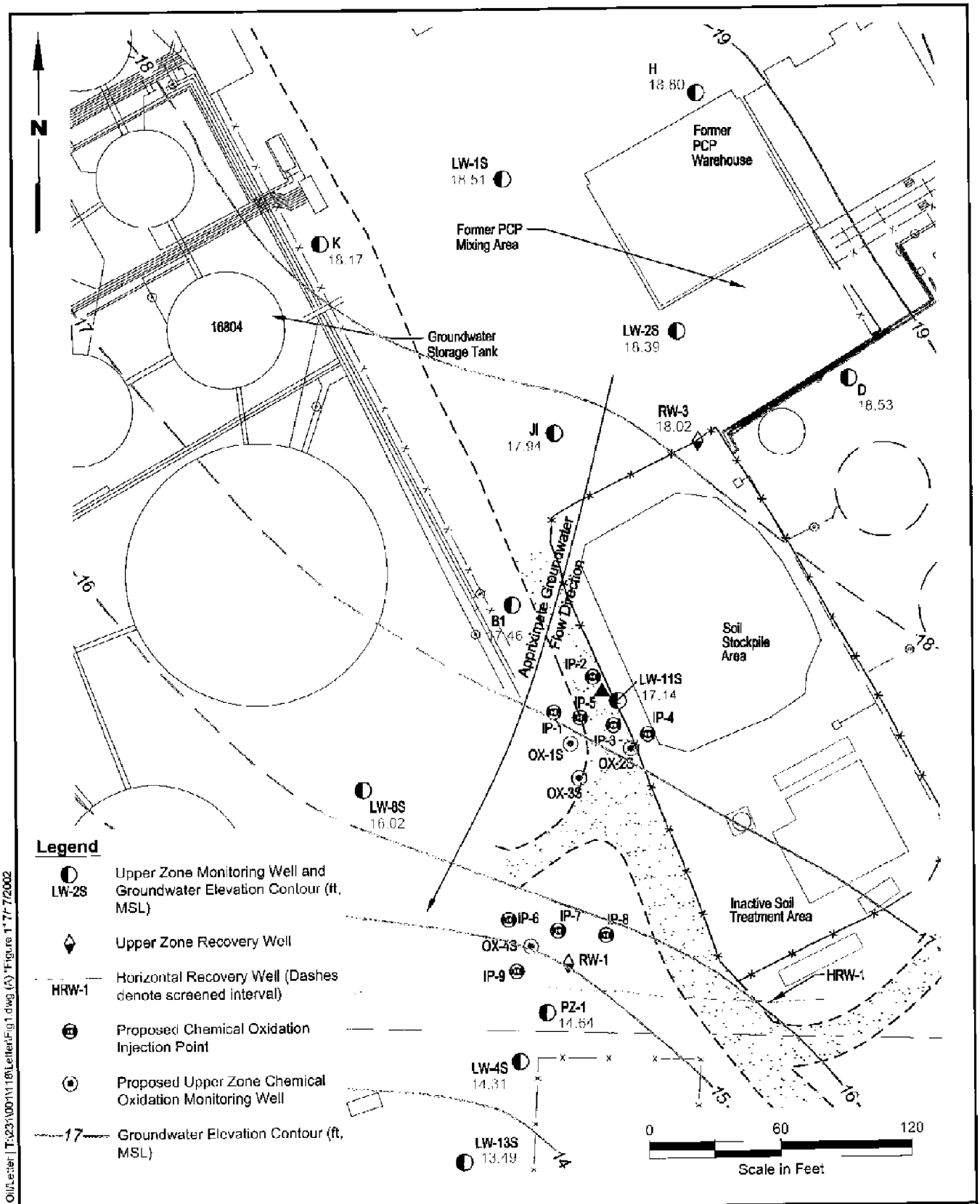

Time Oil/Letter | T:\231\001\118\Letter\Fig1.dwg (A) *Figure 1* 7/2/2002

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Groundwater Flow Direction Within ISCO Pilot Study Area**	Figure **1**

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HEALTH AND SAFETY PLAN

SITE:

TIME OIL
NORTHWEST TERMINAL SITE
10350 NORTH TIME OIL ROAD
PORTLAND, OREGON

JULY 2002

PREPARED FOR:

TIME OIL COMPANY
2737 WEST COMMODORE WAY
SEATTLE, WASHINGTON 98199-1257

PREPARED BY:

IN-SITU OXIDATIVE TECHNOLOGIES, INC.
5200 DTC PARKWAY
SUITE 150
ENGLEWOOD, COLORADO 80111

ISOTEC PROJECT NO. 900057

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Section 1 PROJECT IDENTIFICATION

CLIENT NAME:	Time Oil Company
CLIENT ADDRESS:	2737 West Commodore Way Seattle, Washington 98199-1257
ISOTEC PROJECT No.:	900057
PROJECT NAME:	Time Oil – Northwest Terminal Site
LOCATION/ADDRESS:	10350 North Time Oil Road
ISOTEC PROJECT MANAGER:	Stan Haskins
ISOTEC SITE MANAGER:	Stan Haskins
ISOTEC SITE SAFETY OFFICER:	Stan Haskins
PLAN VALID FROM:	May 22, 2002
PLAN EXPIRES:	December 31, 2002

- **End of Section –**

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Section 2 INTRODUCTION

The purpose of this Health and Safety Plan (HASP) is to identify, evaluate and control health and safety hazards, and to provide for emergency response during field activities. All employees of ISOTEC, as well as its contractors and subcontractors who have agreed to abide by this HASP and who are involved in field activities on this project, will be bound by these provisions.

This site-specific HASP is based on a review and evaluation of the potential hazards and risks associated with this project. It outlines the health and safety procedures, and the equipment required, needed to minimize the potential for harm to field personnel and site visitors. Since work activities, site conditions and exposures to various combinations of contaminants which may be present are variable, the potential for adverse health effects associated with field activities on this site cannot be predicted with confidence.

2.1 Site Description & History

The Northwest Terminal site is owned by Time Oil Company and is located at 10350 North Time Oil Road, in Portland, Oregon. Site characterization activities performed at the site revealed that pentachlorophenol contaminated soil and groundwater is present at the site.

See Attachments A and B for the site location and street maps that identify the location and possible routes to the nearest hospital.

2.2 Key Personnel

2.2.1 ISOTEC Project Manager: Stan Haskins

The ISOTEC Project Manager has the following responsibilities:

- To provide the ISOTEC Director of Health and Safety with project-related health and safety information.
- To have a site-specific Health & Safety Plan (HASP) prepared.
- To implement the HASP.
- To see that the project is performed in a manner consistent with applicable local, state and federal regulations.
- To monitor compliance with the HASP.

The ISOTEC Project Manager has the authority to take the following actions:

- To suspend field activities, if the health and safety of field personnel are endangered.
- To suspend an individual from field activities for infractions of the HASP, pending further consideration by the ISOTEC DHS.

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2.2.2 ISOTEC Director of Health and Safety: Henry P. Shotwell, Ph.D., CIH

The ISOTEC DHS has the following responsibilities, although he will not be on-site during the work:

- To consult with the ISOTEC Project Manager in project-related matters of health and safety.
- To monitor compliance with the HASP.
- To assist the ISOTEC Project Manager in complying with the terms of this HASP, and applicable regulations.
- To verify that on-site personnel are properly trained and medically qualified to carry out their duties.

The ISOTEC DHS has the authority to take the following actions:

- To suspend work or otherwise limit personnel exposure if a HASP appears to be unsuitable or inadequate.
- To direct personnel to modify any work practices that are deemed to be hazardous to health and safety.
- To remove field personnel from the project if their physical actions or mental condition endangers their own health and safety, or that of their coworkers.

2.2.3 ISOTEC Site Safety Officer: Stan Haskins

The ISOTEC Site Safety Officer (ISOTEC SSO) will be present on-site during work. The SSO and ISOTEC Alternate Site Safety Officer(s) (Alternate ISOTEC SSO) have the following responsibilities:

- To direct on-site health and safety activities.
- To report safety-related incidents to the ISOTEC Project Manager and ISOTEC DHS.
- To assist the ISOTEC Project Manager in all aspects of implementing the HASP.
- To maintain an adequate supply of health and safety equipment on-site, as specified in the HASP.
- To observe on-site health and safety activities, as specified in the HASP, and report results to the ISOTEC Project Manager and the ISOTEC DHS.

The ISOTEC SSO has the authority to take the following actions:

- To suspend field activities, if the health and safety of field personnel are endangered.
- To suspend an individual from field activities for infractions of the HASP, pending further consideration by the ISOTEC DHS.

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2.2.4 ISOTEC Injection Technicians: Tim Eilber, Pat Gallagher, and Mike Tanner

The ISOTEC Injection Technicians have the following responsibilities:

- To report safety-related incidents to the ISOTEC SSO.
- To comply with the HASP while working.

The ISOTEC Injection Technicians have the authority to take the following actions:

- To suspend field activities, if the health and safety of field personnel are endangered.

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Section 3 GENERAL HEALTH AND SAFETY REQUIREMENTS

3.1 Personnel Medical Clearance

Prior to working at this site, ISOTEC assigned employees must: 1) have been certified by a licensed, ISOTEC-approved physician as being physically able to perform their assigned field work, and to use the Personal Protective Equipment (PPE) which will be required for this project, in accordance with the provisions of OSHA Regulation 29 CFR 1910.120(f); 2) have successfully completed an ISOTEC 40-hour basic health and safety training course (Level C) for field personnel or its equivalent. Site managers and supervisors must have successfully completed an 8-hour managers' health and safety course, in addition to the other clearance requirements.

ISOTEC subcontractor employees must also have similar medical, training, and respirator fit clearances and they will be required to provide proof of clearance before beginning work.

3.2 Hazard Training

All personnel working on-site who have potential exposures to health or safety hazards shall be thoroughly trained as specified in OSHA Regulations 29 CFR 1910.120(e). This training will include: (1) Attendance at an initial 40-hour basic health and safety training course off the Site; (2) At least three days of actual field experience under the direct supervision of a trained, experienced supervisor; (3) On-site, site-specific training; and (4) an 8-hour annual update in the basic health and safety training course. ISOTEC personnel may also receive specific topic training throughout the year. This training may include blood-borne pathogen training, low-level radioactivity safety, ergonomics updates, and newsletters/bulletins with pertinent or applicable information.

In addition to the above, on-site Managers and supervisors who are directly responsible for, or who supervise employees engaged in hazardous waste operations must also receive: (1) 8-hours of site supervisor training; and (2) additional training at the time of job assignment on such topics as, but not limited to, the company's safety and health program and the associated employee training program; personal protective equipment program; spill containment program; air quality monitoring; emergency response; monitoring equipment usage and calibration; and, health hazard monitoring procedures and techniques.

At the time of job assignment, special training will be provided to on-site personnel who may be exposed to unique or special hazards not covered by the initial 40-hour basic health and safety course. If unique or special hazards are unexpectedly encountered, specialized training will be provided before work proceeds.

3.3 Incident Reporting

An ISOTEC Health & Safety Incident Report will be filed for any incident involving personnel working at this Site. Situations covered by this policy include, but are not limited to, fires, explosions, illnesses, injuries and motor vehicle collisions. These reports must be sent to the ISOTEC DHS within 24 hours of the incident. Worker's Compensation

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Insurance reports for ISOTEC employees must be filed within 48 hours of each incident or illness that results from work-related activities and requires medical attention. See Attachment C for a copy of the ISOTEC Health & Safety Incident Report. The ISOTEC SSO or Project Manager will complete this form if needed.

3.4 Illumination, Sanitation and Confined Space Entry

3.4.1 Illumination

All major work tasks will occur outside during daylight hours. The illumination requirements set forth by OSHA Regulations 29 CFR 1910.120 (m) will be met.

3.4.2 Sanitation

The sanitation requirements regarding potable and non-potable waters, toilet facilities and washing facilities will be followed as set forth in OSHA Regulations 29 CFR 1910.120(n).

3.4.3 Confined Space Entry

Confined Space Entries will not be conducted under this HASP.

3.5 Respirator Maintenance, Fitting and Decontamination

Respirators will only be used when deemed necessary by the ISOTEC SSO. In the event that respirators are used, the respirators will be cleaned daily according to procedures described below. Cartridges will be replaced when breakthrough is detected at any time while in use. An increased resistance to breathing will determine breakthrough for HEPA cartridges. The following checks will be performed daily, in addition to the above:

- Exhalation valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve, which could cause leakage.
- Inhalation valves - screw off both cartridges and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.
- Make sure a protective lens cover is in place.
- Make sure you have the proper HEPA cartridges.
- Make sure that the face piece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.
- Make sure the speaking diaphragm retainer ring is hand tight.

NOTE: <u>The respirator MUST be Leak-Tested before each use.</u>

Test the respirator for leakage by using both the positive- and the negative-pressure method. Lightly place your palm over the exhalation valve cover. Exhale gently. The body of the respirator should bulge slightly outward from your face. If any leakage is detected around the face seal, readjust the head harness straps and repeat the test until there is

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no leakage. If leakage is detected other than in the face seal, the condition must be investigated and corrected before another test is made. The negative pressure test must also be made. Lightly place your palms or some impervious material, like Saran Wrap® over the cartridges or filter holders. Inhale gently. The face-piece should collapse against the face. The respirator must pass these two tightness tests before the respirator is used. The respirator will not furnish protection unless all inhaled air is drawn through suitable cartridges or filters.

NOTE: Respirators provide no protection in oxygen-deficient atmospheres!

After use, follow these steps to clean your respirator:

- Wash with Alconox® solution and brush gently. (This step will remove any soil/solid particulate matter that may have been collected on the respirator during field activities.)
- Rinse with distilled/de-ionized water, making sure that the inhalation and exhalation valves are clean and unobstructed.
- Rinse with distilled/de-ionized water.
- Wipe with sanitizing solution. (This step will assure the sterility of the respirator.)
- Allow your respirator to air dry.
- Place the respirator inside a sealed bag or a clean area away from extreme heat or extreme cold.

3.6 ISOTEC Project Manager Notification

All field personnel must sign-in on a sheet maintained by the ISOTEC SSO or the Alternate ISOTEC SSO before entering the Site.

IF ANY PREVIOUSLY UNIDENTIFIED POTENTIAL HAZARDS ARE DISCOVERED DURING ANY FIELD WORK, LEAVE THAT AREA OF THE SITE IMMEDIATELY AND CONTACT THE ISOTEC SSO FOR FURTHER INSTRUCTIONS.

3.7 OSHA Information Poster

In accordance with the Occupational Safety and Health Act of 1970, a copy of the OSHA information poster must be present at the Site. It will be posted at full size (11" x 17") in a permanent structure or temporary field office, or will be communicated to on-site personnel via Attachment E.

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3.8 Prohibitions

Smoking, eating, drinking, chewing tobacco or toothpicks, applying cosmetics, storing food or food containers, and having open fires will be permitted only in designated areas that will be established by the ISOTEC SSO. Under no circumstances will any of the above activities be permitted within the Exclusion or Contamination Reduction Zones. Good personal hygiene should be practiced by field personnel to avoid ingesting contaminants.

3.9 Initial Site Safety Meeting and Signing of Health and Safety Plan Compliance Agreement

The ISOTEC SSO will hold an initial site safety meeting with ISOTEC, subcontractor and contractor field personnel before work activities begin at the Site. At this meeting, it will be verified that all personnel have been provided with or have reviewed a HASP for the work activities to be performed at this Site. For ISOTEC personnel, its subcontractor's personnel, and contractor personnel whose employer(s) have adopted this HASP, the HASP shall be reviewed, discussed and questions will be answered. Signed Health and Safety Plan Compliance Agreement Forms of personnel who will be following this HASP will be collected by the ISOTEC SSO and filed. Individuals refusing to sign the Form will not be allowed to work on the Site.

3.10 Daily Site Safety Briefings

During field operations, site safety briefings will be held at the start of each day by the ISOTEC SSO to review and plan specific health and safety aspects of scheduled work. All field personnel who are following this HASP are required to attend these briefings. These meetings and their content shall be documented by the ISOTEC SSO or Project Manager. Each company will have a SSO. SSO's will meet each day to discuss accidents and relative risk and safety issues. Each SSO is responsible for their personnel. SSO's will agree on communication methods when health and safety actions occur. Potential subjects that may be discussed are presented below:

1. Preliminary
   - Medical clearances.
   - Training requirements.
   - Written HASP availability.
   - Designation of responsibilities for on-site personnel.
   - Identification of on-site personnel trained and certified to administer First Aid.
2. Training topics

   Review of HASP including: types of hazards; pathways of exposure; levels of protection; contamination avoidance; prohibitions; work procedures; work zones; emergency response procedures; and, specific on-site area/work tasks of concern.

   Decontamination.

   Personnel Protective Equipment.

   Air Quality Monitoring Program.

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3.11 ISOTEC Material Handling and Storage

ISOTEC employees will handle and store hydrogen peroxide and catalyst to complete this project. These employees, the injection technicians and the SSO, have received training in the proper handling and storage of the chemicals. They have also received specific training in the PPE required to handle the chemicals safely.

In brief, the 35% hydrogen peroxide and the catalyst should be stored in such a way that if a spill were to occur the two would not come into contact with each other. To avoid this, the 35% peroxide is stored in a location separate from the catalyst. Specifically the peroxide is stored in 55 gallon polyethylene drums on the ground outside of the ISOTEC box trucks while dry and liquid catalyst are stored inside of the box truck. Diluting the peroxide is performed in a dilution tank. Water is added to the dilution tank along with dry stabilizer in a predetermined volume to create a 12% concentration after the addition of a predetermined volume of 35% hydrogen peroxide. An electric drum pump or an air operated double diaphragm pump is used to transfer the 35% into the dilution tank. Two technicians are required to complete this process. One operates the pump and one holds the transfer wand in the dilution tank. Both technicians wear splash shields and gloves while completing the transfer.

To mix catalyst, Catalyst 4260 Component A is added to the mixing tank followed by a predetermined quantity of water and an electric mixer is turned on to mix the solution. Catalyst 4260 Component B is then added to the solution and mixing continues. Although the mixing process is generally dust free, the technician completing the mixing will wear a dust mask as a precautionary measure.

Once the catalyst is mixed and the peroxide is diluted safety hazards associated with the reagents are minimal. Technicians should avoid contact with the liquids during injection. If contact occurs flush the affected area with water and follow the procedures outlined in the MSDS sheet.

Combustion issues associated with the presence of hydrogen peroxide, a strong oxidizer, are minimized since a maximum solution of 35% will be delivered to the site. The 35% peroxide is stored in DOT approved drums. Flammable materials, i.e., gasoline, will not be stored near the peroxide or in locations where a spill of peroxide could occur. If 35% peroxide does come in contact with organic materials, i.e., wood, asphalt or clothing, the areas should be rinsed with water, contained and cleaned up following the procedures in the Pollution Prevention Plan. Hydrogen peroxide at a concentration of 35% is insufficient to cause instantaneous combustion of non-flammable organic materials. The ISOTEC reagents are not mixed at the surface. The peroxide and catalyst only come into contact with one another in the subsurface. Precautions are taken, by flushing all equipment with water, between separate injections of each reagent. The maximum temperature rise documented in the subsurface due to the ISOTEC process is 25°F.

- End of Section –

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Section 4 HAZARD ASSESSMENT

An assessment of the known or suspected chemical, physical and biological hazards has been made for each of the activities specified below.

4.1 Approved Work Activities

Work activities, which may be performed under this HASP, are limited to the following:

- Mixing and injecting ISOTEC reagents through wells and/or drive points installed by Cascade Drilling, Inc.

This HASP does not cover any site activities beyond those specifically listed above. Work activities not described above may be conducted only after an appropriate Addendum to this HASP has been issued by the ISOTEC DHS.

4.2 Hazards

Potential hazards associated with the project are discussed below. Specific hazards associated with ISOTEC reagent handling and storage are discussed in Section 3.11.

4.2.1 Temporary Drive Point Installation

Although ISOTEC employees will not be drilling, direct push operations will occur while ISOTEC employees are on-site. The hazards involved with the use of drill rigs are significant and include noise, pinch points, entrapment in machinery, impact from moving parts, electrocution from contact with over head wires or buried utilities, and improper operations. Use of hand tools, moving the rigs/equipment, and conducting required repairs can increase physical risks. Working with and around a drill rig can involve a high risk of serious injury or death. In order to reduce the risk, proper safety precautions, including the use of hearing protection, must be observed at all times.

4.2.2 Environmental Contaminants

The following chemical information presents the significant contaminants that have been previously identified or routinely encountered during groundwater sampling activities within the site boundaries.

4.2.2.1 Chemical Hazards

The following chemical hazards have been identified, based on documented prior site uses and/or initial site investigations.

1. Pentachlorophenal (PCP)
2. Hydrogen peroxide (35%)
3. Catalyst (inorganic salts)

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4.2.2.2 Chemical Exposure Controls

Contaminants usually enter the body through the mouth (ingestion), the lung (inhalation) or by absorption through the skin and mucous membranes. Chemical exposure through these routes will be controlled by limiting eating, drinking, and smoking to uncontaminated areas; through the use of hygiene practices and decontamination procedures; and by the use of appropriate engineering controls and personal protective equipment (PPE). There are four levels of personal protection (Levels A, B, C, and D), according to the degree of protection they afford, with Level A providing the greatest degree of protection. The initial level of personal protective equipment to be used while performing activities at the Site will be Modified Level D, based on the current site conditions without any known surface contamination.

The contaminants known to be present in the soils and groundwater at the site do not have the capacity to become airborne during the subsurface injection of reagents, due to their confined nature in the subsurface.. Therefore, the monitoring program outlined in Section 5 is considered to be protective of the surrounding areas, outside of the work zone.

4.2.3 Physical Agents

Physical agents include noise, electro-magnetic fields, ionizing and non-ionizing radiation, thermal stress, street work and concrete trucks. There is also a risk of physical injury from slips, trips, falls, cuts, sprains, etc., when working in the field with sampling tools, and when near heavy equipment, operating machinery and vehicular traffic. Field personnel should be able to recognize these hazards and take steps to avoid injurious contact with them. The Following precautions must be observed whenever heavy equipment is in use:

- Personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, and hard hats must be worn whenever such equipment is present.
- Personnel must at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of its operation. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent, particularly if you intend to work near or approach the equipment.
- Never walk directly in back of or to the side of, heavy equipment without the operator's acknowledgment.
- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements.
- Keep all non-essential personnel out of the work area.
- Any heavy equipment that is used in the exclusion zone should remain in that zone until its task is completed. The equipment subcontractor should completely decontaminate such equipment in the designated equipment decontamination area as required prior to moving the equipment outside of the Exclusion Zone.

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Noise Exposure

Work at the site may be conducted with high noise levels from equipment such as excavators, pumps and drill rigs. ISOTEC standards require that hearing protection be used when noise levels exceed 85 dBA, averaged over an 8-hour day. Hearing protection will be required at this site for noise exposures greater than 85 dBA for **any** length of time. Hearing protection will be worn anytime a normal conversation cannot be heard. ISOTEC and subcontractor personnel shall have hearing protection on-site and available for use at all times.

Thermal Stress

Depending on the altitude, geographic location and the season, the use of required PPE may cause heat or cold related stress on the wearer. The Heat Stress Casualty Prevention Plan as specified in Attachment-F will be referred to for dealing with this health hazard during warm weather. The Plan outlines heat stress identification, treatment, prevention and monitoring. Fluids will be provided at all times during work periods, in order to maintain adequate body fluid levels for field personnel.

Radiation Exposures

Radiation is used to mean ionizing and non-ionizing, laser and microwave emissions. No sources of these forms of radiation are known to exist on-site.

4.2.3.1 Controls for Physical Agents

No physical hazards, as defined, are known or believed to be present.

4.2.4 Biological Agents

Biological agents may be viral, fungal, bacterial, or of higher orders: insects (including ticks and stinging insects), wild animals (especially snakes) and domesticated animals. Any mammal encountered on-site should be considered potentially rabid. Field personnel are encouraged to use insect repellents before donning PPE. To avoid snake bites check for snakes before walking through grassy or debris strewn areas. The presence of medical waste suggests the possibility that pathogenic micro-organisms may be present. A fully-stocked first aid kit must be available for use in the field.

4.2.4.1 Biological Agent Controls

No biological agents, as defined, are known or believed to be present.

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4.2.5 Safety Hazards

Use of steel-toed work boots, safety glasses or goggles will be required when in an Exclusion Zone. Personnel should be aware that when PPE such as respirators, gloves, and protective clothing are worn, visibility, hearing, and manual dexterity are impaired.

- **End of Section –**

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Section 5 AIR QUALITY MONITORING AND MEASURES FOR THE CONTROL OF EMISSIONS

5.1 Air Quality Monitoring Instrument

Air quality may be measured to determine exposure potentials prior to the start of work, and at various times during the course of the project, if deemed necessary. Instruments which may be used to monitor air quality are discussed below:

- **Photoionization Detector**
  The HNu Systems Model PI-101 Photoionization Detector (PID) with a 10.7eV lamp or equivalent will be used to detect trace concentrations of certain organic gases and a few inorganic gases in the air. Methane, ethane, and the major components of air are not detected by the HNu PID. PID readings reflect total (readable) vapors in the air. PID readings must be given as "PID units", rather than "ppm". The PID detects mixtures of compounds simultaneously. PID readings do not measure concentrations of any individual compound when a mixture of compounds is present.

  The PID will be calibrated twice each day (before start of work and after the conclusion of work) using an isobutylene standard (molecular weight = 56.2) for calibration. Calibrations will be logged. PID readings should be measured in the breathing zone of the most highly exposed worker (i.e., the person who is closest to the source of known or suspected contamination).

- **Combustible Gas Indicator/Oxygen**
  An approved Combustible Gas Indicator/Oxygen Meter and/or a four gas meter will be used to measure the concentration of flammable vapors and gases and oxygen in the air during field activities. Flammable gas concentrations are measured as percentages of the Lower Explosive Limit (LEL). Oxygen content is measured as a percentage of air.

5.2 Air Quality Response Levels

The Site Safety Officer will decide when to change protection levels in response to air monitoring results. The ISOTEC DHS will be notified of any upgrades from initial protection levels, as soon as is practical. ISOTEC Action Levels for this project are described in detail in Table 5-1, at the end of this Section. These Action (Response) Levels apply to the work activities covered by this HASP.

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5.3 Monitoring Guidelines

5.3.1 Background Organic Vapor Monitoring

Background organic vapor and combustible gas readings may be taken at least twice daily: before the start, and after the conclusion of, work activities. Background levels will be taken at locations surrounding the site that are unaffected by on-site work. Once work at the Site begins, reselection of the original background location may be required.

5.3.2 Air Monitoring Protocol

During intrusive work activities (i.e. drilling, excavation) at least one series (series=PID and CGI) of readings will be taken every 15 minutes. If no increase in readings, above action levels, are observed after one hour of monitoring, the frequency will be reduced to once every 30 minutes. If no increase in readings, above action levels, are observed after one hour of monitoring, the frequency will be reduced to once each hour. During non-intrusive work activities, one series will be performed at the start of work, one series at some point during the work, and one near the conclusion of the work. This will be in addition to the background monitoring described in the previous section.

5.3.3 Documenting Monitoring Results

A calibration log will be kept for each of the monitoring instruments used, which describes the calibration method(s) used, and the readouts obtained. Should work at the Site require respiratory protection, the need for a personal exposure monitoring program will be evaluated by the ISOTEC DHS. Details of this program and any monitoring equipment required for its implementation will be specified in an Addendum to this HASP prepared by the ISOTEC DHS. Records of exposure measurements will be maintained in the Health and Safety file for this project.

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TABLE 5-1

ISOTEC RESPONSE ACTIONS

ISOTEC Air Quality Measurements and Response Actions

Air Quality Measurement [1]	Frequency	Response Action
PID reading less than 1 unit above background (averaged over 1 minute) CGI reading less than 10% LEL (averaged over 1 minute) Oxygen Meter reading between 19.5% and 25% (averaged over 1 minute)	Every 15 minutes during drilling or injection for first 1 hour. If action levels not exceeded then every 30 minutes for one hour. If action levels not exceeded then every hour for the first day of operations. Twice per day for the duration of drilling injection events.	Modified Level D Protection (at the discretion of the ISOTEC SSO)
PID reading greater than 1 unit and less the 3 units above background (averaged over 1 minute) CGI reading less than 10% LEL (averaged over 1 minute) Oxygen Meter reading between 19.5% and 25% (averaged over 1 minute)	Every 15 minutes during drilling or injection for first 1 hour. If action levels not exceeded then every 30 minutes for the duration of the drilling mixing/injection events.	Level C Protection (at the discretion of the ISOTEC SSO)

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TABLE 5-1 (CONTINUED)

ISOTEC RESPONSE ACTIONS

ISOTEC Air Quality Measurements and Response Actions

Air Quality Measurement [1]	Frequency	Response Action
PID reading greater than 3 units above background (averaged over 1 minute)	Every 15 minutes during drilling or injection for first 1 hour. If action levels not exceeded then every 30 minutes for the duration of the drilling injection events.	Suspend all work activities in immediate area and notify ISOTEC DHS and ISOTEC Project Manager.
CGI reading 10-25%LEL (averaged over 1 minute) Oxygen Meter reading between 19.5% and 25% (averaged over 1 minute)		Continue air monitoring until readings indicate that work may resume.

[1] All Air Quality Measurements, with the exception of CGI measurements for flammable vapors and gases, should be made in the breathing zone of personnel who, in the opinion of the ISOTEC SSO, are most exposed to airborne contaminants. Measurements of flammable vapor and gas levels should be made in the vicinity of the nearest ignition source. .

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Section 6 PERSONAL PROTECTIVE EQUIPMENT

6.1 Description of Levels of Protection

The personal protection equipment specified in this HASP will be available to all ISOTEC field personnel. The following requirements will also be met, in accordance with OSHA regulations:

1. Facial hair may not interfere with the proper fit of respirators;
2. Contact lenses will not be worn on-site, without exception.
3. Eyeglasses that interfere with the proper fit of full-face respirators will not be worn.
4. No eating, drinking or smoking will be allowed in any area where respiratory protection is required.

Level D Personal Protective Equipment

- Safety glasses or goggles
- Steel-toed leather or rubber work boots
- Hearing protection (if warranted)
- Traffic vest (if warranted)

Modified Level D Personal Protective Equipment

- Hard hat[1]
- Safety glasses or goggles
- Steel-toed leather work boots
- Rubber overboots, steel-toed rubber boots, or disposable "booties" [1]
- Nitrile-butadiene rubber outer gloves
- Nitrile surgical gloves (to be worn underneath outer gloves)
- Dust Mask [1]
- Face Shield [1]
- Polyethylene coated or Saranex impregnated Tyvek coveralls[1] (taped at cuffs)
- Hearing protection (if warranted)
- Traffic vest[1]
- [1] Optional, at the discretion of ISOTEC SSO.

Level C Personal Protective Equipment (not called for under this plan)

- Hard hat
- Half-face Air-Purifying Respirator with applicable chemical cartridge combined with a HEPA filter
- Steel-toed leather work boots
- Rubber overboots, steel-toed rubber boots, or disposable "booties"
- Nitrile-butadiene rubber outer gloves
- Nitrile surgical gloves (to be worn underneath outer gloves)

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- Polyethylene coated or Saranex impregnated Tyvek coveralls (taped at cuffs)
- Hearing protection if warranted.

A first aid kit, multi-purpose dry chemical UL Class 10A-10B-C fire extinguisher, eye wash station, appropriate barricades and alarm horns will be present and maintained at the Site.

Selection of the PPE specified for this project is based on a review of known or suspected hazards, routes of potential exposure (inhalation, skin absorption, ingestion, and skin or eye contact) and the effectiveness of personal protective equipment in providing a barrier to these hazards. In addition, PPE has been selected to match the work requirements and task-specific conditions of the job, and to provide adequate protection without causing unnecessary discomfort or physical impairment to the worker.

6.2 Initial PPE Levels for Specific Work Tasks

The selection of Initial Levels-of-Protection takes into consideration the physical, biological and chemical hazards posed by the site as well as those posed by the various pieces of personnel protective clothing. Initial Levels-of-Protection are established so as to obtain acceptable levels of protection while not imposing an unacceptable level of physical stress on the wearer.

The following initial PPE levels have been established for the tasks described in Section 4.1, Approved Work Activities:

Work Activity	Level of Protection
ISOTEC catalyst preparation	Modified Level D
ISOTEC catalyst injection	Modified Level D
Initial soil penetration with Geo-Probe equipment	Modified Level D
ISOTEC oxidizer preparation and injection	Modified Level D
Reagent injection	Modified Level D

- End of Section -

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Section 7 DESIGNATION OF WORK ZONES

This section of the Health & Safety Plan applies to excavation projects where contaminated soils are exposed and may release their contaminants to the air, or come in contact with field personnel. To minimize the migration of contaminant from the Site to uncontaminated areas, three work zones will be set up:

Zone 1: Exclusion Zone
Zone 2: Contamination Reduction Zone
Zone 3: Support Zone

The Exclusion Zone is the area where contamination occurs or could occur. Initially, the Exclusion Zone should extend a distance of 25 ft from the edge of intrusive activity unless conditions at the Site warrant either a larger or smaller distance as determined by the ISOTEC SSO. All persons entering the Exclusion Zone must wear the applicable level of protection as set forth in Section 6.1, Personal Protective Equipment and Section 6.2, Initial PPE Levels for Specific Work Tasks. It is anticipated that work zones will be established at each individual area of intrusive work rather than encompass the entire Site.

The Support Zone is the area of the Site where significant exposure to contamination is not expected to occur during non-intrusive activities. The Support Zone is considered to be the "clean area" of the Site.

Between the Exclusion Zone and Support Zone is the Contamination Reduction Zone, which provides a transition zone between the contaminated and clean areas of the Site. The Contamination Reduction Zone will be located directly outside of the Exclusion Zone. All personnel must decontaminate when leaving the Exclusion Zone. A Contamination Reduction Zone (decontamination area) will be established adjacent to each individual area of intrusive work.

- End of Section -

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Section 8 DECONTAMINATION PROCEDURES

Contamination reduction procedures appropriate for the existing work area will be developed and specified by the SSO. Such procedures must be in place before site operations begin, and they must remain in place (modified as necessary) throughout the period of activity. Wherever possible, the need for decontamination should be reduced through work practices that minimize contact with contaminants. Personnel should avoid walking through heavily contaminated areas, should not kneel or directly touch contaminated materials, and should use remote handling and sampling techniques when feasible.

Decontamination will be performed only in designated areas. Separate areas may be set up for equipment and personnel.

8.1 Personnel Decontamination

Personnel who have been in contact with contaminated materials will decontaminate themselves in the following manner:

- Deposit contaminated equipment on plastic drop cloths.
- Stand in wash tub containing Alconox® and water, wash boots and outer gloves with long handled brush.
- Rinse boots and outer gloves with long handled brush in a wash tub containing clear water or use a sprayer to rinse off boots and gloves.
- Remove ankle and wrist tapes; place in disposal drum.
- Remove outer gloves and place in disposal drum.
- Remove Tyvek® suit and place in disposal drum.
- Remove respirator and place on table to be decontaminated.
- Remove inner gloves and place in disposal drum.
- Wash hands and face.

8.2 Equipment Decontamination

Equipment which might require decontamination includes heavy equipment, tools, monitoring equipment, sampling equipment, and sample containers; trucks and trailers; and the decontamination equipment itself when the decontamination is closed down. Before entering the site, all equipment will be cleaned to remove grease, oil, encrusted dirt, or other potential contaminants.

All tools or equipment which have been in contact with contaminated materials, must be decontaminated after leaving the Exclusion Zone. This decontamination is to be performed using a high pressure/hot water "steam type" cleaner or a spray/rinse decontamination sequence as described in Section 3.5, Respirator Maintenance, Fitting and Decontamination, as appropriate.

Contaminated liquids from the decontamination area and contaminated clothing will be disposed of in accordance with site protocols.

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8.3 Disposal of Decontamination Wastes

Solid and liquid decontamination waste will be containerized. Solids may be double bagged, or placed in a sealed drum or similar container. Liquids will be collected during decontamination and placed in sealed containers or pumped into holding tanks for future testing and disposal. Containers must be clearly labeled for content, the operation from which they were filled, and the dates.

- End of Section -

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Section 9 EMERGENCY RESPONSE PLAN

9.1 Emergency Response

Emergencies addressed by this plan include:

- Fire;
- Chemical over-exposures;
- Physical injuries to site personnel; and,
- Chemical spills.

The ISOTEC Health & Safety Officer and Project Manager must be notified as soon as possible of any on-site emergency or potential emergency including fire, explosive conditions or OSHA-recordable physical injury.

9.2 Emergency Recognition and Prevention

9.2.1 Fires

Fires are possible whenever oxygen and flammable gases or vapors are mixed together in proper proportions and an ignition source is present. Construction equipment provides an ignition source. To prevent fires and explosions, a CGI as specified in Section 5.0 will be used to detect flammable or explosive atmospheres. Ignition and other sources which produce electrical sparks will be turned off and the area evacuated if vapors or gases reach 25% of the Lower Explosion Limit (LEL) as measured by the CGI. Work will not resume until the ISOTEC SSO observes CGI readings below 25% of the LEL for at least 5 consecutive minutes.

9.2.2 Chemical Exposures

Work should always be performed in a manner that minimizes exposure to contaminants through skin or eye contact, inhalation or ingestion. Work practices to reduce the risk of chemical exposure include:

- PPE, as specified in Section 6.0, will be used by all field personnel covered by this HASP. A formal revision to the HASP must be made by the ISOTEC DHS to modify the PPE specifications.
- Keep hands away from face during work activities.
- Minimize all skin and eye contact with contaminants.

Early recognition of the signs and symptoms of chemical exposure is essential for the prevention of serious chemical exposure incidents. Symptoms of exposure to the compounds present at the Site include the following:

Irritation of eyes and mucous membranes, headache, nausea, incoordination (feeling "tipsy").

If a person experiences any of these acute symptoms, or recognizes any of them in a fellow worker, the person experiencing the symptoms will stop work immediately and report to the ISOTEC SSO. If the symptoms persist or

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affect performance in any way, the ISOTEC SSO will arrange for medical treatment. If the symptoms are serious, or affect several people, work activities in the exposure area will be discontinued until more is known about the cause(s). Incident reporting procedures as specified in Section 3.3 will be initiated.

9.2.3 Physical Injuries

Site personnel should be on the lookout for potential safety hazards such as holes or ditches; improperly positioned objects, such as drums or equipment that may fall; sharp objects, such as nails, metal shards, and broken glass; protruding objects at eye or head level; slippery surfaces; steep grades; unshored steep entrenchments, uneven terrain or unstable surfaces, such as walls that may cave in or flooring that may give way. Site personnel should inform the ISOTEC SSO of any potential hazards observed so that corrective action can be taken.

9.2.4 Spill Prevention

Site personnel should be aware of potential conditions that could cause a spill and take preventative measures before a spill occurs. Hydrogen peroxide and catalyst will be stored in such a way that if a spill of either were to occur the two would not come into contact with each other. Safe storage and handling procedures are discussed further in Section 3.11. The tanks used to dilute the peroxide and to mix and store the catalyst are oversized to prevent spillage from the tanks. If a small spill, less than five gallons of peroxide occurs to the ground surface water will be used to dilute it further and actions taken to prevent the fluid from entering the any storm drains or drainage ditchs, while the fluid is soaked up with clay sorbent. If a larger spill of peroxide occurs the same procedure will be followed and any excess liquid will be pumped into a clean empty storage tank. If a small spill, less than 5 gallons, of catalyst occurs it should be contained and soaked up with sorbent pads then placed in a poly drum. If a large spill of catalyst occurs it will be contained and pumped into the storage tank with an air diaphragm pump. If a spill of dry catalyst occurs it will be swept up and placed in a poly bag. **If any spill occurs work will stop immediately until the spill is cleaned up and the cause of the spill is determined and corrected**. All spilled materials will be disposed of properly. Refer to the appropriate MSDS sheet for proper disposal instructions.

9.3 Emergency Alerting Procedures

The ISOTEC SSO will alert the appropriate work groups when an emergency occurs. The appropriate phone numbers for key project personnel are listed below in Section 9.5. The ISOTEC SSO and any isolated work group will carry radios if direct contact cannot be maintained. If direct contact cannot be maintained, an air horn will be used to signal workers to stop work and assemble in the Contamination Reduction Zone. If evacuation of the Site is necessary, a pre-arranged signal from the air horn will be sounded.

9.4 Evacuation Procedures and Routes

Normally, personnel should evacuate through the Contamination Reduction Zone, and from there, to the Support Zone. Evacuation from the Contamination Reduction Zone will proceed in an upwind direction from the emergency.

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If evacuation to the Support Zone does not provide sufficient protection from the emergency, personnel will be advised to evacuate the Site proper.

9.5 *Telephone Numbers for Emergency Services and Contacts*

The telephone numbers of local emergency services are given below:

Emergency Service		Telephone Number
Ambulance		911
Fire Department		911
Police Department		911
Hospital	Legacy Emanuel Hospital & Health Care	(503) 413-2200
Poison Control Center		(800) 962-1253
USEPA National Response Center		(800) 438-2427
Time Oil PM	Kevin Murphy	(206) 286-6443
ISOTEC CO Office		(303) 843-9079
ISOTEC PM	Stan Haskins – Cellular Phone	(303) 931-4257

These telephone numbers must be verified by the ISOTEC SSO before the start of field work.

9.6 *Emergency Response Personnel*

The ISOTEC SSO will have the primary role in responding to all emergencies at the Site. The ISOTEC SSO, or the Alternate ISOTEC SSO, will be present at the Site during all work activities. If any emergency such as a fire, chemical exposure, or physical injury occurs, the ISOTEC SSO shall be notified immediately. The ISOTEC SSO will direct all site personnel in cases of emergency.

After an emergency has occurred at the Site, the causes and responses to that emergency shall be thoroughly investigated, reviewed and documented by the ISOTEC Project Manager and ISOTEC SSO; this documentation is to be submitted to the ISOTEC DHS within 48 hours of the incident.

9.7 *Decontamination Procedures During an Emergency*

Decontamination of an injured or exposed worker or during a site emergency shall be performed only if decontamination does not interfere with essential treatment or evacuation.

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If a worker has been injured or exposed and decontamination can be done: Wash, rinse, and/or cut off protective clothing and equipment.

If a worker has been injured or exposed and cannot be decontaminated:

- Wrap the victim in blankets, plastic or rubber to reduce contamination of other personnel;
- Alert emergency and off-site medical personnel to potential contamination; and,
- Have the ISOTEC SSO or other personnel familiar with the incident and contaminants at the Site accompany the victim to the hospital. If possible, send a copy of the appropriate MSDS(s) with the victim.

9.8 Emergency Medical Treatment and First Aid Procedures

Emergency medical treatment or First Aid may be administered at the Site by the ISOTEC SSO or other personnel who have been certified in First Aid.

General emergency medical and First Aid procedures are as follows:

- Remove the injured or exposed person(s) from immediate danger.
- Render First Aid as needed; decontaminate affected personnel, if necessary.
- Call an ambulance for transport to local hospital immediately. This procedure shall be followed even if there is no apparent serious injury.
- Evacuate other personnel at the Site to safe places until the ISOTEC SSO determines that it is safe for work to resume.
- Report the accident to the ISOTEC DHS immediately.

Emergency Medical Treatment and First Aid Procedures are presented in Attachment-G.

9.9 Directions to the Hospital from Site

The route and/or directions to the hospital from the Site are in Attachment-B.
The directions to the hospital from the Site must be verified by the ISOTEC SSO prior to the start of field work.

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Section 10 PERSONNEL ASSIGNMENTS

10.1 Project Personnel

ISOTEC personnel authorized to enter the Site and work on this project, subject to compliance with provisions of the HASP, are:

ISOTEC Project Manager	Stan Haskins
ISOTEC Site Manager	Stan Haskins
ISOTEC Site Safety Officer	Stan Haskins
ISOTEC Director of Health and Safety	Henry P. Shotwell, Ph.D., CIH
ISOTEC Injection Personnel	Tim Eilber, Pat Gallagher & Mike Tanner

Other personnel who meet HASP requirements, including training and participation in a medical surveillance program, may enter and work on the Site subject to compliance with provisions of the HASP.

10.2 Project Safety Responsibilities

Personnel responsible for implementing this Health and Safety Plan are the ISOTEC Project Manager and the ISOTEC Site Safety Officer. Their specific responsibilities and authority are described in the ISOTEC Health and Safety Manual.

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Section 11 HEALTH AND SAFETY PLAN APPROVALS

The authorized signatures below verify that this Health and Safety Plan has been read and approved for the work to be performed at the subject site:

ISOTEC Case Name: Time Oil – Northwest Terminal Site

ISOTEC Case Number: 900057

Stan Haskins
ISOTEC Project Manager

Date

Henry P. Shotwell, Ph.D., CIH
ISOTEC Director of Health and Safety

Date

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Section 12 HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

I have reviewed a copy of the Health and Safety Plan for _____ _____, dated _____. I have read the HASP, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the Health and Safety Plan.

Name	Company
Signature	Date
Name	Company
Signature	Date
Name	Company
Signature	Date
Name	Company
Signature	Date
Name	Company
Signature	Date

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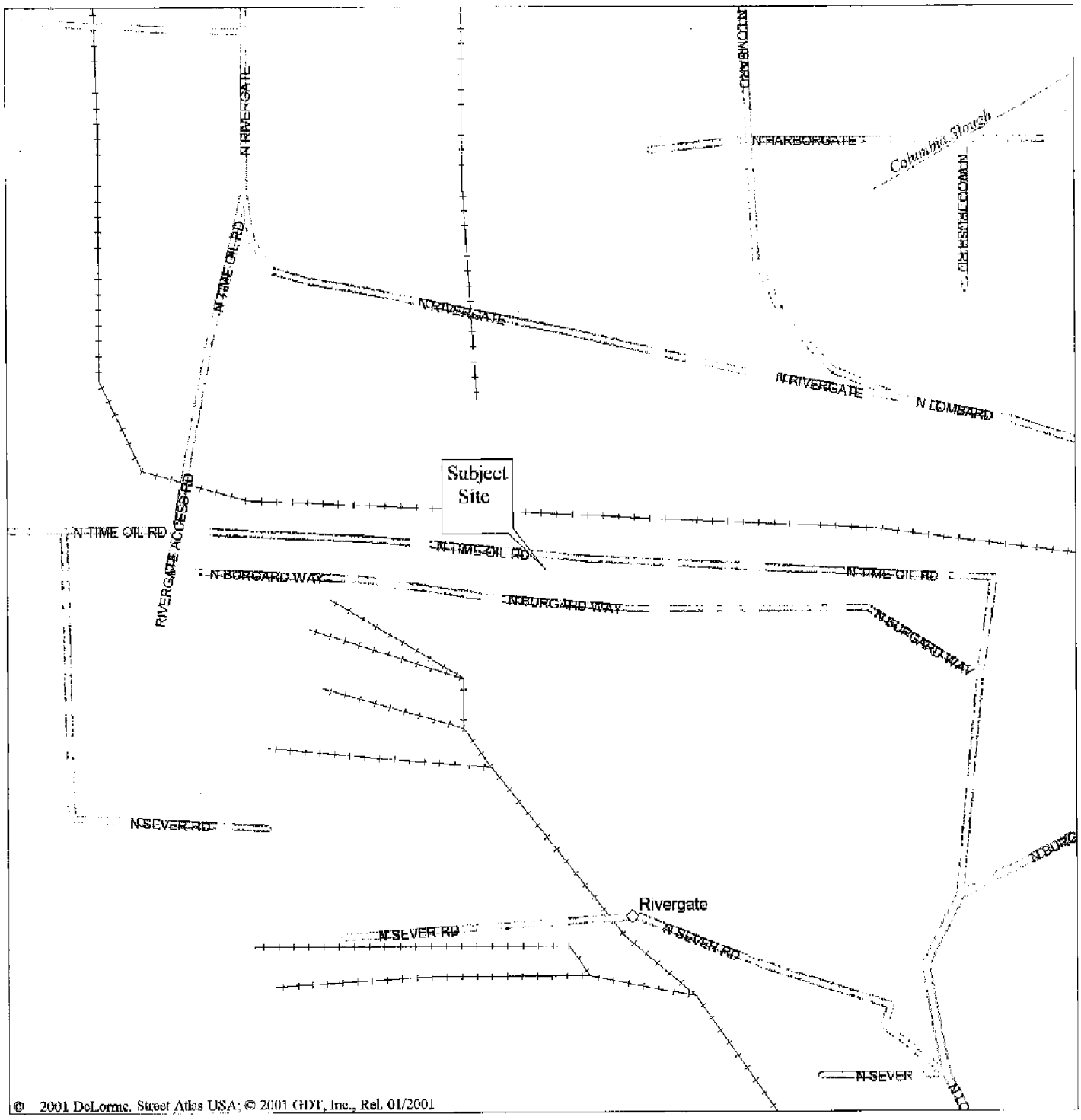
ATTACHMENT A

SITE LOCATION MAP



In-Situ Oxidative Technologies, Inc. 5200 DTC Parkway, Suite 150 Englewood, Colorado 80111	SCALE: NOT TO SCALE DATE: 5/20/02 DRAWN BY: SCH CHECKED BY: CN	PROJECT# 900057
Site Location Map **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 1

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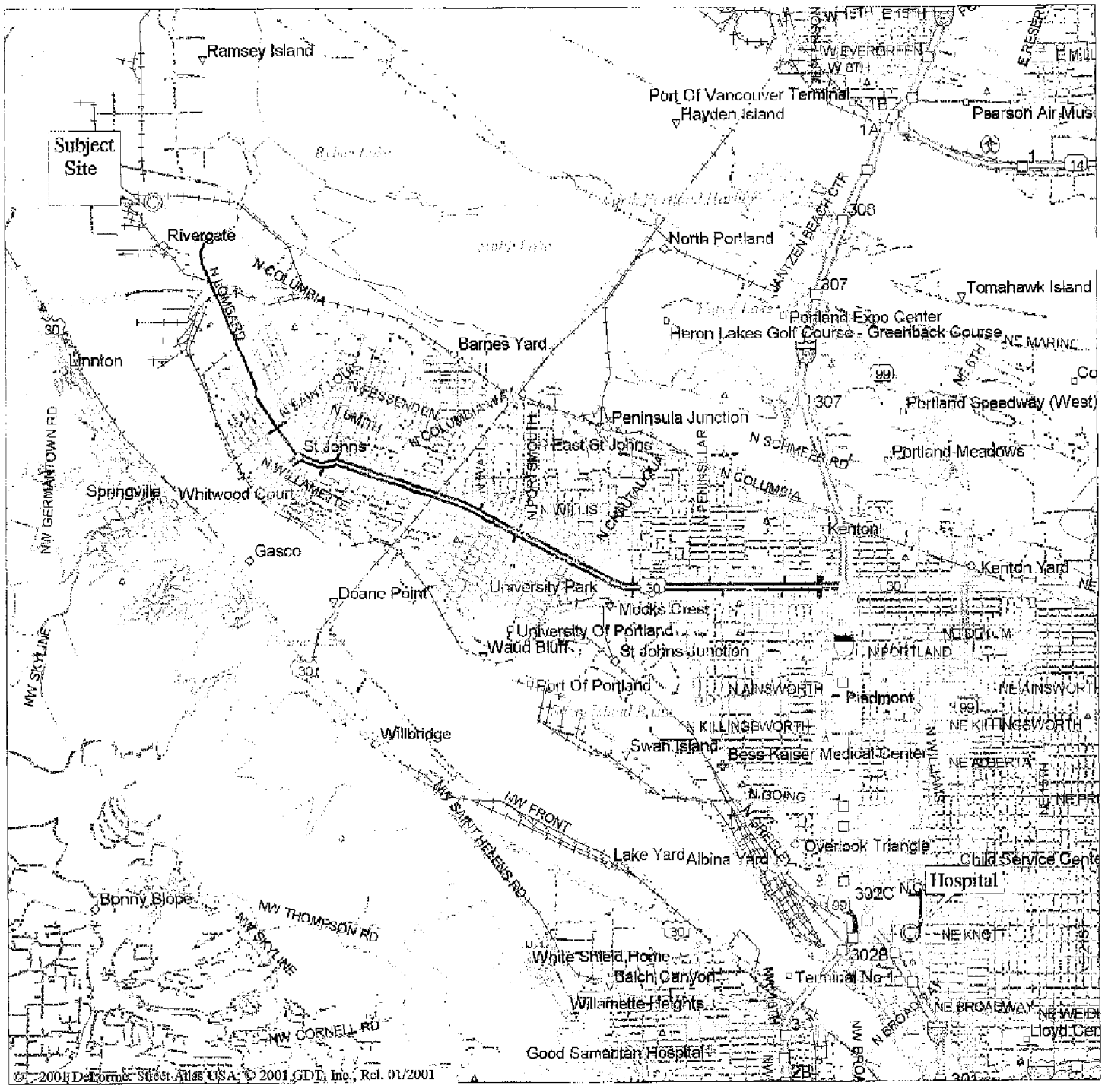
ATTACHMENT B

EMERGENCY ROUTE MAP

EMERGENCY ROUTE DIRECTIONS

HOSPITAL: ***Legacy Emanuel Hospital & Health Center***
2801 North Gantenbein Avenue
Portland, Oregon 97227
(503) 413-2200

FROM SITE: Exit Site going Southeast on North Time Oil Road towards North Burgard Way. Take North Burgard way to North Burgard Street. Exit onto North Lombard Street heading Southeast. North Lombard Street turns into US 30 Bypass. Continue on North Lombard Street/US 30 Bypass until Interstate 5. Take Interstate 5 South to North Gantenbein Avenue. Turn right onto North Gantenbein Avenue. Legacy Emanuel Hospital & Health Care is at the intersection of North Graham Street and North Gantenbein Avenue.



In-Situ Oxidative Technologies, Inc. 5200 DTC Parkway, Suite 150 Englewood, Colorado 80111	SCALE: NOT TO SCALE DATE: 5/20/02	PROJECT# 900057
	DRAWN BY: SCH CHECKED BY: CN	

EMERGENCY ROUTE TO HOSPITAL
Time Oil Company
Northwest Terminal Site
Portland, Oregon

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ATTACHMENT C

HEALTH & SAFETY INCIDENT REPORT

IN-SITU OXIDATIVE TECHNOLOGIES, INC
HEALTH & SAFETY INCIDENT REPORT
Form HS-102

Project Number:_____ **Date/Time of Incident:** _____

Project Name:_____ **Project Location:**_____

DESCRIPTION OF INCIDENT (Describe what happened and possible cause, identify individuals involved, witnesses, and their affiliations, and describe emergency or corrective action taken.)

Reporter: _____ _____ _____
Print Name Signature Date

Reporter must deliver this report to the ISOTEC Director of Health and Safety within one day of the date of incident for medical treatment cases or vehicle accidents and within five days for other incidents.

Reviewed by: Henry Shotwell, Ph.D., CIH _____ _____
Name **Signature** **Date**

PROJECT SAFETY LOG

ATTACHMENT D

IN-SITU OXIDATIVE TECHNOLOGIES, INC.

PROJECT SAFETY LOG

Form HS-106

ISOTEC SSO: Date:

Weather:

Personnel:

Personnel Present Affiliation:

Work Activities Level of Protection

PID (ppm)
reading time reading time reading time reading time

CGI/O_2 (%LEL)
reading time reading time reading time reading time

CGI/O_2 (O_2%)
reading time reading time reading time reading time

Hydrogen Peroxide Colorimetric Tubes (ppm)
reading time reading time reading time reading time

MiniRam (mg/m^3)
reading time reading time reading time reading time

ATTACHMENT E

OSHA POSTER

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory civil penalties against employers of up to $7,000 for each serious violation and for optional penalties of up to $7,000 for each nonserious violation. Penalties of up to $7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $70,000 for each such violation. A minimum penalty of $5,000 may be imposed for each willful violation. A violation of posting requirements can bring a penalty of up to $7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of $10,000 or up to six months in jail or both.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the

Atlanta, GA	(404) 562-2300
Boston, MA	(617) 565-9860
Chicago, IL	(312) 353-2220
Dallas, TX	(214) 767-4731
Denver, CO	(303) 844-1600
Kansas City, MO	(816) 426-5861

Alexis M. Herman, Secretary of Labor

Washington, DC
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OSHA 2203

ATTACHMENT F

HEAT AND COLD STRESS GUIDELINES

HEAT STRESS CASUALTY PREVENTION PLAN

Due to the increase in ambient air temperatures and the effects of protective outer wear decreasing body ventilation, there exists an increase in the potential for injury, specifically, heat casualties. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties.

IDENTIFICATION AND TREATMENT

- **Heat Exhaustion**

Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, skin is clammy, and may perspire profusely. The pulse is weak and fast, breathing is shallow. The victim may faint unless victim lies down. This may pass, but sometimes it remains and death could occur.

First Aid: Immediately remove the victim to the Contamination Reduction Zone in a shady or cool area with good air circulation. Remove all protective outerwear. Call a physician. Treat the victim for shock. (Make victim lie down, raise feet 6 to 12 inches and keep victim warm but loosen all clothing). If the victim is conscious, it may be helpful to ingest sips of a salt-water solution (1 teaspoon of salt to 1 glass of water). Transport victim to a medical facility as soon as possible.

- **Heat Stroke**

Symptoms: This is the most serious of heat casualties due to the fact that the body excessively overheats. Body temperatures often are between 107 degrees Fahrenheit to 110 degrees Fahrenheit. First there is often pain in the head, dizziness, nausea, oppression, and the skin is dry, red and hot. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly.

First Aid: Immediately evacuate the victim to a cool and shady area in the Contamination Reduction Zone. Remove all protective outerwear and all personal clothing. Lay victim on back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place victim in a tub of cool water. The main objective is to cool victim without chilling. Give no stimulants. Transport the victim to a medical facility as soon as possible.

PREVENTION OF HEAT STRESS

- One of the major causes of heat casualties is the depletion of body fluids. On the site there will be plenty of fluids available. Personnel should replace water and salts loss from sweating. Salts can be replaced by either a 0.1% salt solution, more heavily salted foods, or commercial mixes such as Gatorade. The commercial mixes are advised for personnel on low sodium diets.

- A work schedule should be established so that the majority of the work day will be during the morning hours of the day before ambient air temperature levels reach their highs.

- A work/rest guideline will be implemented for personnel at all anticipated PPE levels. This guideline is as follows:

Level D:

Ambient Temperatures	Maximum Work Period
Above 90°F	1 hours
80° to 90°F	2 hour
70° to 80°F	4 hours

Level B and C:

Ambient Temperatures	Maximum Work Period
Above 90°F	1/2 hour
80° to 90°F	1 hour
70° to 80°F	2 hours
60° to 70°F	3 hours
<60°F	4 hours

A sufficient period will be allowed for personnel to "cool down." This may require shifts of workers during operations.

HEAT STRESS MONITORING

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or if slow recovery rates are indicated. When temperatures exceed 80 degrees Fahrenheit, workers must be monitored for heat stress after every work period.

- Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.

- Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the OT exceeds 99.7 degrees Fahrenheit at the beginning of the next period, the following work cycle should be further shortened by 33%. OT should be measured again at the end of the rest period to make sure that it has dropped below 99 degrees Fahrenheit.

- Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighings; preferably the worker should be nude. The scale should be accurate to plus or minus 1/4 pound. BWL should not exceed 1.5% of the total body weight. If it does, workers should be instructed to increase their daily intake of fluids by the weight lost.

Ideally, body fluids should be maintained at a constant level during the work day. This requires replacement of salt lost in sweat as well.

Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

COLD EXPOSURE CASUALTY PREVENTION PLAN

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ear, are the most susceptible.

EFFECTS OF COLD EXPOSURE

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 mile per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are severe degrees of damage. Frostbite of the extremities can be categorized into:

- **Frost nip or incipient frostbite:** characterized by suddenly blanching or whitening of skin.

- **Superficial frostbite:** skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

- **Deep Frostbite:** tissues are cold, pale, and solid; extremely serious injury.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas quickly in water between 102 degrees Fahrenheit and 105 degrees Fahrenheit. Give a warm drink not coffee, tea or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws. Then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

After thawing, the victim should try to move the injured areas a little, but no more than can be done alone, without help.

- Do not rub the frostbitten part (this may cause gangrene).

- Do not use ice, snow, gasoline or anything cold on frostbite.

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- Do not use heat lamps or hot water bottles to rewarm the part.
- Do not place the part near a hot stove.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature, it symptoms are usually exhibited in five stages; 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and, finally, 5) death.

As a general rule, field activities should be curtailed if equivalent chill temperature (degrees Fahrenheit) is below zero unless the activity is of an emergency nature. The ultimate responsibility for proposing on delaying work at a site due to inclement weather rests with the ISOTEC Site Safety Officer.

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ATTACHMENT G

EMERGENCY PROCEDURES

EMERGENCY MEDICAL TREATMENT AND FIRST AID PROCEDURES

If an employee working at the Site is physically injured, emergency medical treatment and/or First Aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If the employee can be moved, they will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing will be removed (if possible), emergency first aid administered, and transportation to local emergency medical facility awaited.

If the injury to the worker is chemical in nature (e.g., overexposure), the following procedures are to be instituted as soon as possible:

- Eye Exposure - If contaminated solid or liquid gets into the eyes, wash eyes immediately at the emergency eyewash stations using large amounts of water and lifting the lower and upper lids occasionally. Obtain medical attention immediately. (Contact lenses are not permitted in the Exclusion Areas.)

- Skin Exposure - If contaminated solid or liquid gets on the skin, promptly wash contaminated skin using soap or mild detergent and water. If solids or liquid penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Obtain medial attention immediately if symptoms warrant.

- Breathing - If a person breathes in large amounts of organic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

- Swallowing - If contaminated solid or liquid has been swallowed and the person is conscious, feed the person large quantities of salt water immediately and induce vomiting (unless the person is unconscious). Obtain medical attention immediately.

First Aid Procedures

- Remove the injured or exposed person(s) from immediate danger.

- Render first aid if necessary, decontaminate affected personnel, if necessary.

- Call an ambulance for transport to local hospital immediately. This procedure should be followed even if there is no apparent serious injury.

- Evacuate other personnel on-site to a safe place until the ISOTEC Site Safety Officer determines that it is safe for work to resume.

- Report the accident to the ISOTEC Director of Health and Safety immediately.

ATTACHMENT H

MSDS SHEETS

Degussa

Degussa
Corporation

H202 50% 227KG DRUM

04

Degussa Corporation
Chemical Group
65 Challenger Road, Ridgefield Park, NJ 07660
Non-Emergency Product Information: 1-201-641-6100
Emergency Only(Chemtrec): 1-800-424-9300

Revised: 7/31/97 Supersedes: 2/12/96

I. PRODUCT INFORMATION

TRADE NAMES/SYNONYMS: Hydrogen Peroxide 20% to 52%

CHEMICAL NAME: Hydrogen Peroxide 20% to 52% by wt.in aqueous soloution

CAS NUMBER: 7722-84-1

CHEMICAL FAMILY: Inorganic Peroxide

CHEMICAL FORMULA: H2O2

This material is in compliance with the Toxic Substances Control Act.

II. SUMMARY OF HAZARDS

DANGER! This product is a strong oxidizer which may release oxygen and promote the combustion of flammable material. May cause eye and skin irritation and/or burns. May cause irritation to the respiratory tract.
See Section V for additional information on health hazards.

III. HAZARDOUS COMPONENTS

NAME	CAS NO.	%	EXPOSURE LIMITS PEL	TLV	OTHER
1. Hydrogen Peroxide	7722-84-1	20-52	1 ppm	1 ppm	None

No carcinogenicity designated by NTP, IARC, OSHA or others.

IV. CHEMICAL AND PHYSICAL PROPERTIES

BOILING POINT:	220-237 F(104-113 C)	VAPOR PRESSURE:	18 - 27 mmHg @ 85 F
MELTING POINT:	Not applicable	VAPOR DENSITY:	1.0 (Air = 1)
SOL. IN WATER:	Complete	SPECIFIC GRAVITY:	1.1 - 1.2 (H2O = 1)

pH: 0 - 3 EVAPORATION RATE: >1 (Butyl acetate=1)

APPEARANCE/ODOR: Clear, colorless liquid with a slightly pungent odor.

V. HEALTH HAZARD DATA & FIRST AID PROCEDURES

The LD50 below corresponds to 50% Hydrogen Peroxide.

CHEMICAL NAME	TOXICITY DATA LD50	LC50
Hydrogen Peroxide	800 mg/kg rat-orl	Not Available

EYE CONTACT: Expected to cause eye irritation and/or burns. As a liquid, vapor or aerosol, this product could cause corneal damage which may occur several days later. In case of contact, flush eyes with plenty of water for at least 15 minutes. Call physician/ophtalmologist immediately.

SKIN CONTACT: Expected to cause skin irritation and/or burns. As the concentration and/or time of exposure increases, the extent of skin damage increases. In case of contact, flush skin with plenty of water while removing contaminated clothing. Call a physician if irritation persists or if burns occur.

SKIN ABSORPTION: May be harmful if absorbed through the skin. In the case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician if irritation persists or if burns occur.

INHALATION: Expected to be irritating to respiratory tract. If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Call a physician if irritation persists.

INGESTION: Expected to cause burns to the gastrointestinal tract. If swallowed, do not induce vomiting. Give victim plenty of water to dilute stomach contents. Call a physician immediately. Never give anything by mouth to an unconscious person.

CHRONIC EFFECTS OF OVEREXPOSURE: No chronic (long term) effects are known for humans.

OTHER HEALTH EFFECTS: Medical conditions which may be aggravated by exposure to

this product include: Conjunctivitis of the eye, dermatitis of the skin, asthma and respiratory diseases.

VI. EXPOSURE CONTROL MEASURES

EYE PROTECTION: Chemical goggles or face shield is required.

PROTECTIVE GLOVES: Wear chemical resistant neoprene, butyl rubber or vinyl gloves.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure limits listed in Section III by using engineering controls. If not feasible, use an approved supplied air respirator.

OTHER PROTECTION: If skin contact or contamination of clothing is possible, chemical resistant clothing must be worn.

VENTILATION: Provide general and/or local exhaust ventilation to maintain airborne levels below the exposure limits in Section III. Refer to "Industrial Ventilation" by ACGIH for a manual of recommended practices.

PERSONAL HYGIENE/ WORK PRACTICES: Establish good personal hygiene and work practices. Always wash hands and face before eating, drinking or smoking. Provide safety shower and eye wash station in work area.

VII. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): Non-flammable

FLAMMABLE LIMITS LOWER: None UPPER: None

EXTINGUISHING MEDIA: Use water only to fight fires in which this material is involved. Apply vast amounts of water for cooling and dilution.

FIRE FIGHTING INSTRUCTIONS: Evacuate enclosed and surrounding areas. If smoke and fumes cannot be avoided, use proximity suit and self-contained breathing apparatus. In case of external fire, cool hydrogen peroxide container with plenty of water.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Spontaneous combustion can occur if allowed to remain in contact with oxidizable materials. Drying of product on clothing or combustible material may cause fire. Do not

allow temperature of storage tanks to rise above 100F (38C) Do not heat solution to concentrate of 74% or greater. Mixtures with combustible material may be explosive.

VIII. REACTIVITY DATA

STABILITY: This product is stable only when cool and pure.

INCOMPATABILITY: Heavy metals, heavy metal ions/salts, rust, alkali, organic material, reducing agents, dust, and dirt.

HAZARDOUS PRODUCTS OF DECOMPOSITION: Can include oxygen, which will promote the combustion of flammable material.

HAZARDOUS POLYMERIZATION: Will not undergo hazardous polymerization.

IX. ENVIRONMENTAL & DISPOSAL INFORMATION

GENERAL: CERCLA/SARA requires notification to the appropriate Federal state and local authorities of releases of hazardous or extremely hazardous quantities equal to or greater than the Reportable Quantities (RQs) in 40 CFR 302.4 and 40 CFR 355.

SARA Title 313 requires submissions of annual reports of releases of toxic chemicals that appear in 40 CFR 372. Components present in this product at a level which could require reporting under the statute are: *None*

ACTION TO TAKE FOR SPILLS/LEAKS: See Section V and VI for hazards and exposure controls. Eliminate source of spill and wash away with vast amounts of water. For an emergency, contact Degussa at (334) 443-1634.

DISPOSAL METHOD: Dispose of in accordance with all local, state and federal regulations. Contact Degussa at (334) 443-4000, ext. 4287 or ext. 4427 for assistance with disposal requirements.

X. PRECAUTIONS FOR SAFE HANDLING, STORAGE AND USE

Store in original vented containers, in dry location and away from sun and heat or in dedicated bulk storage facilities. Protect from physical damage. Keep open flames, fire and sparks away from containers. Do not confine in unvented vessels or between closed valves. Never use

pressure to empty container and do not return product to the container after it has been removed.

XI. SHIPPING INFORMATION

PRIMARY HAZARD: Oxidizer SECONDARY HAZARD: Corrosive

DOT SHIPPING NAME: Hydrogen Peroxide Aqueous Solutions

HAZARD CLASS: Oxidizer, (Div. 5.1) UN #: 2014 UN CLASS: 5 PG #: II

49 CFR REFERENCE: 173.202, 173.243

LABEL(S): OXIDIZER CORROSIVE

PLACARD(S): OXIDIZER

SHIPPING RESTRICTIONS: Air - forbidden in concentrations of 40% or greater. Below 40%: Pass. A/C-1 liter max./pkg. Cargo only-5 liters max./pkg.

AUTHORIZED CONTAINER TYPE(S): Drum - UN 3H1. IM 101 Portable Tanks.

XII. ADDITIONAL INFORMATION

For additional product safety or product use information, contact the Product Manager at the address or phone number listed on page one.

NOTICE

The data contained herein is based on information that Degussa believes to be reliable, but no expressed or implied warranty is made with regard to the accuracy of such data or its suitability for a given situation. Such data relates only to the specific product described and not to such product in combination with any other product and no agent of Degussa is authorized to vary any of such data. Degussa Corporation and its agents disclaim all liability for any actions taken or foregone on reliance upon such data.

TMC CHEMICALS, INCORPORATED
P.O. BOX 5430
PARSIPPANY, NJ 07054

PHONE: 973-560-1400
FAX: 973-560-0400

MATERIAL SAFETY DATA SHEET

SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME	ISOTEC[SM] Catalyst Series 4260 Component-A Powder Mix

ISOTEC[SM] is a registered servicemark of In-Situ Oxidative Technologies, Inc.

MANUFACTURER	TMC Chemicals, Inc. P.O. Box 5430 Parsippany, NJ 07054
EMERGENCY TELEPHONE NUMBER(S)	(973) 560-1400 (Northern NJ) (609) 275-8500 (Southern NJ)
DATE PREPARED:	May 2000 (Revised)
C.A.S. CHEMICAL NAME	Mixture
SYNONYMS	None
CHEMICAL FAMILY	Not Applicable
EMPIRICAL FORMULA	MIXT
INTENDED USE	Catalyst

SECTION 2 - INGREDIENTS

CAS Number and Chemical Name	%	OSHA ACGIH PEL/TLV-TWA ppm - mg/M^3	ACGIH STEL-TWA ppm - mg/M^3
Catalyst is a trade secret	100	Not established	Not established

SECTION 3 - HEALTH HAZARDS

EMERGENCY OVERVIEW

Applicable properties are relevant to the mixture when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

ROUTES OF EXPOSURE
Inhalation, Skin Contact, Ingestion

EXPOSURE STANDARDS
See Section 2 for exposure standards on ingredients

HEALTH HAZARDS
Eye and skin irritant, harmful if inhaled or swallowed

TARGET ORGANS
Eyes, respiratory tract

SIGNS AND SYMPTOMS OF EXPOSURE (Acute and Chronic effects)
Irritant to mucous membranes and upper respiratory tract; stinging of eyes, causes eye and skin irritation, stomach ache, breathing difficulty

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
Not Evaluated

IRRITATION EFFECTS DATA
Not Evaluated

ACUTE TOXICITY EFFECTS DATA
Oral LD50 - Not Evaluated
Dermal LD50 - Not Evaluated

OTHER ACUTE EFFECTS
Not Evaluated

CHRONIC/SUBCHRONIC DATA
Not Evaluated

SECTION 4 - FIRST AID

EYE CONTACT

Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

SKIN CONTACT

Wash affected area immediately with soap and water.

INHALATION

In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored; give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.

INGESTION

If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE AND EXPLOSION DATA

CHARACTERISTICS:

Flash Point	None
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Applicable
Flash Point Method(s)	None
Unusual Fire & Explosion Hazards	None
Fire Hazard Classification (OSHA/NFPA)	None

EXTINGUISHING MEDIA

In case of fire, flood with water.

SPECIAL FIRE FIGHTING PROCEDURES

Firefighters should wear butyl rubber boots, gloves, body suit and self-containing breathing apparatus. Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.

UNUSUAL FIRE AND EXPLOSION HAZARDS

May emit toxic fumes of sulfur oxides under burning conditions. See Section 6 for hazardous combustion products.

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SECTION 6 - REACTIVITY DATA

CHEMICAL STABILITY
Stable

INCOMPATIBILITIES
Avoid mixing powder with strong oxidizing agents and alkalies

CONDITIONS TO AVOID
Contact with combustible materials, heat

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
Toxic fumes of Sulfur oxides i.e. SO_2 and SO_3

HAZARDOUS POLYMERIZATON
Will not occur

NFPA Reactivity Rating
None

SECTION 7 - SPILL, LEAK AND WASTE DISPOSAL INFORMATION

CLEAN-UP PROCEDURES
Sweep up and repackage or place in receptacle for future disposal.

OTHER EMERGENCY ADVISE
Avoid eye and skin contact. Wear protective clothing including gloves, safety goggles, breathing mask and coveralls when handling. Stored materials should be placed in a dry and reasonably temperature area, preferably below 75°F.

WASTE DISPOSAL
Remove to properly designated landfill. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS
Data not yet available

SECTION 8 - PERSONAL PROTECTION/EXPOSURE CONTROLS

EYE PROTECTION

Splash proof goggles.

HAND PROTECTION

Impermeable gloves made of Nitrile or rubber.

RESPIRATORY PROTECTION

Wear appropriate NIOSH/MSHA-approved full-face respirator with HEPA cartridges for particulate matter/ dust.

PROTECTIVE CLOTHING

Long sleeved clothing (e.g. cotton coveralls or Tyvek).

ENGINEERING CONTROLS

Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression.

WORK AND HYGIENIC PRACTICES

Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet.

SECTION 9 - STORAGE AND HANDLING

STORAGE

Keep container tightly closed and dry. Keep in a cool place. Do not store next to strong oxidizers (e.g. hydrogen peroxide). Store approximately 10 feet away from oxidizers.

HANDLING

Do not inhale. Avoid contact with skin and eyes.

OTHER PRECAUTIONS:

Carefully read instructions before handling this material. Be sure that all engineering and personal protective equipment is in working order.

MATERIAL SAFETY DATA SHEET

SECTION 10 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM	Powder
COLOR	Light Green
ODOR	None

TYPICAL PHYSICAL DATA

pH (10% aqueous)	3.5-3.9
VAPOR PRESSURE (mm Hg)	0
VAPOR DENSITY (Air = 1)	Not Applicable
BOILING POINT	Decomposition at 300°C
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN WATER	57% by weight @ 158°
SPECIFIC GRAVITY (Water = 1)	1.899 @ 14°/ 8°C
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 11 - TRANSPORTATION INFORMATION

UN No. 1481

DOT SHIPPING NAME	No Data
IMO SHIPPING NAME	No Data
LATA SHIPPING NAME	No Data

The information set forth above is based upon information which TMC Chemicals, Inc. believes to be accurate. No warranty, express or implied, is intended. The information is provided solely for your information and consideration and TMC Chemical, Inc. assumes no legal responsibility for use or reliance thereon.

BZTO104(e)016796

TMC CHEMICALS, INCORPORATED
P.O. BOX 5430
PARSIPPANY, NJ 07054

PHONE: 973-560-1400
FAX: 973-560-0400

MATERIAL SAFETY DATA SHEET

SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME	ISOTEC[SM] Catalyst-4260 Chelopolychempremox-B

ISOTEC is a registered servicemark of In-Situ Oxidative Technologies, Inc.

MANUFACTURER	TMC Chemicals, Inc. P.O. Box 5430 Parsippany, NJ 07054
EMERGENCY TELEPHONE NUMBER(S)	(973) 560-1400 (Northern NJ) (609) 275-8500 (Southern NJ)
DATE PREPARED:	May 2000 (revised)
C.A.S. CHEMICAL NAME	Mixture
SYNONYMS	None
CHEMICAL FAMILY	Not Applicable
EMPIRICAL FORMULA	MIXT
INTENDED USE	Catalyst

SECTION 2 - INGREDIENTS

CAS Number and Chemical Name	%	OSHA ACGIH PEL/TLV-TWA ppm - mg/M^3	ACGIH STEL-TWA ppm - mg/M^3
Catalyst is a trade secret	100	Not established	Not established

SECTION 3 - HEALTH HAZARDS

EMERGENCY OVERVIEW

Applicable properties are relevant to the mixture when certain proprietary ingredients present at their highest concentrations. Please note that the effects are normally lower for a typical mixture with smaller concentrations of these ingredients present.

ROUTES OF EXPOSURE
Inhalation, Skin Contact, Ingestion

EXPOSURE STANDARDS
See Section 2 for exposure standards on ingredients

HEALTH HAZARDS
Eye and skin irritant, may be harmful if inhaled or swallowed

TARGET ORGANS
Kidney, Ureter, Bladder

SIGNS AND SYMPTOMS OF EXPOSURE (Acute and Chronic effects)
Irritant to mucous membranes and upper respiratory tract; causes eye and skin irritation

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
Not Evaluated

IRRITATION EFFECTS DATA
Not Evaluated

ACUTE TOXICITY EFFECTS DATA
Oral LD50 - Not Evaluated
Dermal LD50 - Not Evaluated

OTHER ACUTE EFFECTS
Not Evaluated

CHRONIC/SUBCHRONIC DATA
Not Evaluated

SECTION 4 - FIRST AID

EYE CONTACT

Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

SKIN CONTACT

Wash affected area immediately with soap and water.

INHALATION

In case of inhalation or suspected inhalation, move patient at once to fresh air and call a physician. Keep patient absolutely quiet. If breathing has stopped or is labored, give assisted respiration (e.g., mouth-to-mouth). Supplemental oxygen may be indicated.

INGESTION

If swallowed, call a physician immediately. Induce vomiting or remove stomach contents by gastric suction only as directed by medical personnel. Wash mouth with plenty of water. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE AND EXPLOSION DATA

CHARACTERISTICS:

Flash Point	Not Evaluated
Upper Explosive Limit (UEL)	Not Applicable
Lower Explosive Limit (LEL)	Not Applicable
Autoignition Temperature	Not Evaluated
Flash Point Method(s)	Not Specified
Fire Hazard Classification (OSHA/NFPA)	None

EXTINGUISHING MEDIA

In case of fire, flood with water.

SPECIAL FIRE FIGHTING PROCEDURES

Firefighters should wear butyl rubber boots, gloves, body suit and self containing breathing apparatus. Use water spray to cool all affected containers. Avoid skin contact. Contain runoff water in dikes. Prevent stream contamination. Expended liquids from fire fighting should be diverted to an active sanitary sewer line.

UNUSUAL FIRE AND EXPLOSION HAZARDS

May emit oxides of carbon, nitrogen, and sulfur under burning conditions.

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SECTION 6 - REACTIVITY DATA

CHEMICAL STABILITY
Stable

INCOMPATIBILITIES
Strong Oxidizing Agents. Do not mix with pure oxidizing agents

CONDITIONS TO AVOID
Contact with combustible materials, heat

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
Oxides of carbon, nitrogen and sulfur.

HAZARDOUS POLYMERIZATON
Will not occur

NFPA Reactivity Rating
None

SECTION 7 - SPILL, LEAK AND WASTE DISPOSAL INFORMATION

CLEAN-UP PROCEDURES
Do not mix combustible substances (e.g., sawdust) with spilled material. Do not raise dust while sweeping.

OTHER EMERGENCY ADVISE
Avoid eye and skin contact. Wear protective clothing.

WASTE DISPOSAL
Sweep up, place in a bag and hold for waste disposal. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state and local environmental regulations.

ENVIRONMENTAL EFFECTS
Data not yet available

BZTO104(e)016800

SECTION 8 - PERSONAL PROTECTION/EXPOSURE CONTROLS

EYE PROTECTION

Splash-proof goggles.

HAND PROTECTION

Impermeable gloves made of Nitrile or rubber.

RESPIRATORY PROTECTION

Wear appropriate NIOSH/MSHA-approved full-face respirator with HEPA cartridges for particulate matter/ dust.

PROTECTIVE CLOTHING

Long sleeved clothing such as cotton coveralls or Tyvek.

ENGINEERING CONTROLS

Avoid drafts that may disperse material beyond the work area. Use light water spray for dust suppression.

WORK AND HYGIENIC PRACTICES

Provide readily accessible eye wash stations. Wash at the end of each work shift and before eating, smoking or using the toilet.

SECTION 9 - STORAGE AND HANDLING

STORAGE

Keep container tightly closed and dry. Keep in a cool place. Do not store near strong oxidizers (e.g. hydrogen peroxide). Store at least 10 feet away.

HANDLING

Do not inhale. Avoid contact with skin and eyes.

OTHER PRECAUTIONS:

Carefully read instructions before handling this material. Be sure that all engineering and personal protective equipment is in working order.

SECTION 10 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM	Powder
COLOR	White
ODOR	None

TYPICAL PHYSICAL DATA

pH (10% aqueous solution)	7.9-8.5
VAPOR PRESSURE (mm Hg)	Non Volatile
VAPOR DENSITY (Air = 1)	Non Volatile
BOILING POINT	Not Applicable
FREEZING/MELTING POINT	> 300°C
SOLUBILITY IN WATER	Soluble
SPECIFIC GRAVITY (Water = 1)	Not Evaluated
EVAPORATION RATE (Butylacetate = 1)	Non Volatile
VISCOSITY (CPS)	Not Evaluated

SECTION 11 - TRANSPORTATION INFORMATION

UN No. 1481

DOT SHIPPING NAME	No Data
IMO SHIPPING NAME	No Data
LATA SHIPPING NAME	No Data

The information set forth above is based upon information which TMC Chemicals, Inc. believes to be accurate. No warranty, express or implied, is intended. The information is provided solely for your information and consideration and TMC Chemical, Inc. assumes no legal responsibility for use or reliance thereon.

86-102

LANDAU ASSOCIATES

July 9, 2002

REC'D JUL 12 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the June 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks/tam

Rebekah Brooks
Senior Hydrogeologist

RB/tam
7/9/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr.doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
June 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the May 2001 monthly report to DEQ.

- Received notice from HAZCO Environmental Services that the Swan Hills treatment/disposal facility would accept F027 waste from the Northwest Terminal. Began negotiations with HAZCO as the potential remediation contractor for removal/management of the soil stockpile.

- Submitted applications to EPA and Environment Canada for offsite treatment/disposal of the soil stockpile and *in situ* soil to be excavated from the Northwest Terminal at the Swan Hills facility in Swan Hills, Alberta, Canada.

- Submitted a letter to DEQ providing Time Oil's amended plans for offsite disposal of the soil stockpile at the Swan Hills facility and copies of the applications to EPA and Environment Canada.

- Discussed Time Oil's plans and received general concurrence with DEQ to include *in situ* soil to be excavated from the former pentachlorophenol (PCP) mixing area with the soil stockpile material for offsite treatment/disposal at the Swan Hills facility.

- Prepared a removal action plan for warehouse demolition/in situ soil excavation in and adjacent to the former PCP mixing area and submitted to client. Prepared a scope of work for the removal action and provided to the remediation contractor (HAZCO Environmental Services).

- Began development of plans to conduct additional sampling in the former PCP mixing area to obtain analytical data for the "clean fill" or overburden that was used to backfill the 1989 excavation within the former PCP mixing area, to address data gaps where existing data does not provide adequate coverage for identification of excavation boundaries for the soil removal in the mixing area, and to confirm that the soil action level proposed for PCP (5 mg/kg) will be adequate for protection of groundwater.

- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an average flow rate of 6.8 gpm. Continued implementation of the groundwater interim action in the upper zone at HRW-1, at an average flow rate of 0.63 gpm. Approximately a total of 7.43 million gallons of groundwater have been recovered, treated, and discharged, with a total of about 308,000 gallons treated in June 2002. Analytical results from samples collected from the treatment system effluent indicate PCP is degraded to nondetectable concentrations or concentrations less than the permitted discharge limitations.

- Due to operational problems noted with HRW-1 in May 2002, redeveloped HRW-1 and determined condition of the submersible pump on June 6, 2002. Redevelopment method included using a combination of a "jetting tool" (modified pressure washer hose) and a fire hose nozzle to pump clean water from a fire hydrant into the screened section of HRW-1. Organic debris was observed in the material removed from the well. A vacuum truck was used to remove water and debris from HRW-1 and the water was transferred to Tank 16804 for subsequent treatment in the onsite wastewater treatment facility. Based on the observation of heavy solids loading in the wastewater treatment facility following the redevelopment of HRW-1, significant solids removal from HRW-1 during redevelopment was achieved. Following redevelopment of HRW-1, the submersible pump installed

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in HRW-1 was evaluated and determined to require replacement as it was not properly shutting down under dry run conditions. A new submersible pump was installed in HRW-1 on June 12, 2002. Following replacement of the submersible pump, resumed groundwater recovery operations from HRW-1.

- Installed three piezometers to assess HRW-1 performance: two piezometers were installed directly above HRW-1 and one piezometer was installed near a lateral that was abandoned during field activities for installation of HRW-1.

- Completed internal review of a technical memorandum documenting startup activities at HRW-1 and provided to client.

- Submitted a work plan for conducting a pilot test for remediation of upper zone groundwater using in situ chemical oxidation (ISCO) techniques to DEQ. Received DEQ comments and approval for conducting the bench-scale treatability study.

- Installed and developed four new monitoring wells to be used for the ISCO pilot test and collected soil and groundwater samples for the ISCO bench-scale treatability study. Began conducting the bench-scale study.

- Conducted the 2nd quarter 2002 groundwater sampling event, June 24-27, 2002.

- Conducted groundwater level measurements and collected a sample of the groundwater recovered from HRW-1 as part of HRW-1 startup activities.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.

- Conducted client reviews of the *First Quarter 2002 Groundwater Interim Action Status Report.*

- Submitted the *First Quarter 2002 Groundwater Report* to client and conducted client review.

- Continued internal review of a technical memorandum documenting the results of the Phase II supplemental sampling event.

- Provided a response to DEQ's comments on the *East Property Remedial Action Plan* to DEQ.

- Prepared a contractor scope of work for the east property remedial action activities and contacted potential subcontractors.

- Provided a response to DEQ's comments on the *Phase III Preliminary Evaluation Technical Memorandum* and provided to DEQ.

- Provided DEQ with the Phase III laboratory data reports, data validation reports, and representative boring logs for the Phase III study area, in response to DEQ's comments on the *Phase III Preliminary Evaluation Technical Memorandum.*

- Began development of plans to conduct additional sampling in the Bell Terminal area in conjunction with the Phase III CPT investigation to evaluate the distribution of petroleum-related impacts in that area.

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- Contacted potential subcontractors and obtained cost estimates for conducting the Phase III CPT investigation and additional sampling within the former PCP mixing area and Bell Terminal, scheduled to begin on July 8, 2002. Selected the CPT contractor (GeoTech Environmental).

RESULTS COLLECTED

- None.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- Redeveloped HRW-1 and replaced the submersible pump to address performance issues identified in May 2002 and discussed above.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Receive approval from EPA and Environment Canada for treatment and disposal of stockpile soil and excavated soil at the Swan Hills facility in Swan Hills, Alberta, Canada.
- Complete negotiation with remediation contractors for treatment/disposal of the stockpiled material and begin site preparation activities and mobilization for soil stockpile removal.
- Continue implementation of the groundwater interim action in the lower zone at RW-2. Continue full-scale treatment and discharge to POTW.
- Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.
- Complete client reviews of the *First Quarter 2002 Groundwater Interim Action Status Report* and the *First Quarter 2002 Groundwater Report* and provide to DEQ.
- Complete client review of a technical memorandum documenting startup activities at HRW-1 and provide to DEQ.
- Provide response to DEQ's comments on the work plan for conducting a pilot test for remediation of upper zone groundwater using ISCO techniques to DEQ.
- Complete performance of ISCO bench-scale study and evaluate results.
- Receive 2nd quarter 2002 groundwater data and begin processing and validation.
- Complete preparation of the *Phase II Supplemental Sampling Technical Memorandum* and provide to client for review.
- Provide a request for proposal and scope of work to potential bidders for the remedial action on the east property. Review the proposal, select a contractor, and begin preparation for mobilization for field activities.

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- Begin field work for Phase III CPT investigation and additional sampling events in the former PCP mixing area and Bell Terminal.
- Submit a revised storm water pollution control plan (SWPCP) for the terminal to the city of Portland.
- Submit the Removal Action Plan for warehouse demolition and *in situ* soil excavation to DEQ.
- Submit UIW application to DEQ for injection wells to be used for the ISCO pilot test.

TRANSMITTAL

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

AUG 1 2 2002

To: City of Portland
Environmental Services
6543 N. Burlington Avenue
Portland, Oregon 97203-5452

Date: August 12, 2002

Attn: Mr. Aaron B. Wieting, R.G., C.H.M.M.

Project No.: 231001.181

RE: Time Oil Northwest Terminal

Copies	Description
2	Stormwater Pollution Control Plan, Time Oil Northwest Terminal, 10350 North Time Oil Road, Portland, Oregon

Please find enclosed two copies of the above-referenced report, including one for Ann O'Roke. Please let me know if you have questions, or need additional information.

LANDAU ASSOCIATES, INC.

for Rebekah Brooks
Project Manager

RB/rgm
Enclosure

Cc: Ms. Ann O'Roke, City of Portland Environmental Services
Mr. Kevin Murphy, Time Oil Co.
Ms. Patty Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

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Stormwater Pollution Control Plan
Time Oil Northwest Terminal
10350 North Time Oil Road
Portland, Oregon

August 12, 2002

Source ID No. 109186
Permit No. 1215; Permit Type GEN12Z
File No. 109186

Prepared for

Time Oil Co.
2737 W. Commodore Way
Seattle, WA 98100-1233

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

STORMWATER POLLUTION CONTROL PLAN CERTIFICATION PAGE

CERTIFICATION:

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.

Name: Kevin Murphy, Remediation Manager Time Oil Co.

Signature: _____ _____

Date: _____ _____ _____

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2	Facility Plot/Drainage Plan
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1	Areas of Industrial Activities
2	Stormwater Benchmarks

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1	NPDES 1200-Z Permit
2	SWPCP Review Form
3	Stormwater Collection/Treatment Block Flow Schematic
4	Operator Log Sheet
5	Discharge Monitoring Report Form

1.0 INTRODUCTION

This Stormwater Pollution Control Plan (SWPCP) has been prepared for the Time Oil Co. (Time Oil), St. Johns (Northwest) Terminal in Portland, Oregon to meet the requirements of Schedule A of the Terminal's National Pollutant Discharge Elimination System (NPDES) General Permit 1200-Z (Permit) for discharge of stormwater. A copy of the Permit is provided in Attachment 1.

1.1 REGULATORY FRAMEWORK

In order to reduce the impact of pollutants contained in stormwater runoff on water quality, on November 16, 1990, Congress issued an amendment to the Clean Water Act which required the Environmental Protection Agency (EPA) to control stormwater discharge through implementation of the NPDES permit program. EPA's stormwater permit program is codified in Title 40 of the Code of Federal Regulations (CFR) Part 122.

The Oregon Department of Environmental Quality (DEQ) is the agency responsible for administering the stormwater-permitting program in Oregon. As the administering agency, DEQ has issued a 1200-Z General Permit to address the industrial activities specified by EPA.

Schedule A of the Permit requires that an SWPCP be prepared to minimize pollutants in stormwater discharges associated with industrial activities.

1.2 PLAN OBJECTIVES

The two basic objectives of this SWPCP are to minimize the potential for stormwater associated with industrial activities from containing significant amounts of pollutants, and to ensure compliance with the applicable regulations. Specific objectives include:

1. Implement Best Management Practices (BMPs) that will identify the sources of stormwater pollution from industrial activities and reduce or eliminate the discharge of stormwater pollutants
2. Maintain a current and accurate SWPCP
3. Meet stormwater benchmark concentrations.

1.3 PLAN REQUIREMENTS

A full description of the required elements of the SWPCP is provided in Schedule A of the Permit (Attachment 1). Requirements for modifications to and retention of the SWPCP are summarized below in this section.

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1.3.1 PLAN MODIFICATIONS

Time Oil will review and update the SWPCP as necessary. At a minimum, the SWPCP will be reviewed annually. The Plan review will include a site inspection of areas involving industrial activities where potential spills of significant materials could impact stormwater runoff. The relevant plans and programs will also be evaluated for their effectiveness in preventing pollution of runoff. In addition, the SWPCP will be modified if the following conditions occur:

- There is a significant change in facility design, construction, operation, or maintenance that may affect the composition of the stormwater discharges associated with industrial activities
- Stormwater discharge benchmark concentrations are not met
- BMPs can be improved for preventing stormwater pollution associated with industrial activities
- Self inspection reveals that the description of potential pollutant sources or established pollution prevention measures and control are inadequate for the stormwater associated with industrial activities.

Amendments and updates will be noted on the SWPCP Review Form, provided as Attachment 2. Copies of the completed Review Form will also be distributed to Time Oil personnel who have been provided with a copy of the SWPCP.

1.3.2 PLAN RETENTION AND AVAILABILITY

The original, current version of the SWPCP is maintained by Mr. Kevin Murphy (Remediation Program Manager) at the following address:

Time Oil Co.
2737 Commodore Way
Seattle, WA 98199

Additional copies of the SWPCP will be maintained at the office of Time Oil's environmental consultant (Landau Associates) and at the groundwater treatment system building at the terminal.

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2.0 SITE DESCRIPTION

2.1 GENERAL SITE DESCRIPTION

The Northwest Terminal is an inactive petroleum and chemical bulk storage and transfer facility currently owned by Time Oil. The Standard Industrial Classification (SIC) code is 4226. The facility formerly had approximately 717,000-barrel storage capacity in 36 storage tanks. The facility is located at 10350 North Time Oil Road in the industrial Rivergate area of north Portland, Oregon, as shown on Figure 1. The site is bounded by the Willamette River on the west, by undeveloped land owned by the Port of Portland on the north and by the Schnitzer Corporation on the east and south. Latitude is 45 degrees 36 minutes 54 seconds. Longitude is 122 degrees 46 minutes 54 seconds.

The facility began operations in June 1943 and formerly operated 24 hours per day handling products such as: automotive gasoline(s), denatured ethyl alcohol (ethanol), methyl alcohol (methanol), diesel fuels and fuel oils. These products were stored at ambient temperature and atmospheric pressure. Also, between 1967 to 1984, wood treatment products containing pentachlorophenol were formulated at the facility. Products were delivered to and shipped from the terminal by railcar, truck, and marine vessels.

A site plan is presented on Figure 2.

2.2 INDUSTRIAL ACTIVITIES

The terminal ceased active operations in October 2001. Industrial activities formerly consisted of the storage and distribution of petroleum hydrocarbons and alcohols, and wastewater treatment activities. All product storage tanks have been emptied and have been rinsed to remove residual product. For the purposes of the SWPCP, the facility is best described via the following functional terminal areas:

EXTERIOR AREAS

- Tank Farm (Inactive)
- Truck Loading Racks (Inactive)
- Rail Car Loading Racks (Inactive)
- Marine Dock Loading/Unloading (Inactive
- Pump Pit (Inactive)
- Soil Stockpile
- Loading Dock for Groundwater Treatment Building
- Loading Dock for Hazardous Waste Storage (Inactive)
- Loading Dock for Service Station Supplies (Inactive)

INTERIOR AREAS

- Maintenance Shop/Sample Storage (Inactive)
- Hazardous Waste Storage Warehouse (Inactive)
- Groundwater Treatment Building
- Equipment Warehouse
- Tool Warehouse (Inactive)

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Currently, the only industrial activities at the site consist of the operation of a groundwater treatment facility associated with the remediation of groundwater contamination and the maintenance of a stockpile of contaminated soil. The industrial activities occurring within the interior areas are not exposed to rain or snow, therefore there is no reasonable potential for pollutants from these areas to contact precipitation or stormwater runoff. As such, these areas are not specifically addressed in relation to stormwater pollution prevention activities.

In keeping with best management practices, where industrial activities formerly occurred within the exterior areas and there is potential for contaminated runoff, the stormwater is collected and diverted to an activated carbon treatment system, prior to discharge via the NPDES outfall.

Table 1 identifies areas where industrial activities formerly occurred that discharged to the wastewater biological treatment system prior to discharge via the sanitary sewer. These wastewater sources now discharge to the NPDES outfall after activated carbon polishing in two (2) 2000 lb beds, with the exception of the tank farm area which will continue to percolate rainfall.

2.3 SITE CHARACTERISTICS

This section provides descriptions of site characteristics as related to stormwater drainage patterns and stormwater collection.

2.3.1 SITE DRAINAGE

Figure 2 is a site drainage characteristic map which shows drainage patterns, drainage and discharge structures, paved areas and buildings, and the location of former industrial activities on the site. In addition, a flow diagram representing stormwater drainage for the site is included in Attachment 3.

The drainage basins served by the catch basins of the asphalt paved area office/warehouses complex can be isolated with gate valves. Normal operation includes maintaining these valves in an "open" position, since there is no longer tanker truck traffic on site. Figure 3 shows the flow routes of the stormwater sewer system.

2.3.2 IMPERVIOUS SURFACE AREAS

The site is approximately 52 acres (2,265,120 ft^2) in size. The portion of the terminal that is covered by this permit is the industrial areas on the western side of the terminal areas. The industrial areas encompass approximately 9 acres. The impervious surface areas within the industrial areas, which include rooftops and asphalt and concrete pavement, encompass approximately 150,000 ft^2. Figure 2 presents impervious surface areas at the site.

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2.3.3 Runoff, Outfall, and Receiving Water Information

As shown on Figure 3, runoff from the site is primarily collected in a series of catch basins which convey the stormwater to a 15-inch storm drain that discharges into the Willamette River, on the southwestern side of the property.

2.3.4 Materials Stored Onsite

The only chemicals stored at the terminal are those associated with the groundwater treatment system. The chemicals include hydrogen peroxide solution, bags of caustic soda in dry granular form, sulfuric acid, anti-foaming agent, and fertilizer (nitrogen:phosphorus:potasium). These chemicals are stored indoors (groundwater treatment system and equipment storage building) and are not exposed to precipitation or stormwater runoff.

A dumpster for trash generated at the facility is stored near the office building, at the approximate location shown on Figure 2. The disposal container has lids that prevent precipitation from contacting the waste, and the lids are kept closed at all times other than active use.

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3.0 SITE CONTROLS

This section provides information related to the Stormwater BMPs, spill prevention and response procedures, preventative maintenance, employee education, and record keeping.

3.1 BEST MANAGEMENT PRACTICES (BMPS)

The stormwater BMPs used at the terminal are discussed in the following sections.

3.1.1 STORMWATER CONTAINMENT AND TREATMENT

Stormwater runoff in the former industrial activity areas is initially contained by the surface topography, then drains to the collection/conveyance system, and is ultimately treated by the activated carbon treatment system prior to discharge via the NPDES outfall. The tank farm and office/warehouse areas are exceptions, as discussed below.

The inactive tank farm is within a containment dike, and this area is unpaved. Therefore, precipitation and stormwater runoff collected in this area infiltrates into the ground.

Stormwater in the office/warehouse drainage basin(s) area should not have any significant source of pollutants and drains directly to the NPDES outfall. However, in the event of a material spill or another identified source of potential pollution, stormwater runoff from this area can be isolated and contained via gate valves which control flow to the stormwater NPDES outfall.

The contaminated soil stockpile is covered with a 10-mil thick reinforced polyethylene cover to prevent erosion of the soil and to prevent contact with precipitation and stormwater runoff. Non-contact stormwater from the cover of the stockpile collected in catch basins and routed into the 15-inch storm drain line leading to the outfall.

3.1.2 ABOVEGROUND STORAGE TANKS

Petroleum products are no longer stored at the terminal. All product storage tanks have been emptied and have been rinsed to remove any residual product. Only one tank (No. 16804) is used in the former tank farm, and that tank is used for storage of extracted groundwater containing low concentrations of pentachlorophenol (PCP) prior to treatment by the groundwater treatment system. The capacity of this tank is approximately 704,000 gal. The groundwater storage tank is equipped with a high-level shutoff switch that is designed to shut off the groundwater extraction system if the tank is filled above a set level of approximately 461,000 gal. Manual adjustment of the groundwater treatment cycles is performed to maintain the volume of water in the tank between approximately 220,000 and 275,000

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gal. If for some reason this tank were to have a major leak, the full tank capacity is readily contained within the bermed tank farm area and would not be able to reach the storm drains.

The tank (No. 38009) located outside the former tank farm area, is used for temporary storage of environmental investigation waste water prior to treatment at the groundwater treatment system. The capacity of this tank is about 38,000 gal. The tank is scheduled for demolition in August 2002.

Two large aeration/biological treatment tanks (approximately 13,100 gal each) and two smaller tanks (2,800-gal clarifier and 1,200-gal batch tank) are used as part of the groundwater treatment system. These tanks are located within the groundwater treatment system building. A spill collection berm will be constructed surrounding these tanks and is scheduled to be completed in summer 2002. A sump pump will also be installed within the bermed area to pump any spilled water into the 2,800-gal clarifier tank for temporary storage until personnel can respond to the spill. The layout of the treatment system building and the planned location of the spill collection berm are shown on Figure 3.

3.1.3 Storage of Chemicals and Sulfuric Acid Containment Pallets

Chemicals stored at the terminal are those associated with the groundwater treatment system (Figure 4). The chemicals include hydrogen peroxide solution, bags of caustic soda in dry granular form, sulfuric acid, anti-foaming agent, and fertilizer. These chemicals are stored indoors and are not exposed to precipitation or stormwater runoff. Liquid chemicals (e.g., sulfuric acid, hydrogen peroxide solution, and antifoaming agent) are stored either on spill containment pallets or in double-walled storage drums. The storage condition of the chemicals is monitored during normal daily inspections.

3.1.4 Fueling Operations

Fueling operations are no longer conducted at this facility.

3.1.5 Vehicle and Equipment Maintenance

Vehicle maintenance is not conducted at the terminal. If equipment maintenance or other facility operations are required that would involve materials that could pollute stormwater (e.g., oils, greases, solvents, acids, caustic, or waste materials), this work would be conducted in indoor areas where the materials would not come into contact with precipitation or stormwater.

3.1.6 Housekeeping

Although the terminal operations have been discontinued, good housekeeping is practiced for the remaining environmental operations that are still conducted at the facility. As discussed later in

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Section 3.3, facility inspections are typically performed five times per week. If improper storage of materials, any spills, or any other potential source of stormwater pollution is identified during the facility inspection, then corrective action is to be implemented promptly. Identified problems and corrective actions taken are to be recorded on the operator log sheet (Attachment 4).

3.1.7 CATCH BASINS MAINTENANCE

All catch basins onsite are trap style catch basins designed for oil/water separation and initial sedimentation. In addition, each catch basin is retrofitted with disposable inserts for removal of influent oil, sediment, and debris. The catch basins are inspected during the monthly stormwater inspection and the insert filters are replaced if necessary. An adequate stock of insert filters is maintained at the site.

3.2 SPILL PREVENTION AND RESPONSE PROCEDURES

Terminal operations and the storage of petroleum products are no longer performed at the facility. Therefore, there is a significantly lower risk for a spill of a significant amount of hazardous material to occur. With only environmental related operations continuing to occur at the facility, materials that could be spilled and negatively impact stormwater quality include collected untreated groundwater, collected untreated stormwater, and chemicals associated with the groundwater treatment system (listed in Section 2.2.4).

3.2.1 SPILL PREVENTION

Spill prevention measures that are employed at the facility have already been discussed in this SWPCP. These spill prevention measures include a high level shutoff for the groundwater storage tank; containment berms around the former tank farm and the groundwater treatment tanks (pending); and automatic pump out of the bermed groundwater treatment tank area to the spare 2,800-gal tank compartment (pending). In addition, inspections and preventative maintenance are performed as discussed below in Section 3.3.

3.2.2 SPILL RESPONSE

If a spill is actively occurring, the employee will take necessary steps to stop the spill if it can be done safely (e.g., turn off the pump, close a valve, etc.). Spill response equipment available onsite is limited to shovels and brooms for the cleanup of small quantities of spilled materials. For larger spills of solid or liquid materials, a cleanup contractor will need to be contacted.

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The first and primary contact to report a spill event is:

Time Oil Dispatch (800) 325-0391

(Notify Kevin Murphy)

The following are contractors who can be contacted for cleanup of large spills:

West Coast Marine Cleaning (Allen Ramsey) (877) 926-2462

Terra Hydr (Hank Stukey) (503) 625-4000 (24-hour answering service)

To report spills that have entered the NPDES outfall or immediately threaten to enter the outfall, the following are contact telephone numbers:

City of Portland, Bureau of Environmental Services
Industrial Stormwater Section (503) 823-5600

Oregon Department of Environmental Quality (DEQ)
Northwest Region (503) 229-5263

3.3 INSPECTIONS AND PREVENTATIVE MAINTENANCE

Facility inspections are generally performed 5 days per week. Items to be examined during these inspections include the conditions of tanks, the proper storage of materials, piping leaks, proper operation of the groundwater treatment system, proper operation of the stormwater treatment system, and conditions of the stormwater collection and discharge features. A copy of the operator log sheet is included as Attachment 4.

3.4 EMPLOYEE EDUCATION

Currently, one employee is assigned to the Northwest Terminal. The primary responsibility of the employee at the terminal is the operation and maintenance of the groundwater treatment facility and stormwater treatment systems. The employee has been trained in the operation of the groundwater treatment facility and stormwater treatment system, as well as the documentation of stormwater collection system documentation. Additional employee education will be provided to site personnel, as necessary.

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4.0 STORMWATER MONITORING

4.1 BENCHMARKS

The 1200-Z NPDES Permit for the facility establishes water quality guidelines, which are referred to as "benchmarks." Benchmarks are guideline concentrations, not limitations. The stormwater benchmarks, as listed on Schedule A.9 of the 1200-Z Permit, are shown on Table 2.

4.2 MONITORING FREQUENCY

The permit (Schedule B.1.a) requires monitoring/sampling the stormwater discharge twice per year for the six benchmark parameters listed in Table 2. The two sampling events are to be at least 60 days apart, preferably once in the fall and once in the spring. The sample collection point is the effluent of the activated carbon treatment system (Figure 3).

In addition, as listed in Table 2, visual monitoring for floating solids and oil and grease sheen is to be performed on a monthly basis. The point at which this visual monitoring is conducted is outside of the treatment system building where the stormwater treatment system discharges to the asphalt adjacent to the stormwater catch basin. The discharged treated stormwater drains into a nearby catch basin (Figure 3) that is also inspected at least monthly for the presence of floating solids and oil and grease sheen.

If benchmarks listed in Table 2 are met for four consecutive sampling events over a 24-month period, sampling and laboratory analysis can be discontinued. Written notification will be given to DEQ prior to discontinuance of sampling.

4.3 REPORTING

The permit requires submitting a Monitoring Report by July 15 of each year for the twice per year stormwater sampling events. This report must include the laboratory analysis reports that show analytical methods and detection limits, for stormwater samples collected for the previous monitoring year (July 1 June 30). The monthly Discharge Monitoring Report (DMR) forms to be used for reporting are provided as Attachment 5.

If benchmarks are not achieved, the SWPCP will be reviewed within 60 days of receiving the sampling results, as required by the Permit. If newly identified site controls are identified as part of this review they will be implemented in a timely manner and incorporated into this SWPCP as an update. The SWPCP Review Form (Attachment 2) will be used to document the review and will be kept with the SWPCP.

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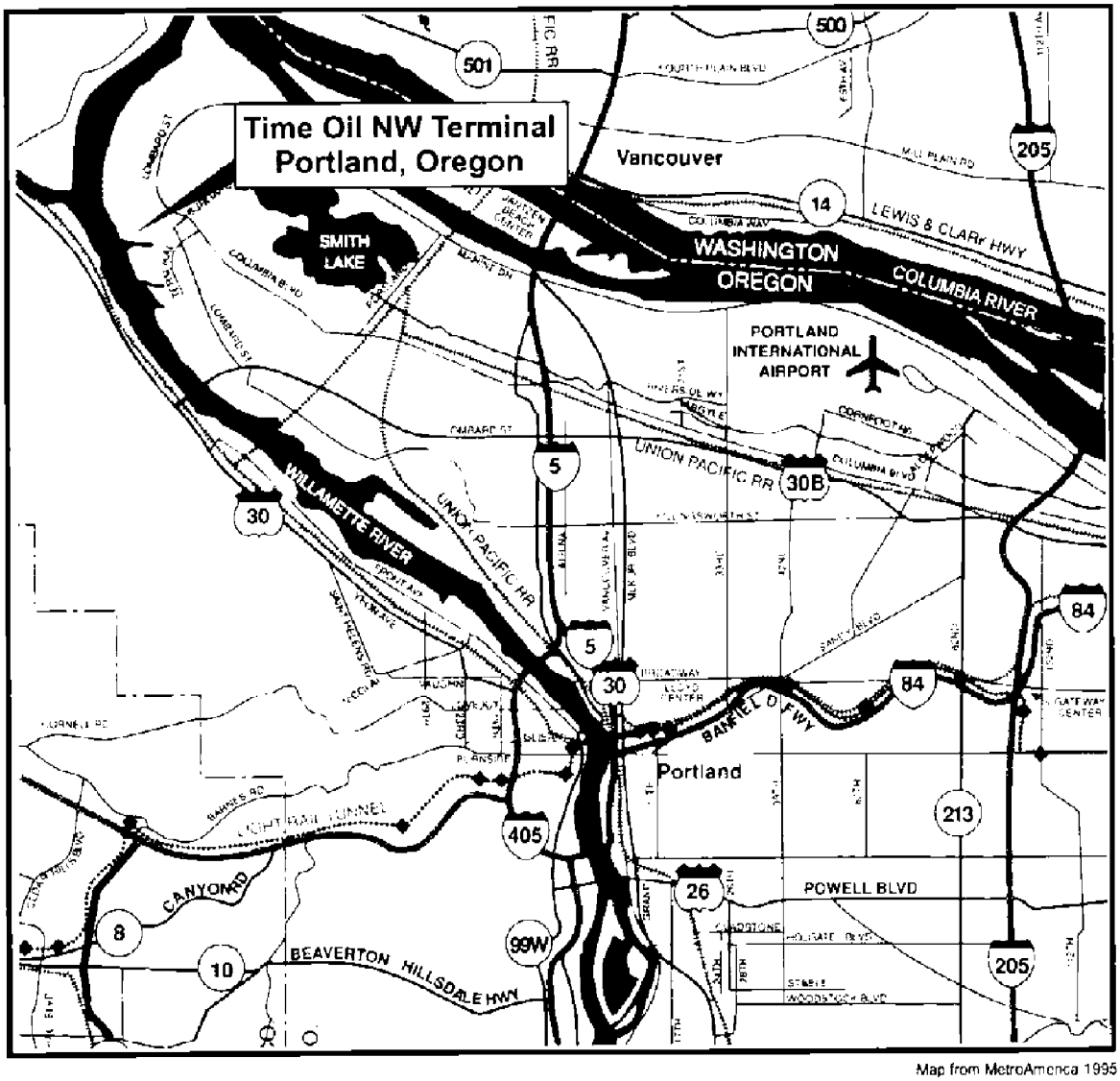
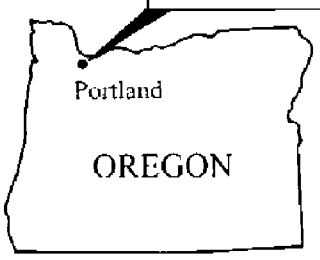


Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



0 2 4
Approximate Scale in Miles

Time Oil | T:\231\001\Vicinity Map.cdr (C) 05/10/2002

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Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

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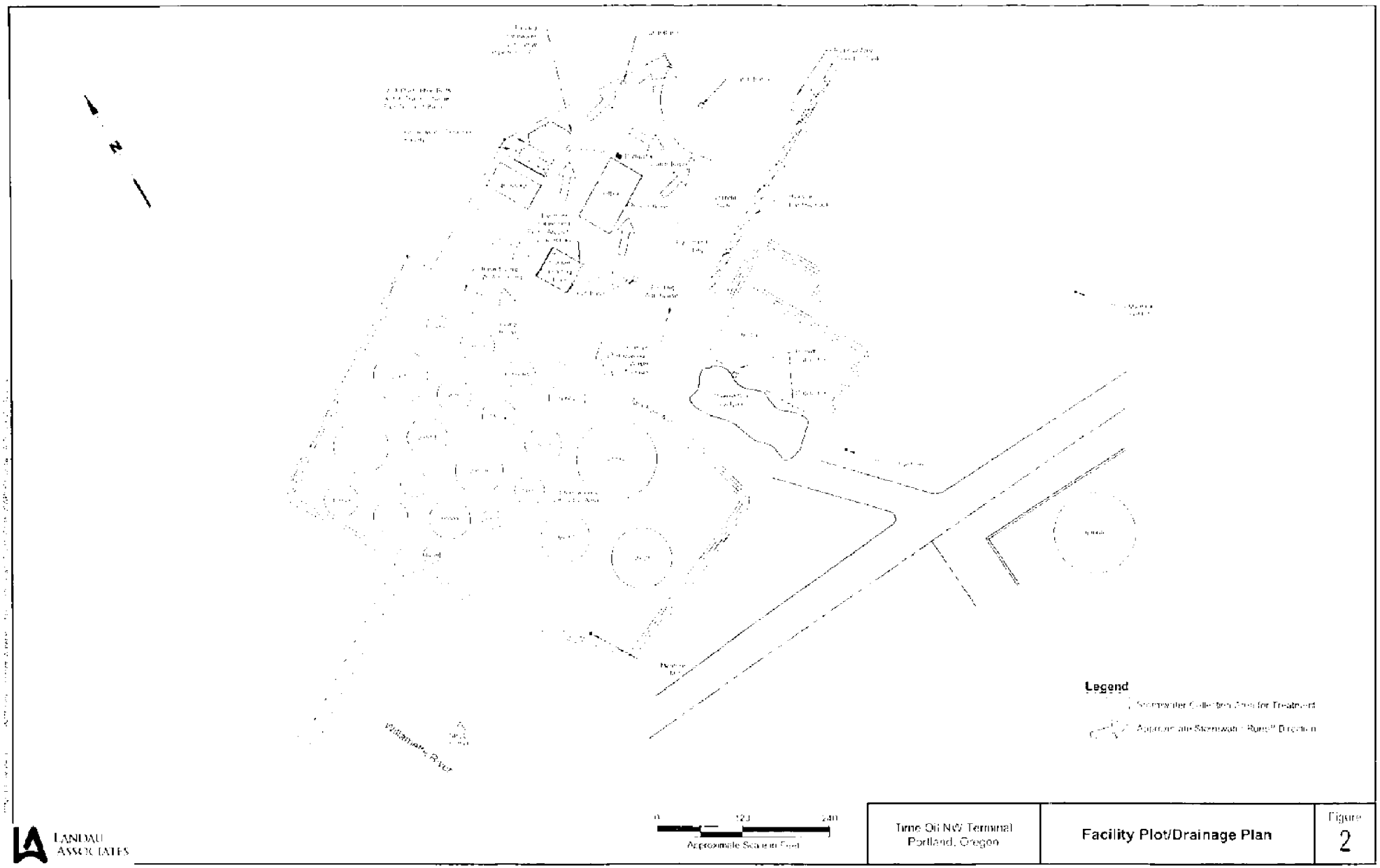

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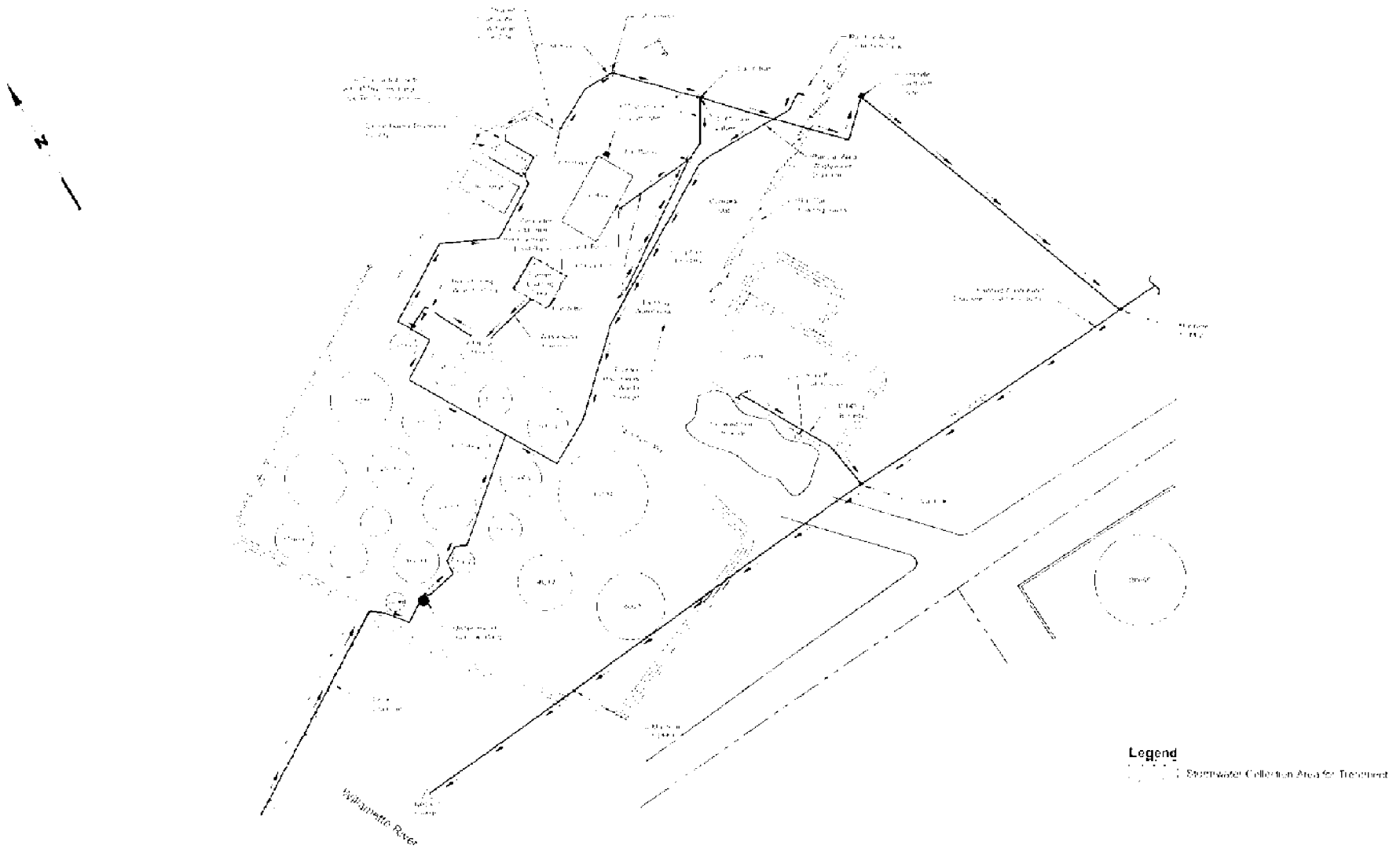

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0 120 240
Approximate Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Stormwater Sewer System Flow Route**	Figure 3

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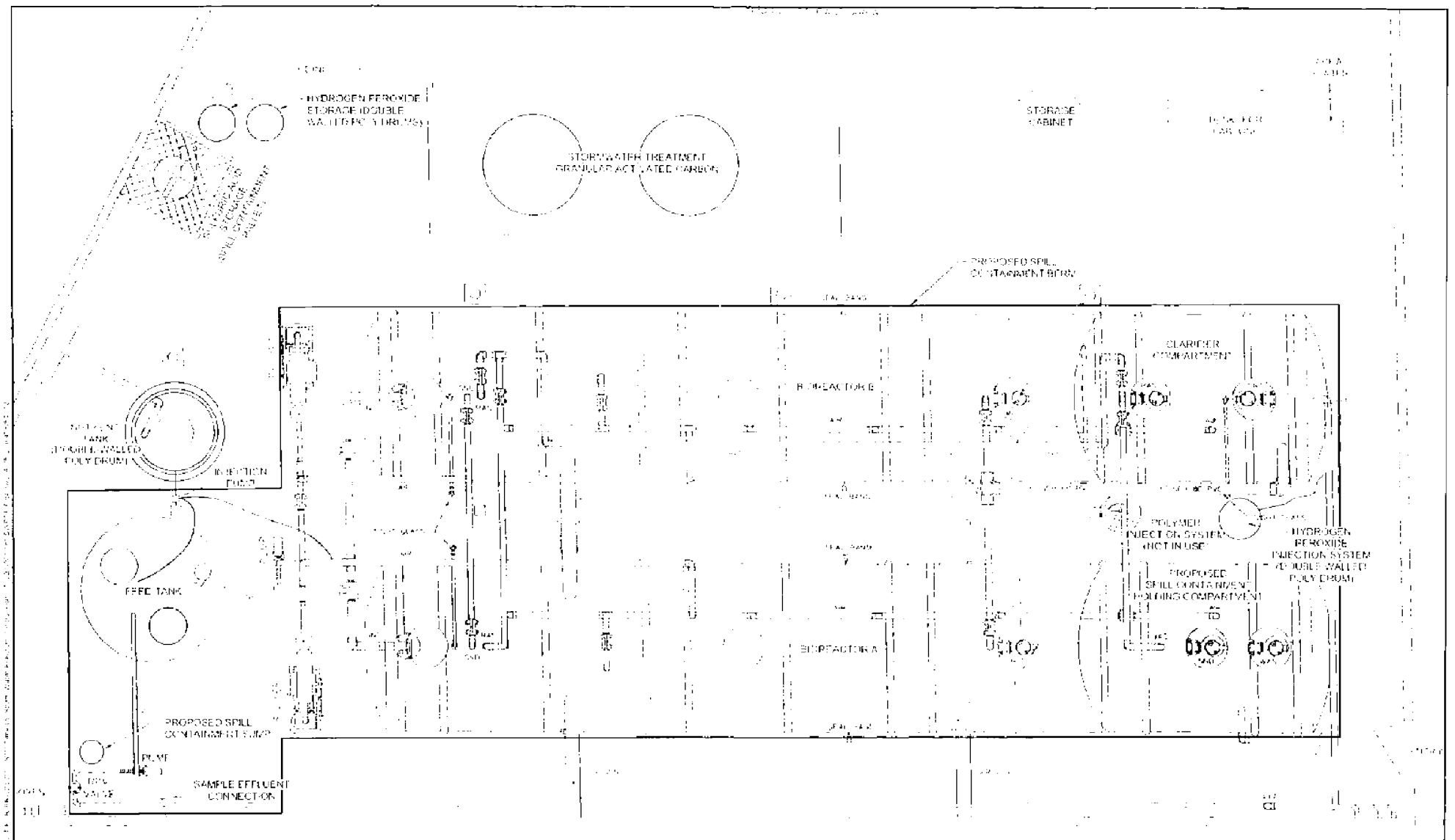

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	Groundwater Treatment System Proposed Spill Containment	Figure 4

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TABLE 1
AREAS OF INDUSTRIAL ACTIVITIES

Area	Former Activity Exposed to Precipitation or Surface Runoff	Potential Pollutants	Comments
Tank Farm	Storage, unloading, and loading of products (inactive) Groundwater Remediation System Surge Tank (active)	Gasoline, ethanol, methanol, diesel, fuels and fuel oils	No stormwater discharge under normal conditions. Tank farm is inside a containment dike.
Truck Loading Racks (Inactive)	Unloading and loading products	Gasoline, ethanol, methanol, diesel, fuels and fuel oils	Loading racks are within asphalt-paved containment berm, which drain to a level-controlled underground sump that discharges to activated carbon beds for polishing, prior to discharge via the NPDES outfall.
Rail Car Loading Racks (Inactive)	Unloading and loading products	Gasoline, ethanol, methanol, diesel fuels and fuel oils	Loading racks are within concrete-paved containment berms, which drain to a level-controlled underground sump that discharges to activated carbon beds for polishing, prior to discharge via the NPDES outfall.
Marine Dock (Inactive)	Loading and unloading products	Gasoline, ethanol, methanol, diesel fuels, and fuel oils	Loading arms are within concrete-paved containment areas, which drain via drip pans to a level-controlled underground sump that discharges to activated carbon beds prior to discharge via the NPDES outfall.
Pump Pit (Inactive)	Loading, unloading, and transferring product	Gasoline, ethanol, methanol, diesel fuels, and fuel oils	Pumps are within concrete-paved containment areas, which drain to a level-controlled underground sump that discharges to activated carbon beds prior to discharge via the NPDES outfall.

TABLE 2 STORMWATER BENCHMARKS		
Parameter	**Benchmark**	**Frequency**
pH	5.5 - 9 S.U.	Twice per Year
Total Suspended Solids (TSS)	130 mg/l	Twice per Year
Oil and Grease (O & G)	10 mg/l	Twice per Year
Total Copper (Cu)	0.1 mg/l	Twice per Year
Total Lead (Pb)	0.4 mg/l	Twice per Year
Total Zinc (Zn)	0.6 mg/l	Twice per Year
	(Visual Monitoring when Discharging)	
Floating Solids (associated with industrial activities)	No Visible Discharge	Once per Month
Oil and Grease Sheen	No Visible Sheen	Once per Month

ATTACHMENT 1

NPDES 1200-Z Permit

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

November 6, 1997

Donald W. Butler
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199-1233

Re: NPDES General Permit 1200Z
Time Oil Co.
10350 North Time Oil Road
Portland, OR 97203
File No. 109186
ORR80-2182
Multnomah County

The Oregon Department of Environmental Quality has received your application for renewal of National Pollutant Discharge Elimination System (NPDES) General Permit No. 1200 and the appropriate fees and is enclosing the requested permit. Additionally, we are enclosing a memo dated September 22, 1997 which discusses changes to the new NPDES General Permit 1200Z.

Please read the permit and the enclosed memo carefully to become familiar with the terms and conditions to which you must comply. We ask that you particularly observe the monitoring and reporting requirements outlined on pages 9 and 10 of the permit.

Should you have any questions, please contact the Northwest Region Office at 229-5552.

Sincerely,

Neil J. Mullane

Neil J. Mullane, Manager
Water Quality Source Control
Northwest Region

rcd
Enclosures
cc: File

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

DEQ 1

State of Oregon

Department of Environmental Quality — Memorandum

To: Holders of NPDES General Permit 1200 (D-W) **Date:** September 22, 1997

From: Rene C. Dulay

Subject: NPDES General Permit 1200Z Renewal

On July 22, 1997, the Department of Environmental Quality renewed the National Pollutant Discharge Elimination System (NPDES) General Permit 1200 (D, F, G, H, L, M, P, R, S, T, & W). These general permits cover the facilities identified in 40CFR§122.26(b)(14)(i-ix, xi) and with storm water discharges.

You should be aware of the following changes of the new permit which are as follows:

- The previous NPDES General Permits 1200 (D, F, G, H, L, M, P, R, S, T and W) were consolidated into one NPDES General Permit 1200Z. Table I on pages 2-3 shows the sources covered by the new permit.

- The Storm Water Pollution Control Plan (SWPCP) shall be prepared by a person knowledgeable in storm water management and familiar with the facility. It does not necessarily need a registered engineer or architect to review and stamped the SWPCP. The SWPCP shall be signed according to the procedures specified in the federal regulation, 40CFR§122.22.

- If waste disposal wells will be used for surface drainage the requirements of Oregon Administrative Rules (OAR) 340-44-050 must be complied with. The wastewater that could be discharged to disposal wells is restricted to storm water only.

- Categorical industries such as cement manufacturing, steam powered electric power generation facilities with coal handling and storage facilities and asphalt paving and roofing emulsions manufacturing must meet their respective effluent limitations specified on page 7 of the permit.

- Benchmarks are established for pollutants of concern (see page 8) for each point source storm water discharge. The benchmarks are guideline concentrations and not limitations. Sampling frequency is specified in Schedule B. If the benchmarks are not achieved the SWPCP has to be reviewed within 60 days of receiving the sampling results and identify additional control to further improve the quality of the storm water discharge.

Please read the enclosed permit and be familiar with all the conditions and requirements including the conditions emphasized above.

If you have any questions regarding the permit please contact the Northwest Region office at 229-5552

GENERAL PERMIT
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
STORM WATER DISCHARGE PERMIT

Department of Environmental Quality
811 Southwest Sixth Avenue, Portland, OR 97204
Telephone: (503) 229-5279
Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

All Owners Or Operators Of Storm Water Point Source Discharges That Are Covered By This Permit

Issued 11-6-97 GEN12Z MULTNOMAH/NWR
File No. 109186 ORR80-2182

Time Oil Co.
2737 West Commodore Way
Seattle WA 98199-1233
Site: 10350 N Time Oil Road, Portland 97203

SOURCES COVERED BY THIS PERMIT

Facilities identified in 40 Code of Federal Regulation (CFR) §122.26(b)(14)(i -ix, xi) with storm water discharges. Construction activities, asphalt mix batch plants, concrete batch plants and Standard Industrial Classification code 14, *Mining and Quarrying of Nonmetallic Minerals, Except Fuels* are excluded from this permit. These activities are regulated under separate permits.

See Table 1: Sources Covered, pages 2-3, for more information on the CFR regulated industries covered by this permit.

Michael T. Llewelyn, Administrator
Water Quality Division

JULY 22, 1997
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate storm water treatment and/or control facilities, and to discharge storm water to public waters in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

			Page
Schedule A	-	Storm Water Pollution Control Plan, Additional Requirements, Limitations, and Benchmarks	4-8
Schedule B	-	Monitoring and Reporting Requirements	9-10
Schedule C	-	Compliance Conditions and Schedules	11
Schedule D	-	Special Conditions	12
Schedule F	-	General Conditions	13

Unless authorized by another NPDES permit, all other direct and indirect discharges to public waters are prohibited.

TABLE 1: Sources Covered

Previous Permit Type	Sources Covered
1200-D	Facilities with the following primary Standard Industrial Classification codes: 21 Tobacco Products 22 Textile Mill Products 23 Apparel and Other Finished Products Made From Fabrics and Similar Material 27 Printing, Publishing and Allied Industries 4221 Farm Product Warehousing and Storage 4222 Refrigerated Warehousing and Storage 4225 General Warehousing and Storage Facilities with SIC codes 22, 23, 27, 4221, 4222, and 4225 are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.
1200-F	Facilities with primary Standard Industrial Classification code 20 Food and Kindred Products. Facilities with this SIC code are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.
1200-G	Landfills, land application sites and open dumps.
1200-H	Facilities with the following primary Standard Industrial Classification codes: 28 Chemicals and Allied Products (excluding 2874 Phosphate Fertilizer Manufacturing) 29 Petroleum Refining and Related Industries 30 Rubber and Miscellaneous Plastics Products 31 Leather and Leather Products 32 Stone, Clay, Glass, and Concrete Products 33 Primary Metal Industries and Steam Electric Power Generation including coal handling sites. Facilities with SIC codes 283, 285, 30, 31 (except 311), and 323 are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.
1200-L	Facilities with the following primary Standard Industrial Classification codes: 34 Fabricated Metal Products, Except Machinery and Transportation Equipment 35 Industrial and Commercial Machinery and Computer Equipment 36 Electronic and Other Electrical Equipment and Components, Except Computer Equipment 37 Transportation Equipment 38 Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks 39 Miscellaneous Manufacturing Industries Facilities with SIC codes 34 (except 3441), 35, 36, 37 (except 373), 38, and 39 are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.

TABLE 1: Sources Covered (cont.)

Previous Permit Type	Sources Covered
1200-M	Facilities with the following primary Standard Industrial Classification codes: 10 Metal Mining 12 Coal Mining 13 Oil and Gas Extraction
1200-P	Facilities with primary Standard Industrial Classification code 26 Paper and Allied Products. Facilities with SIC codes 265 and 267 are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.
1200-R	Hazardous Waste Treatment, Storage and Disposal Facilities, and facilities with primary Standard Industrial Classification codes 5015 Motor Vehicle Parts, Used, and 5093 Scrap and Waste Materials.
1200-S	Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, recycling, and reclamation of municipal or domestic sewage (including land dedicated to the disposal of sewage sludge that are located within the confines of the facility) with the design flow capacity of 1.0 mgd or more, or required to have a pretreatment program under 40 CFR § 403.
1200-T	Facilities with the following primary Standard Industrial Classification codes that have vehicle maintenance shops (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or airport deicing operations: 40 Railroad Transportation 41 Local and Suburban Transit and Interurban Highway Passenger Transportation 42 Motor Freight Transportation and Warehousing (excluding 4221 Farm Product Warehousing and Storage, 4222 Refrigerated Warehousing and Storage, and 4225 General Warehousing and Storage) 43 United States Postal Service 44 Water Transportation 45 Transportation by Air 5171 Petroleum Bulk Stations and Terminals
1200-W	Facilities with the following primary Standard Industrial Classification codes: 24 Lumber and Wood Products, Except Furniture (excluding 2491 Wood Preserving and 2411 Logging) 25 Furniture and Fixtures Facilities with SIC codes 2434 and 25 are only required to apply for permit if storm water is exposed to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery.

SCHEDULE A
STORM WATER POLLUTION CONTROL PLAN

1. **Preparation and Implementation of the Storm Water Pollution Control Plan (SWPCP)**
   a) The SWPCP shall be prepared by a person knowledgeable in storm water management and familiar with the facility.
   b) The SWPCP shall be signed in accordance with 40 CFR §122.22. Updates and revisions to the SWPCP shall also be signed in this manner. The SWPCP shall be signed as follows:
      i) For a Corporation - By a principal executive officer of at least the level of vice president;
      ii) For a Partnership or Sole Proprietorship - By a general partner or the proprietor, respectively; or
      iii) For a Municipality, State, Federal, or other Public Facility - By either a principal executive officer or ranking elected official.
   c) The SWPCP shall be prepared and implemented according to the time frames set forth in Schedule C.
   d) The SWPCP shall be kept current and updated as necessary to reflect any changes in facility operation.
   e) The SWPCP and updates to the SWPCP shall be submitted to the Department in accordance with Schedule B.3.
   f) A copy of the SWPCP shall be kept at the facility and made available upon request to government agencies responsible for storm water management in the permittee's area.

2. **Storm Water Pollution Control Plan Requirements**
   a) **Site Description** The SWPCP shall contain the following information:
      i) A description of the industrial activities conducted at the site. Include a description of the significant materials (see Schedule D.3, Definitions) that are stored, used, treated and/or disposed of in a manner that allows exposure to storm water. Also describe the methods of storage, usage, treatment and/or disposal.
      ii) A general location map showing the location of the site in relation to surrounding properties, transportation routes, surface waters and other relevant features.
      iii) A site map including the following:
         (1) drainage patterns
         (2) drainage and discharge structures
         (3) outline of the drainage area for each storm water outfall
         (4) paved areas and buildings within each drainage area
         (5) areas used for outdoor manufacturing, treatment, storage, and/or disposal of significant materials
         (6) existing structural control measures for reducing pollutants in storm water runoff
         (7) material loading and access areas
         (8) hazardous waste treatment, storage and disposal facilities
         (9) location of wells including waste injection wells, seepage pits, drywells, etc.
         (10) location of springs, wetlands and other surface water bodies.
      iv) Estimates of the amount of impervious surface area (including paved areas and building roofs) relative to the total area drained by each storm water outfall.
      v) For each area of the site where a reasonable potential exists for contributing pollutants to storm water runoff, identify the potential pollutants that could be present in storm water discharges.
      vi) The name(s) of the receiving water(s) for storm water drainage. If drainage is to a municipal storm sewer system, the name(s) of the ultimate receiving waters and the name of the municipality.

vii) Identification of the discharge outfall(s) and the point(s) where storm water monitoring will occur as required by Schedule B. If multiple discharge outfalls exist but will not all be monitored (as allowed in Schedule B.1.c), a description supporting this approach shall also be included.

b) **Site Controls** The permittee shall maintain existing controls and/or develop new controls appropriate for the site. The purpose of these controls is to eliminate or minimize the exposure of pollutants to storm water. In developing a control strategy, the SWPCP shall have the following minimum components. A description of each component shall be included in the SWPCP.

i) *Storm Water Best Management Practices* If technically and economically feasible, the following best management practices shall be employed at the site. A schedule for implementation of these practices shall be included in the SWPCP if the practice has not already been accomplished. This schedule must be consistent with the requirements for developing and implementing the SWPCP in Schedule C of the permit.

(1) Containment - All hazardous materials (see Schedule D.3, Definitions) shall be stored within berms or other secondary containment devices to prevent leaks and spills from contaminating storm water. If the use of berms or secondary containment devices is not possible, then hazardous materials shall be stored in areas that do not drain to the storm sewer system.

(2) Oil and Grease - Oil/Water separators, booms, skimmers or other methods shall be employed to eliminate or minimize oil and grease contamination of storm water discharges.

(3) Waste Chemicals and Material Disposal - Wastes shall be recycled or properly disposed of in a manner to eliminate or minimize exposure of pollutants to storm water. All waste contained in bins or dumpsters where there is a potential for drainage of storm water through the waste shall be covered to prevent exposure of storm water to these pollutants. Acceptable covers include, but are not limited to, storage of bins or dumpsters under roofed areas and use of lids or temporary covers such as tarps.

(4) Erosion and Sediment Control - Erosion control methods such as vegetating exposed areas, graveling or paving shall be employed to minimize erosion of soil at the site. Sediment control methods such as detention facilities, sediment control fences, vegetated filter strips, bioswales, or grassy swales shall be employed to minimize sediment loads in storm water discharges. For activities that involve land disturbance, the permittee shall contact the local municipality to determine if there are other applicable requirements.

(5) Debris Control - Screens, booms, settling ponds, or other methods shall be employed to eliminate or minimize debris in storm water discharges.

(6) Storm Water Diversion - Storm water shall be diverted away from fueling, manufacturing, treatment, storage, and disposal areas to prevent exposure of uncontaminated storm water to potential pollutants.

(7) Covering Activities - Fueling, manufacturing, treatment, storage, and disposal areas shall be covered to prevent exposure of storm water to potential pollutants. Acceptable covers include, but are not limited to, permanent structures such as roofs or buildings and temporary covers such as tarps.

(8) Housekeeping - Areas that may contribute pollutants to storm water shall be kept clean. Sweeping, prompt clean up of spills and leaks, and proper maintenance of vehicles shall be employed to eliminate or minimize exposure of storm water to pollutants.

ii) *Spill Prevention and Response Procedures* Methods to prevent spills along with clean-up and notification procedures shall be included in the SWPCP. These methods and procedures shall be made available to appropriate personnel. The required clean up material shall be on-site or readily available. Spills prevention plans required by other regulations may be substituted for this provision providing that storm water management concerns are adequately addressed.

iii) *Preventative Maintenance* A preventative maintenance program shall be implemented to ensure the effective operation of all storm water best management practices. At a minimum the program shall include:

(1) Monthly inspections of areas where potential spills of significant materials or industrial activities could impact storm water runoff.

(2) Monthly inspections of storm water control measures, structures, catch basins, and treatment facilities.

(3) Cleaning, maintenance and/or repair of all materials handling and storage areas and all storm water control measures, structures, catch basins, and treatment facilities as needed upon discovery.

iv) *Employee Education* An employee orientation and education program shall be developed and maintained to inform personnel of the components and goals of the SWPCP. The program shall also address spill response procedures and the necessity of good housekeeping practices. A schedule for employee education shall be included in the SWPCP.

c) **Record Keeping and Internal Reporting Procedures** The following information shall be recorded and maintained at the facility and provided to the Department and other government agencies upon request. This information does not need to be submitted as part of the SWPCP.

i) Inspection, maintenance, repair and education activities as required by the SWPCP.

ii) Spills or leaks of significant materials that impacted or had the potential to impact storm water or surface waters. Include the corrective actions to clean up the spill or leak as well as measures to prevent future problems of the same nature.

ADDITIONAL REQUIREMENTS

3. **Oregon Administrative Rule (OAR) 340-44-50, Waste Disposal Wells for Surface Drainage** OAR 340-44-50 requires that waste disposal wells for storm drainage only be used in those areas where there is an adequate confinement barrier or filtration medium between the well and an underground source of drinking water; and where construction of surface discharging storm sewers is not practical. In addition, this rule requires the following:

a) New storm drainage disposal wells shall be as shallow as possible but shall not exceed a depth of 100 feet.

b) Disposal wells shall be located at least 500 feet from domestic water wells.

c) Using a disposal well for agricultural drainage is prohibited.

d) Using a disposal well for surface drainage in areas where toxic chemicals or petroleum products are stored or handled is prohibited unless there is containment around the product area which will prevent spills and leaks from entering the well.

e) Any owner or operator of the disposal well shall have available a means of temporarily plugging or blocking the well in the event of an accident of spill.

f) Any area that is drained by a disposal well shall be kept clean of petroleum products and other organic or chemical wastes as much as practicable to minimize the degree of contamination of the storm water drainage.

4. **Oregon Administrative Rule 340-41-26(3)(a)(D), Surface Water Temperature Management Plan** Individual storm water discharges are not expected to cause a measurable increase in stream temperature. Compliance with this permit meets the requirement of OAR 340-41-26(3)(a)(D) to develop and implement a surface water temperature management plan. If it is determined that storm discharges in a particular basin are impacting a Total Maximum Daily Load for temperature, then permittees in this basin will be required to implement additional management practices to reduce the temperature of the discharges. These practices include, but are not limited to, increased vegetation to provide for shading, underground conveyance systems or detention vaults, and filter treatment systems to reduce detention times.

5. **Storm Water Only** This permit only regulates the discharge of storm water. It does not authorize the discharge or on-site disposal of process wastewater, wash water, boiler blowdown, cooling water, air conditioning condensate, deicing residues, or any other non-storm discharges associated with the facility.

   Any other wastewater discharge or disposal must be permitted in a separate permit. A separate Department permit may not be required if the wastewater is reused or recycled without discharge or disposal, or discharged to the sanitary sewer with approval from the local sanitary authority.

6. **Specific River Basin Requirements** The permittee shall comply with any Oregon Administrative Rule requirements for storm water management specific to the applicable river basin.

7. **Water Quality Standards** The ultimate goal for permittees is to comply with water quality standards in OAR 340-41. In instances where a storm water discharge adversely impacts water quality, the Department may require the facility to implement additional management practices, apply for an individual permit, or take other appropriate action.

CODE OF FEDERAL REGULATION STORM WATER DISCHARGE LIMITATIONS

8. The permittee with the following activities shall be in compliance with the applicable limitations at the time of permit assignment:

CFR Industry Category	Parameter	Limitation	
Cement manufacturing facilities for runoff from material storage piles (40 CFR §411)	pH Total Suspended Solids (TSS)	6.0 - 9.0 SU 50 mg/l	
Steam powered electric power generation facilities with coal handling and storage facilities (40 CFR §423)	TSS	50 mg/l, Daily Maximum	
Manufacturing of asphalt paving and roofing emulsions (40 CFR §443)	Oil & Grease	20 mg/l, Daily Maximum	15 mg/l, 30 Day Average
	pH	6.0 - 9.0 SU	

STORM WATER DISCHARGE BENCHMARKS

9. **Benchmarks** Benchmarks are guideline concentrations not limitations. They are designed to assist the permittee in determining if the implementation of their SWPCP is reducing pollutant concentrations to below levels of concern. For facilities that are subject to federal limitations, benchmarks apply to only those pollutants that are not limited by the federal regulations. The following benchmarks apply to each point source discharge of storm water associated with industrial activity:

Parameter	Benchmark
Total Copper	0.1 mg/l
Total Lead	0.4 mg/l
Total Zinc	0.6 mg/l
pH	5.5 - 9 S.U.
Total Suspended Solids	130 mg/l
Oil & Grease	10 mg/l
** E. coli	406 counts/100 ml
Floating Solids (associated with industrial activities)	No Visible Discharge
Oil & Grease Sheen	No Visible Sheen

** The benchmark for E. coli applies only to landfills, if septage and sewage biosolids are disposed at the site, and sewage treatment plants.

10. **Review of SWPCP** If benchmarks are not achieved, the permittee shall review their SWPCP within 60 days of receiving sampling results. The purpose of this review is to determine if the SWPCP is being followed and to identify any additional technically and economically feasible site controls that need to be implemented to further improve the quality of storm water discharges. These site controls include best management practices, spill prevention and response procedures, preventative maintenance, and employee education procedures as described in Schedule A.2.b.

   a) **SWPCP Revision** Any newly identified site controls shall be implemented in a timely manner and incorporated into the SWPCP as an update. A new SWPCP is not required. If no additional site controls are identified, the permittee shall state as such in an update to the SWPCP.

   b) **SWPCP Revision Submittal** Results of this review shall be submitted to the Department in accordance with Schedule B.3 and made available upon request to government agencies responsible for storm water management in the permittee's area.

   c) **Background or Natural Conditions** If the permittee demonstrates that background or natural conditions not associated with industrial activities at the site cause an exceedance of a benchmark, then no further modifications to the SWPCP are required for that parameter. Upon successful demonstration of natural or background conditions through monitoring of the same storm event used to evaluate benchmarks the permittee would be eligible for the monitoring reduction as outlined in Schedule B.2.

SCHEDULE B
MONITORING AND REPORTING REQUIREMENTS

I. Minimum Monitoring Requirements

a) All permittees shall monitor storm water associated with industrial activity for the following:

GRAB SAMPLES OF STORM WATER	
Parameter	**Frequency**
Total Copper	Twice per Year
Total Lead	Twice per Year
Total Zinc	Twice per Year
pH	Twice per Year
Total Suspended Solids	Twice per Year
Oil & Grease	Twice per Year
**E. coli	Twice per Year

**The monitoring for E.coli applies only to landfills, if septage and sewage biosolids are disposed at the site, and sewage treatment plants.

VISUAL MONITORING OF STORM WATER	
Parameter	**Frequency**
Floating Solids (associated with industrial activities)	Once a Month (when discharging)
Oil & Grease Sheen	Once a Month (when discharging)

b) **Grab Samples** Grab samples that are representative of the discharge shall be taken at least 60 days apart. It is preferred, but not required, that one sample be collected in the fall and one in the spring. Compositing of samples from different drainage areas is not allowed.

c) **Multiple Point Source Discharges** The permittee may reduce the number of storm water monitoring points provided the outfalls have substantially identical effluents. Substantially identical effluents are discharges from drainage areas serving similar activities where the discharges are expected to be similar in composition. Outfalls serving areas with no exposure of storm water to industrial activities are not required to be monitored.

d) **Monitoring Location** All samples shall be taken at monitoring points specified in the SWPCP before the storm water joins or is diluted by any other wastestream, body of water or substance.

e) **No Exposure** If there is no exposure of storm water to material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery at the site, monitoring is not required. The permittee shall submit an annual statement certifying as such in lieu of monitoring (refer to Schedule B.3.b). If exposure cannot be prevented, the permittee shall comply with Schedule B.

2. **Monitoring Reduction**
   a) **Visual Observations** There is no reduction allowed of the required visual observations.

   b) **Grab Samples** The permittee is not required to conduct sampling if the benchmarks specified in Schedule A.9 are met, or if the exceedance is due to natural or background conditions for at least four consecutive storm water monitoring events over 24 continuous months. Note that there is no reduction in monitoring allowed for facilities subject to limitations under CFR (Schedule A.8).
      i) Results from sampling events cannot be averaged to meet the benchmarks.
      ii) Monitoring waivers may be allowed for individual parameters.
      iii) Parameters in exceedance or not previously sampled shall be monitored as required in Schedule B.1 until the monitoring waiver condition above is met.
      iv) Monitoring data from the previous permit period may be used to meet the waiver requirement. This data shall be evaluated against the benchmarks specified in this permit.
      v) Monitoring data from the same storm event shall be used to demonstrate that background or natural conditions not associated with industrial activities at the site are contributing to the exceedance of a benchmark.
      vi) The permittee shall submit written notification to the Department when exercising the monitoring waiver condition (refer to Schedule B.3.c).

   c) **Reinstatement of Monitoring Requirements**
      i) The permittee shall conduct monitoring as specified in Schedule B.1 if changes to site conditions are expected to impact storm water discharge characteristics.
      ii) The Department may reinstate monitoring requirements as specified in Schedule B.1 if prior monitoring efforts were improper or results were incorrect.
      iii) Monitoring may also be reinstated if future sampling efforts indicate benchmarks are being exceeded.

3. **Reporting Requirements** The permittee shall submit the following to the appropriate DEQ regional office:
   a) **Monitoring Data** The permittee shall submit by July 15 of each year grab sampling and visual monitoring data for the previous monitoring period (July 1- June 30). If there was insufficient rainfall to collect samples, the permittee shall notify the Department by July 15 of each year.

   b) **No Exposure Certification** The permittee shall submit an annual certification by July 15 of each year if monitoring is not required due to no exposure of storm water to industrial activities. The certification shall state that site conditions have been evaluated and the facility meets the requirements of Schedule B.1.e.

   c) **Monitoring Reduction Notification** The permittee shall submit written notification when exercising the monitoring reduction condition in Schedule B.2.b.

   d) **SWPCP Update/Completion** The permittee shall prepare or update the SWPCP in accordance with Schedule C of the permit. The permittee shall submit an updated or completed SWPCP within 14 days after completion.

   e) **SWPCP Revision** The permittee shall submit any revisions to the SWPCP required by Schedule A.10 within 14 days after the SWPCP is revised. If the Department does not review and comment on the revised SWPCP within 30 days, the permittee shall implement the revisions as proposed.

SCHEDULE C
COMPLIANCE CONDITIONS AND SCHEDULES

1. **Existing Permittee** (for a facility with an NPDES storm water discharge permit assigned prior to September 30, 1996):

   a) Not later than 90 days after receiving this permit, the existing permittee shall revise and begin implementation of their SWPCP to meet any new permit requirements.

   b) Except for site controls that require capital improvements (see Schedule D.3, Definitions), the SWPCP shall be implemented within 90 days after revision of SWPCP. Site control activities that require capital improvements shall be completed in accordance with the schedule set forth in the SWPCP.

2. **New Permittee with Existing Facility** (for a facility operating prior to September 30, 1996, without an NPDES storm water discharge permit):

   a) Not later than 90 days after receiving this permit, the new permittee shall prepare and begin implementation of their SWPCP.

   b) Except for site controls that require capital improvements (see Schedule D.3, Definitions), the SWPCP shall be implemented within 90 days after completion of SWPCP. Site control activities that require capital improvements shall be completed in accordance with the schedule set forth in the SWPCP.

3. **New Facility** (for a facility beginning operation after September 30, 1996):

   a) Prior to starting operations, a new facility shall prepare and begin implementation of their SWPCP.

   b) Except for site controls that require capital improvements (see Schedule D.3, Definitions), the SWPCP shall be implemented within 90 days after beginning operation. Site control activities that require capital improvements shall be completed in accordance with the schedule set forth in the SWPCP.

4. **New Permittee Discharging to Clackamas River, McKenzie River above Hayden Bridge (River Mile 15) or North Santiam River.** Not later than 180 days after receiving this permit, new permittees discharging to Clackamas River, McKenzie River above Hayden Bridge (river mile 15) or North Santiam River shall submit to the Department a monitoring and water quality evaluation program. This program shall be effective in evaluating the in-stream impacts of the discharge as required by OAR 340-41-470. Within 30 days after Department approval, the permittee shall implement the monitoring and water quality evaluation program. New permittees are defined to include potential or existing dischargers that did not have a permit, and existing dischargers that have a permit but request an increased load limitation.

SCHEDULE D
SPECIAL CONDITIONS

1. **Releases in Excess of Reportable Quantities.** This permit does not relieve the permittee of the reporting requirements of 40 CFR §117 Determination of Reportable Quantities for Hazardous Substances and 40 CFR §302 Designation, Reportable Quantities, and Notification.

2. **Availability of SWPCP and Monitoring Data.** The Storm Water Pollution Control Plan and/or storm water monitoring data shall be made available to government agencies responsible for storm water management in the permittee's area.

3. **Definitions**

   a) *Capital Improvements* means the following improvements that require capital expenditures:
      i) Treatment best management practices including but not limited to settling basins, oil/water separation equipment, catch basins, grassy swales, and detention/retention basins.
      ii) Manufacturing modifications that incur capital expenditures, including process changes for reduction of pollutants or wastes at the source.
      iii) Concrete pads, dikes and conveyance or pumping systems utilized for collection and transfer of storm water to treatment systems.
      iv) Roofs and appropriate covers for manufacturing areas.

   b) *Hazardous Materials* as defined in 40 CFR §302 Designation, Reportable Quantities, and Notification.

   c) *Material Handling Activities* include the storage, loading and unloading, transportation or conveyance of raw material, intermediate product, finished product, by-product or waste product.

   d) *Point Source* means a discharge from any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, or conduit.

   e) *Significant Materials* includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical that a facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ash, slag, and sludge that have the potential to be released with storm water discharges.

SCHEDULE F
NPDES GENERAL CONDITIONS

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

Under ORS 468.943, unlawful water pollution, if committed by a person with criminal negligence, is punishable by a fine of up to $25,000 or by imprisonment for not more than one year, or by both. Each day on which a violation occurs or continues is a separately punishable offense.

Under ORS 468.946, a person who knowingly discharges, places or causes to be placed any waste into the waters of the state or in a location where the waste is likely to escape into the waters of the state, is subject to a Class B felony punishable by a fine not to exceed $200,000 and up to 10 years in prison.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;
b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions
   (1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.
   (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.
   (1) Bypass is prohibited unless:
      (a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;
      (b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
      (c) The permittee submitted notices and requests as required under General Condition B.3.c.
   (2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.
   (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.
   (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   (1) An upset occurred and that the permittee can identify the causes(s) of the upset;
   (2) The permitted facility was at the time being properly operated;
   (3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and
   (4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions
   (1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.
   (2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.
   (3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:
   (1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;
   (2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and
   (3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:
a. The date, exact place, time and methods of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and
d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5 Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected;
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information which must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.
b. Any upset which exceeds any effluent limitation in this permit.
c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;
b. The period of noncompliance, including exact dates and times;
c. The estimated time noncompliance is expected to continue if it has not been corrected; and
d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Reports

Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $100,000 per violation and up to 5 years in prison.

.0. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - [Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:
   (1) One hundred micrograms per liter (100 µg/l);
   (2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;
   (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or
   (4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
   (1) Five hundred micrograms per liter (500 µg/l);
   (2) One milligram per liter (1 mg/l) for antimony;
   (3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or
   (4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.
2. TSS means total suspended solids.
3. mg/l means milligrams per liter.
4. kg means kilograms.
5. m^3/d means cubic meters per day.
6. MGD means million gallons per day.
7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.
8. FC means fecal coliform bacteria.
9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.
10. CBOD means five day carbonaceous biochemical oxygen demand.
11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.
12. Quarter means January through March, April through June, July through September, or October through December.
13. Month means calendar month.
14. Week means a calendar week of Sunday through Saturday.
15. Total residual chlorine means combined chlorine forms plus free residual chlorine.
16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
17. POTW means a publicly owned treatment works.

ATTACHMENT 2

SWPCP Review Form

SWPCP Review Form

Facility Name:

Review completed by: Date

Note: SWPCP review must occur when storm water sample analytical data exceeds benchmarks. If no exceedences, SWPCP review should be completed at least annually to confirm that SWPCP is current.

Storm Water Sample Analytical Data Review (List benchmark exceedences):

Sample Location and Date	Benchmarks Exceeded	List suspected sources

Describe Best Management Practices (BMPs) to address benchmark exceedences:

Additional Site Changes Requiring SWPCP Update:

Construction/demolition (buildings, paving, etc.)?

Site drainage improvements?

Stormwater sampling location change?

Tank commissioning/decommissioning?

Change in outdoor manufacturing processes?

Change in storage/use of hazardous/significant materials?

New BMPs?

Significant spill event occurred?

Company name/ownership change?

Site stormwater/emergency response contact change?

Notes:

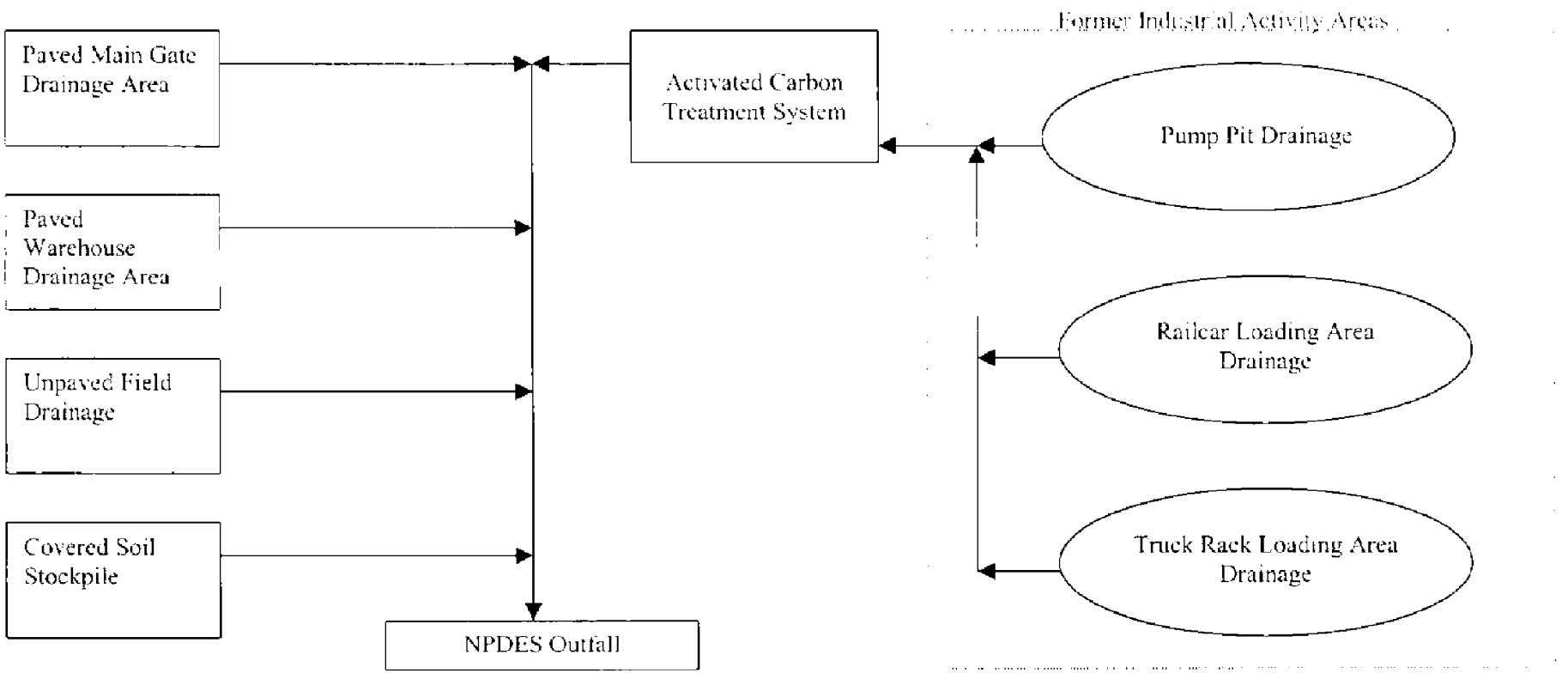
BZTO104(e)016854

ATTACHMENT 3

TIME OIL CO.

ST. JOHNS TERMINAL
10350 NORTH TIME OIL ROAD
PORTLAND, OREGON 97283

STORMWATER COLLECTION/TREATMENT FLOW SCHEMATIC



8/12/02 - LANDAU MAIN VOL1 DATA-WPROC 2/1 - 1.18, ATTACHMENT 3.doc

Landau Associates

BZTO104(e)016855

BZTO104(e)016856

Time Oil Northwest Terminal - Wastewater Treatment Plant - Operator Log Sheet

Operator Name: _____ **Date:** _____

Time of Data Collection: _____

Section 1 - Recovery Well Status

Shallow Recovery Well (RW-2)			**Horizontal Recovery Well (HRW-1)**		
Is Pump Running?	Y / N		Is Pump Running?	Y / N	
Current Pump Flowrate	_____	gpm	Current Pump Flowrate	_____	gpm
Pump Electrical Frequency	_____	hz	Pump Electrical Frequency	_____	hz
Totalizer Reading	_____	X 100 gal	Totalizer Reading	_____	X 100 gal
Hourmeter Reading	_____	hours	Hourmeter Reading	_____	hours
Is Low Water Level Alarm On?	Y / N		Is Sump High Level Alarm On?	Y / N	
Electric Meter Reading	_____	kw-hrs			

Recovery Well Comments: _____

Section 2 - Surge Tank Status - Tank 16804

Current Depth of Water in Tank	_____	feet	Totalizer Reading	_____	X 100 gal
Water Volume in Tank Based on Chart		gallons	Electric Meter Reading		kw-hrs

Section 3 - Wastewater Treatment System Data - Inside Building

Depth to Liquid in Feed Tank	_____	inches	Is Blower Operating?	Y / N	
Depth to Liquid in Fertilizer Tank	_____	inches	Electric Meter No. 1 Reading	_____	kw-hrs
Effluent Dissolved Oxygen Reading	_____	ppm	Electric Meter No. 2 Reading	_____	kw-hrs
Effluent pH Reading	_____	Manual Gauge	_____	Wall Chart Gauge	
Temperature in Bioreactor A	_____	degrees F	Batch Counter Reading	_____	
Temperature in Bioreactor B	_____	degrees F	Settlometer Reading	_____	
Liquid Level in Bioreactor Site Tube	_____	inches	Discharge Totalizer Reading	_____	X 100 gal

Wastewater Treatment System Comments: _____

Section 4 - Stormwater Treatment System - Inside and Outside of Building

Were all Sumps and Pumps Checked?	Y / N		Floating Solids or Sheen Observed at Discharge?	Y / N	
Conditions of Filters	Good / Fair / Poor		Carbon Discharge Meter Reading	_____	X 100 gals

Stormwater Treatment Comments: _____

Section 5 - Sampling Information

Were any samples taken for the wastewater or stormwater treatment systems? Y / N

If yes, then list the samples below:

Sample Name	Sample Location	Parameters to Analyze

s:\sharedoc\231\j001139\wwtp_operate_log

BZTO104(e)016858

NPDES #1300 Oily Discharge General Permit
Discharge Monitoring Report

Submit report monthly by 15th of following month to:
Oregon DEQ

Legal Name:

Common Name:

Facility Location:

Site/File ID #:

County:

Month/Quarter/Year _____

Monitoring for Oil/Water Separator

Day	Oil and Grease (mg/L)	Visible Sheen	Ethanol and/or MBTE	Flow
	Frequency varies, see permit	Daily, visual observation	Quarterly grab sample, if present on site and in bulk	Daily estimate, when discharging
Limit	10 mg/L monthly, 15 mg/L daily max.	No visible sheen at any time	No limit	No limit
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
Total				
Max.				
Average				

See Reverse Side for Additional Monitoring and Signature Block

Stormwater Monitoring

Only for facilities required to have NPDES permits for stormwater, per 40 CFR 122.26
Monitoring required for each point identified in the Stormwater Pollution Control Plan

Day	Visible Sheen	Floating Solids (associated with industry)	Total Copper (mg/L)	Total Lead (mg/L)	Total Zinc (mg/L)	pH (S.U.)	Total Suspended Solids (mg/L)
	Daily when discharging, visual observation	Once per month when discharging	Twice per year, grab sample	Twice per year, grab sample	Twice per year, grab sample	Twice per year, grab sample	Twice per year, grab sample
Limit	No visible sheen	No visible discharge*	0.1 mg/L*	0.4 mg/L*	0.6 mg/L*	Within 6.0 to 9.0	130 mg/L*
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
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21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
Total							
Max.							
Average							

*These are benchmarks, not effluent limits. If benchmarks are exceeded, review/possible revision of Stormwater plan is required. See permit for more details.

Signature Requirement

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 fines and imprisonment for knowing violations.

Signature of Responsible Official: _____

Name and Title (Please Print): _____

Date of Signature: _____ **Telephone:** _____

August 16, 2002

LANDAU ASSOCIATES

REC'D AUG 19 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: SOIL SCRAPE IN FORMER CROSBY & OVERTON TANK AREA TIME OIL NORTHWEST TERMINAL

Dear Tom:

On behalf of Time Oil Co., this letter provides the Oregon Department of Environmental Quality (DEQ) information on an additional activity that Time Oil Co. plans to conduct in conjunction with the removal actions currently planned for this summer at the Time Oil Northwest Terminal in Portland, Oregon.

The former Crosby & Overton tank area is located directly to the east of the soil stockpile and to the south of the former PCP mixing area (Figure 1). As described in the Phase II remedial investigation (RI) report (Landau Associates 2000), two aboveground storage tanks were formerly located in this area and leased from Time Oil by Crosby & Overton, Inc., for the storage of waste oils generated from offsite projects between 1974 to 1989. In 1989, about 1.3 yd^3 of soil impacted with polychlorinated biphenyls (PCBs) were removed from this area and the tanks were dismantled and removed. Sample results collected in this area as part of the Phase II RI in 1997 indicated detected concentrations of PCBs ranging from less than 1 to 16 mg/kg and polycyclic aromatic hydrocarbons (PAHs) ranging from less than 1 mg/kg to a maximum of about 27 mg/kg for benzo(a)pyrene and 67 mg/kg for pyrene within the upper 6 inches of soil. To facilitate setup of decontamination areas for the soil removal actions associated with the stockpile and *in situ* soil excavation in the former PCP mixing area, to prevent tracking of impacted soil from this area during the removal actions, and to take advantage of the equipment and personnel already mobilized for the removal actions, Time Oil plans to scrape the upper 6 inches of soil over the majority of this area for thermal treatment/disposal at the TPS Technologies facility in Tacoma, Washington. TPS Technologies has already agreed to acceptance of this material.

The boundaries of the planned scrape were conservatively established to remove soil concentrations that exceed 1 ppm for PCBs and 1 ppm for individual PAHs. However, as is planned for the PCP mixing area, any residual chemical concentrations remaining in this area after the scrape will be used during the RI/FS process to determine a final remedial action at the terminal. Figure 2 shows the planned scrape boundaries. Table 1 provides the Phase II analytical data for locations within the planned scrape area.

After the soil is scraped and removed, verification samples will be collected at the base and sidewalls of the excavation, as shown on Figure 2. The samples will be analyzed for PCBs and PAHs. Verification sidewall samples will not be collected on the boundaries (east, west, and south) where the excavation extends to the earth berms or concrete wall surrounding the area. It is not expected that soil comprising the earth berms is impacted because the berms were constructed using clean fill prior to placement of the tanks in this area. Field sampling procedures, quality assurance/quality control procedures, and health and safety protocols will be conducted in accordance with the DEQ-approved protocols established for the soil stockpile and PCP mixing area removal actions (Landau Associates 2002a,b).

It is expected that the soil scrape in the former Crosby & Overton tank area will need to be conducted in advance of setup activities for the removal actions, currently planned to begin early next week (August 19, 2002). To maintain the schedule for the removal action activities, we would appreciate your approval of this activity as soon as feasibly possible. Again, we appreciate your quick response on the activities planned at the terminal. Please feel free to contact Kevin Murphy or me with any questions.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Project Manager

RB/tam
8/16/02 S:\WP\ROC\73\001\139\C&OareaDEQ_let.doc
Attachments

cc: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

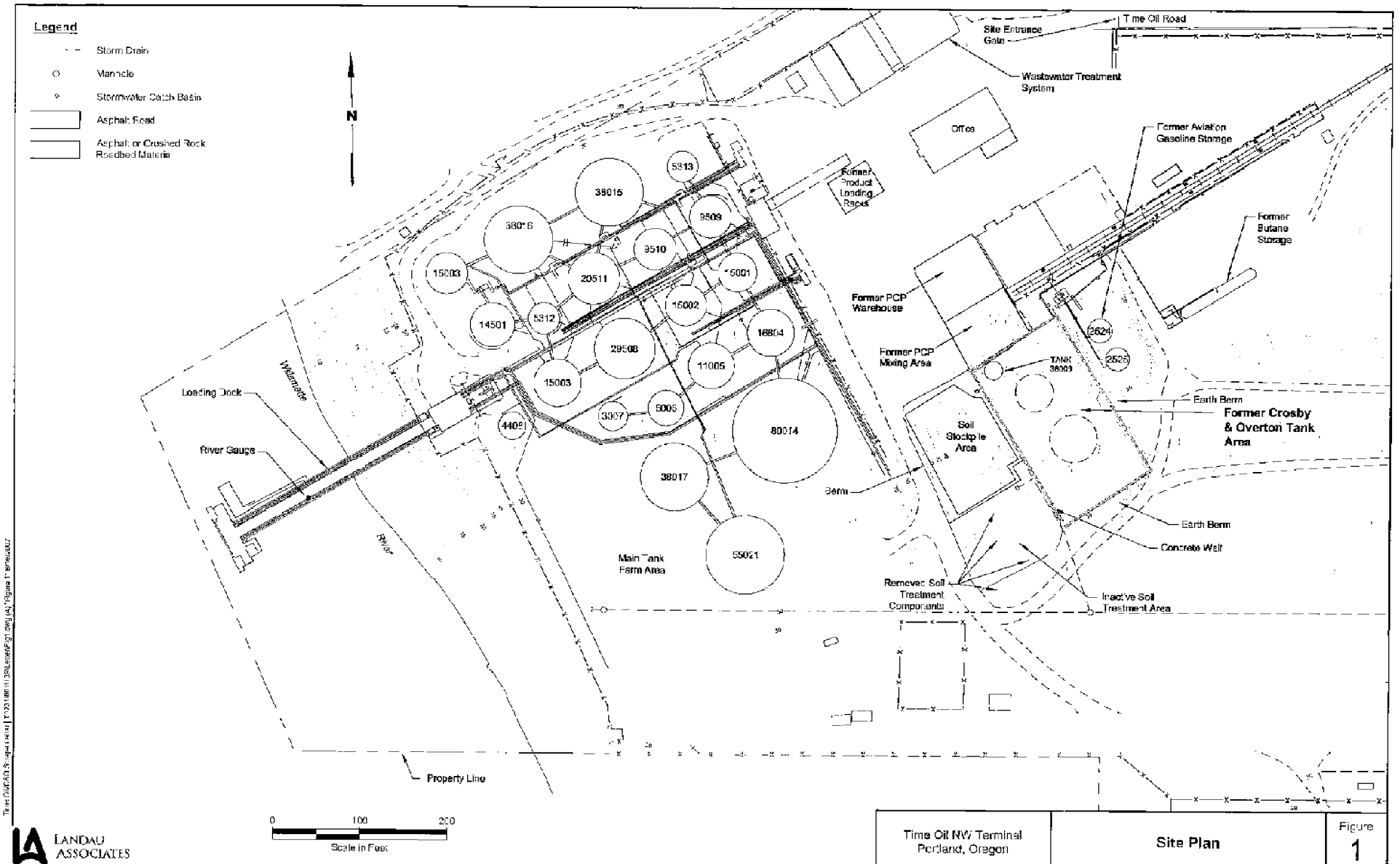
REFERENCES

Landau Associates. 2002a. *Phase I Soil Stockpile Removal Action Plan, Time Oil Northwest Terminal, Portland, Oregon*. Prepared for Time Oil Company. February 8.

Landau Associates. 2002b. *Removal Action Plan, Warehouse Demolition and Soil Excavation, Time Oil Northwest Terminal, Portland, Oregon*. Prepared for Time Oil Co. July 2.

Landau Associates. 2000. *Report Phase II Remedial Investigation, Time Oil Co. Northwest Terminal*. Prepared for Time Oil Co., Seattle, Washington. April 6.

BZTO104(e)016862



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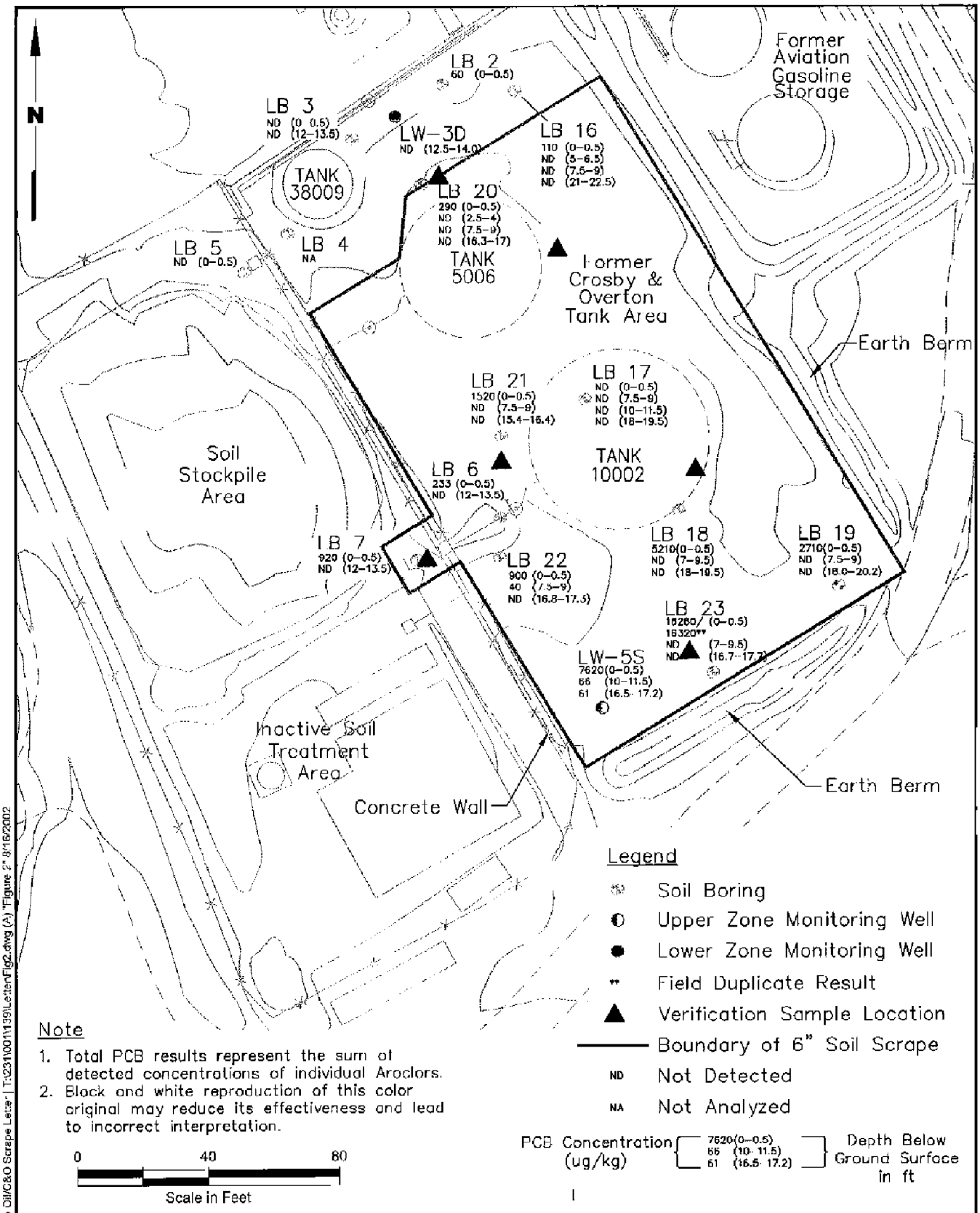

Time Oil/C&O Scrape Letter | T:\231\001\1139\Letter\Fig2.dwg (A) "Figure 2" 8/16/2002

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Soil Scrape Boundary** **Former Crosby & Overton Tank Area**	Figure **2**

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample	LB6 (0-0.5)	LB6(12-13.5)	LB6(17-18)	LB7(0-0.5)	LB7(12-13.5)	LB7(17-18)	LB13 (0-0.5)	LB13 (5-6.5)	LB16 (7.5-9.0)	Dup LB16 (7.5-9.0)	LB16 (21-22.5)	LB17 (0.5-1.0)	LB17 (7.5-9.0)	LB
Date Collected:	10/23/96	10/23/96	10/23/96	10/25/96	10/25/96	10/25/96	R923AY	R923AZ	R923BA	R923T	R923BB	R923Y	R923Z	
Lab ID	Q650AC	Q650AE	Q650AF	Q650AU	Q650AW	Q650AX	03/12/97	03/12/97	03/12/97	03/12/97	03/12/97	03/11/97	03/11/97	
Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
CHLORINATED PHENOLS (µg/kg)														
Method 8040														
Pentachlorophenol	54	8.0 U	13	120	9.9	8.2 U	140	7.1 J	7.8 U	7.8 U	8.7 U	6.6 U	7.9 U	
2,4,6-Trichlorophenol	NA	8.0 U	NA	7.3 U	NA	NA	7.1 J	7.1 J	7.8 U	21 U	8.7 U	6.6 U	7.9 U	
2,3,6-Trichlorophenol	NA	8.0 U	NA	7.3 U	NA	NA	7.1 J	7.1 J	7.8 U	7.8 U	8.7 U	6.6 U	7.9 U	
2,4,5-Trichlorophenol	NA	8.0 U	NA	7.3 U	NA	NA	7.1 J	7.1 J	7.8 U	7.8 U	8.7 U	6.6 U	7.9 U	
2,3,4-Trichlorophenol	NA	8.0 U	NA	7.3 U	NA	NA	7.1 J	7.1 J	7.8 U	9.4 U	8.7 U	6.6 U	7.9 U	
2,3,5,6-Tetrachlorophenol	NA	8.0 U	NA	7.3 U	NA	NA	15 J	7.1 J	7.8 U	7.8 U	8.7 U	6.6 U	7.9 U	
2,3,4,5-Tetrachlorophenol	NA	8.0 U	NA	9.7 U	NA	NA	7.1 J	7.1 J	7.8 U	7.8 U	8.7 U	6.6 U	7.9 U	
SEMIVOLATILES (µg/kg)														
Method SW8270														
Phenol	NA	170 U	NA	160 U	NA	NA	150 J	NA	NA	NA	NA	NA	170 U	
Bis-(2-Chloroethyl) Ether	NA	170 U	NA	160 U	NA	NA	150 J	NA	NA	NA	NA	NA	170 U	
2-Chlorophenol	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
1,3-Dichlorobenzene	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
1,4-Dichlorobenzene	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
Benzyl Alcohol	NA	430 U	NA	400 U	NA	NA	380 J	NA	NA	NA	NA	NA	420 U	
1,2-Dichlorobenzene	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
2-Methylphenol	NA	170 U	NA	160 U	NA	NA	150 J	NA	NA	NA	NA	NA	170 U	
2,2'-Oxybis(1-Chloropropane)	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
4-Methylphenol	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
N-Nitroso-Di-N-Propylamine	NA	170 U	NA	160 U	NA	NA	150 J	NA	NA	NA	NA	NA	170 U	
Hexachloroethane	NA	170 U	NA	160 U	NA	NA	150 J	NA	NA	NA	NA	NA	170 U	
Nitrobenzene	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
Isophorone	NA	87 U	NA	80 U	NA	NA	76 J	NA	NA	NA	NA	NA	84 U	
2-Nitrophenol	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
2,4-Dimethylphenol	NA	260 U	NA	240 U	NA	NA	230 U	NA	NA	NA	NA	NA	250 U	
Benzoic Acid	NA	870 U	NA	800 U	NA	NA	760 U	NA	NA	NA	NA	NA	840 U	
bis (2-Chloroethoxy) Methane	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
2,4-Dichlorophenol	NA	260 U	NA	240 U	NA	NA	230 U	NA	NA	NA	NA	NA	250 U	
1,2,4-Trichlorobenzene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
Naphthalene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
4-Chloroaniline	NA	260 U	NA	240 U	NA	NA	230 U	NA	NA	NA	NA	NA	250 U	
Hexachlorobutadiene	NA	170 U	NA	160 U	NA	NA	150 U	NA	NA	NA	NA	NA	170 U	
4-Chloro-3-methylphenol	NA	170 U	NA	160 U	NA	NA	150 U	NA	NA	NA	NA	NA	170 U	
2-Methylnaphthalene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
Hexachlorocyclopentadiene	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
2,4,6-Trichlorophenol	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
2,4,5-Trichlorophenol	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
2-Chloronaphthalene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
2-Nitroaniline	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
Dimethylphthalate	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
Acenaphthylene	NA	87 U	NA	220	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
3-Nitroaniline	NA	520 U	NA	480 U	NA	NA	460 U	NA	NA	NA	NA	NA	500 U	
Acenaphthene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
2,4-Dinitrophenol	NA	870 U	NA	800 U	NA	NA	760 U	NA	NA	NA	NA	NA	840 U	
4-Nitrophenol	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
Dibenzofuran	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
2,6-Dinitrotoluene	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
2,4-Dinitrotoluene	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
Diethylphthalate	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
4-Chlorophenyl-phenylether	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
Fluorene	NA	87 U	NA	89	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
4-Nitroaniline	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
4,6-Dinitro-2-Methylphenol	NA	870 U	NA	800 U	NA	NA	760 U	NA	NA	NA	NA	NA	840 U	
N-Nitrosodiphenylamine	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
4-Bromophenyl-phenylether	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	317 (10-11.5)	LB17 (18-19.5)	LB18 (0-0.5)	LB18 (7.5-9.0)	LB18 (18-19.5)	LB19 (0-0.5)	LB19 (7.5-9.0)	LB19 (18.0-20.2)	LB20 (0-0.5)	LB20 (2.5-4.0)	LB20 (7.5-9.0)	LB20 (16.3-17.9)	LB21 (0-0.5)
Date Collected:	R923AA	R923AB	R923AC	R923AD	R923AE	R923AF	R923AG	R923AH	R923A	R923AJ	R923AK	R923AL	R923AM
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
CHLORINATED PHENOLS (µg/kg)													
Method 8040													
Pentachlorophenol	6.0 U	8.3 U	**180**	7.8 U	8.4 U	**140**	8.3 U	8.1 U	**610**	**700**	**44**	6.3 J	**460**
2,4,6-Trichlorophenol	6.0 U	8.3 U	7.7 U	7.8 U	8.4 U	7.3 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	7.7 U
2,3,6-Trichlorophenol	6.0 U	8.3 U	7.7 U	7.8 U	8.4 U	7.3 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	7.7 U
2,4,5-Trichlorophenol	6.0 U	8.3 U	7.7 U	7.8 U	8.4 U	7.3 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	7.7 U
2,3,4-Trichlorophenol	6.0 U	8.3 U	7.7 U	7.8 U	8.4 U	7.3 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	7.7 U
2,3,5,6-Tetrachlorophenol	6.0 U	8.3 U	**16**	7.8 U	8.4 U	9.0 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	7.7 U
2,3,4,5-Tetrachlorophenol	6.0 U	8.3 U	7.7 U	7.8 U	8.4 U	12 U	8.3 U	8.1 U	6.9 U	6.9 U	7.7 U	6.3 J	**10**
SEMIVOLATILES (µg/kg)													
Method SW8270													
Phenol	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
Bis-(2-Chloroethyl) Ether	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
2-Chlorophenol	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
1,3-Dichlorobenzene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
1,4-Dichlorobenzene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Benzyl Alcohol	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 J	NA
1,2-Dichlorobenzene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2-Methylphenol	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
2,2'-Oxybis(1-Chloropropane)	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
4-Methylphenol	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
N-Nitroso-Di-N-Propylamine	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
Hexachloroethane	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
Nitrobenzene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Isophorone	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2-Nitrophenol	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 J	NA
2,4-Dimethylphenol	250 U	260 U	240 U	NA	NA	NA	NA	NA	NA	NA	250 U	200 J	NA
Benzoic Acid	840 U	880 U	820 U	NA	NA	NA	NA	NA	NA	NA	820 U	680 J	NA
bis (2-Chloroethoxy) Methane	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2,4-Dichlorophenol	250 U	260 U	240 U	NA	NA	NA	NA	NA	NA	NA	250 U	200 J	NA
1,2,4-Tri-chlorobenzene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Naphthalene	84 U	88 U	**97**	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
4-Chloroaniline	250 U	260 U	240 U	NA	NA	NA	NA	NA	NA	NA	250 U	200 J	NA
Hexachlorobutadiene	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
4-Chloro-3-methylphenol	170 U	160 U	160 U	NA	NA	NA	NA	NA	NA	NA	160 U	140 J	NA
2-Methylnaphthalene	84 U	**130**	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Hexachlorocyclopentadiene	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
2,4,6-Trichlorophenol	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
2,4,5-Trichlorophenol	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
2-Chloronaphthalene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2-Nitroaniline	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
Dimethylphthalate	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Acenaphthylene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
3-Nitroaniline	510 U	530 U	490 U	NA	NA	NA	NA	NA	NA	NA	490 U	410 U	NA
Acenaphthene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2,4-Dinitrophenol	840 U	880 U	820 U	NA	NA	NA	NA	NA	NA	NA	820 U	680 U	NA
4-Nitrophenol	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
Dibenzofuran	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
2,6-Dinitrotoluene	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
2,4-Dinitrotoluene	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 J	NA
Diethylphthalate	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
4-Chlorophenyl-phenylether	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
Fluorene	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
4-Nitroaniline	420 U	440 U	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
4,6-Dinitro-2-Methylphenol	840 U	880 U	820 U	NA	NA	NA	NA	NA	NA	NA	820 U	680 U	NA
N-Nitrosodiphenylamine	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA
4-Bromophenyl-phenylether	84 U	88 U	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 J	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	B21 (7.5-9.0)	B21 (15.4-16.4)	LB22 (0-0.5)	LB22 (7.5-9.0)	LB22 (16.5-17.3)	LB23 (0-0.5)	Dup of LB23 (0-0.5)	LB23 (7.5-9.0)	LB23 (16.7-17.7)	LS7 (0.0-0.5) LW5S (0-0.5)	LW5S (10-11.5)	LW5S (16.5-17.2)
Date Collected:	R923AN	R923AO	R923AP	R923AQ	R923AR	R923AS	R923AV	R923AT	R923AJ	R923U	R923V	R923X
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/12/97	03/12/97	03/12/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
CHLORINATED PHENOLS (µg/kg)												
Method 8040												
Pentachlorophenol	8.4 U	9.1 J	**190**	**6.4**	7.9 U	**550**	**570**	8.2 U	**11**	**440**	7.7 J	**13**
2,4,6-Trichlorophenol	8.4 U	9.1 J	7.2 U	7.5 J	7.9 U	9.1 U	7.4 U	8.2 U	8.1 U	7.1 J	8.1 J	8.1 U
2,3,6-Trichlorophenol	8.4 U	9.1 J	7.2 U	7.5 J	7.9 U	7.1 U	7.4 U	8.2 U	8.1 U	7.1 J	8.1 J	8.1 U
2,4,5-Trichlorophenol	8.4 U	9.1 J	7.2 U	7.5 J	7.9 U	7.1 U	7.4 U	8.2 U	8.1 U	7.1 J	8.1 J	8.1 U
2,3,4-Trichlorophenol	8.4 U	9.1 J	7.2 U	7.5 J	7.9 U	7.1 U	7.4 U	8.2 U	8.1 U	7.1 J	8.1 J	8.1 U
2,3,5,6-Tetrachlorophenol	8.4 U	5.1 J	7.2 U	7.9 J	7.9 U	24 U	25 U	8.2 U	8.1 U	25 U	8.1 J	8.1 U
2,3,4,5-Tetrachlorophenol	8.4 U	9.1 J	**21**	7.9 J	7.9 U	**29**	**43**	8.2 U	8.1 U	7.1 J	8.1 J	8.1 U
SEMIVOLATILES (µg/kg)												
Method SW8270												
Phenol	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
Bis-(2-Chloroethyl) Ether	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
2-Chlorophenol	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
1,3-Dichlorobenzene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
1,4-Dichlorobenzene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
Benzyl Alcohol	NA	NA	NA	420 J	420 U	NA	NA	NA	NA	750 J	430 J	430 U
1,2-Dichlorobenzene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
2-Methylphenol	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
4-Methylphenol	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
N-Nitroso-Di-N-Propylamine	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
Hexachloroethane	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
Nitrobenzene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
Isophorone	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
2-Nitrophenol	NA	NA	NA	420 J	420 U	NA	NA	NA	NA	750 J	430 J	430 U
2,4-Dimethylphenol	NA	NA	NA	250 J	250 U	NA	NA	NA	NA	450 J	250 J	260 U
Benzoic Acid	NA	NA	NA	850 J	840 U	NA	NA	NA	NA	1500 J	860 J	860 U
bis (2-Chloroethoxy) Methane	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
2,4-Dichlorophenol	NA	NA	NA	250 J	250 U	NA	NA	NA	NA	450 J	250 J	260 U
1,2,4-Trichlorobenzene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
Naphthalene	NA	NA	NA	85 J	84 U	NA	NA	NA	NA	150 J	85 J	86 U
4-Chloroaniline	NA	NA	NA	250 J	250 U	NA	NA	NA	NA	450 J	250 J	260 U
Hexachlorobutadiene	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
4-Chloro-3-methylphenol	NA	NA	NA	170 J	170 U	NA	NA	NA	NA	300 J	170 J	170 U
2-Methylnaphthalene	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	**210**	86 U	86 U
Hexachlorocyclopentadiene	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
2,4,6-Trichlorophenol	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
2,4,5-Trichlorophenol	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
2-Chloronaphthalene	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
2-Nitroaniline	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
Dimethylphthalate	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
Acenaphthylene	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	**510**	86 J	86 U
3-Nitroaniline	NA	NA	NA	500 J	500 J	NA	NA	NA	NA	900 J	520 J	520 U
Acenaphthene	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	**230**	86 J	86 U
2,4-Dinitrophenol	NA	NA	NA	830 J	840 J	NA	NA	NA	NA	1500 J	860 J	860 U
4-Nitrophenol	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
Dibenzofuran	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
2,6-Dinitrotoluene	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
2,4-Dinitrotoluene	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
Diethylphthalate	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
4-Chlorophenyl-phenylether	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
Fluorene	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	**440**	86 J	86 U
4-Nitroaniline	NA	NA	NA	420 J	420 J	NA	NA	NA	NA	750 J	430 J	430 U
4,6-Dinitro-2-Methylphenol	NA	NA	NA	830 J	840 J	NA	NA	NA	NA	1500 J	860 J	860 U
N-Nitrosodiphenylamine	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U
4-Bromophenyl-phenylether	NA	NA	NA	83 J	84 J	NA	NA	NA	NA	150 J	86 J	86 U

BZTO104(e)016867

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	LB6 (0-0.5)	LB6(12-13.5)	LB6(17-18)	LB7(0-0.5)	LB7(12-13.5)	LB7(17-18)	LB16 (0-0.5)	LB16 (5-6.5)	LB18 (7.5-9.0)	LB7 (27.5-29.0) Dup LB18 (7.5-9.0)	LB18 (21-22.5)	LB17 (0.5-1.0)	LB17 (7.5-9.0)	LB
Date Collected:	10/23/96	10/23/96	10/23/96	10/25/96	10/25/96	10/25/96	R923AY	R923AZ	R923BA	R923T	R923BB	R923Y	R923Z	
Lab ID:	Q650AC	Q650AE	Q650AF	Q650AU	Q650AW	Q650AX	03/12/97	03/12/97	03/12/97	03/12/97	03/12/97	03/11/97	03/11/97	
Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Hexachlorobenzene	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 U	
Pentachlorophenol	NA	430 U	NA	500	NA	NA	380 U	NA	NA	NA	NA	NA	420 U	
Phenanthrene	NA	87 U	NA	5100	NA	NA	140	NA	NA	NA	NA	NA	84 J	
Carbazole	NA	87 U	NA	200	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
Anthracene	NA	87 U	NA	740	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
Di-n-Butylphthalate	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
Fluoranthene	NA	87 U	NA	8900	NA	NA	330	NA	NA	NA	NA	NA	84 J	
Pyrene	NA	87 U	NA	18000	NA	NA	680	NA	NA	NA	NA	NA	84 J	
Butylbenzylphthalate	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
3,3'-Dichlorobenzidine	NA	430 U	NA	400 U	NA	NA	380 U	NA	NA	NA	NA	NA	420 J	
Benzo(a)anthracene	NA	87 U	NA	4100	NA	NA	150	NA	NA	NA	NA	NA	84 J	
bis(2-Ethylhexyl)phthalate	NA	87 U	NA	280	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
Chrysene	NA	87 U	NA	6300	NA	NA	240	NA	NA	NA	NA	NA	84 J	
Di-n-Octylphthalate	NA	87 U	NA	80 U	NA	NA	76 U	NA	NA	NA	NA	NA	84 J	
Benzo(b)fluoranthene	NA	87 U	NA	5300	NA	NA	220	NA	NA	NA	NA	NA	84 J	
Benzo(k)fluoranthene	NA	87 U	NA	5000	NA	NA	150	NA	NA	NA	NA	NA	84 J	
Benzo(a)pyrene	NA	87 U	NA	7100	NA	NA	260	NA	NA	NA	NA	NA	84 J	
Indeno(1,2,3-cd)pyrene	NA	87 U	NA	6700	NA	NA	280	NA	NA	NA	NA	NA	84 J	
Dibenz(a,h)anthracene	NA	87 U	NA	1100	NA	NA	79	NA	NA	NA	NA	NA	84 J	
Benzo(g,h,i)perylene	NA	87 U	NA	9900	NA	NA	400	NA	NA	NA	NA	NA	84 J	
VOLATILES (µg/kg)														
Method SW8260														
Chloromethane	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromomethane	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Vinyl Chloride	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroethane	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methylene Chloride	NA	4.0	NA	2.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Acetone	NA	11 U	NA	5.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon Disulfide	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethane	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
trans-1,2-Dichloroethene	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
cis-1,2-Dichloroethene	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloroform	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Butanone	NA	6.4 U	NA	5.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,1-Trichloroethane	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Carbon Tetrachloride	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Vinyl Acetate	NA	R	NA	R	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloropropane	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
cis-1,3-Dichloropropene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Trichloroethene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Dibromochloromethane	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2-Trichloroethane	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
trans-1,3-Dichloropropene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Chloroethylvinylether	NA	6.4 U	NA	5.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromoform	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
4-Methyl-2-Pentanone	NA	6.4 U	NA	5.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Hexanone	NA	6.4 U	NA	5.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tetrachloroethene	NA	6.3	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1,2,2-Tetrachloroethane	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Toluene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Ethylbenzene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Styrene	NA	1.3 U	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Trichlorofluoromethane	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	917 (10-11.5)	LB17 (18-19.5)	LB18 (0-0.5)	LB18 (7.5-9.0)	LB18 (18-19.5)	LB19 (0-0.5)	LB19 (7.5-9.0)	LB19 (18.0-20.2)	LB20 (0-0.5)	LB20 (2.5-4.0)	LB20 (7.5-9.0)	LB20 (16.3-17.0)	LB21 (0-0.5)
Date Collected:	R923AA	R923AB	R923AC	R923AD	R923AE	R923AF	R923AG	R923AH	R923AI	R923AJ	R923AK	R923AL	R923AM
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Hexachlorobenzene	84 U	88 U	82 J	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Pentachlorophenol	420 J	440 U	1100	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
Phenanthrene	84 U	180	520	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Carbazole	84 U	88 U	270	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Anthracene	84 U	88 U	4100	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Di-n-Butylphthalate	84 U	88 J	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Fluoranthene	84 U	180	770	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Pyrene	84 U	300	950	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
Butylbenzylphthalate	84 U	88 J	82 U	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
3,3'-Dichlorobenzidine	420 U	440 J	410 U	NA	NA	NA	NA	NA	NA	NA	410 U	340 U	NA
Benzo(a)anthracene	84 U	140	880	NA	NA	NA	NA	NA	NA	NA	82 U	68 U	NA
bis(2-Ethylhexyl)phthalate	84 U	480	130	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Chrysene	84 U	160	1200	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Di-n-Octyl phthalate	84 U	88 J	82 U	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Benzo(b)fluoranthene	84 U	88 J	1100	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Benzo(k)fluoranthene	84 U	88 J	840	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Benzo(a)pyrene	84 U	110	960	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
indeno(1,2,3-cd)pyrene	84 U	88 U	910	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Dibenz(a,h)anthracene	84 U	88 U	280	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
Benzo(g,h,i)perylene	84 U	88 U	1300	NA	NA	NA	NA	NA	NA	NA	82 J	68 U	NA
VOLATILES (µg/kg)													
Method SW8260													
Chloromethane	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	4.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	8.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloroethylvinylether	6.1 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-Pentanone	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample	LB21 (7.5-9.0)	LB21 (15.4-16.4)	LB22 (0-0.5)	LB22 (7.5-9.0)	LB22 (16.8-17.3)	LB23 (0-0.5)	Dup of LB23 (0-0.5)	LB23 (7.5-9.0)	LB23 (16.7-17.7)	LW5S (0-0.5)	LW5S (10-11.5)	LW5S (16.5-17.2)
Date Collected	R923AN	R923AO	R923AP	R923AQ	R923AR	R923AS	R923AV	R923AT	R923AL	R923U	R923V	R923X
Lab ID	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/12/97	03/12/97	03/12/97
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Hexachlorobenzene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	150 U	86 U	86 U
Pentachlorophenol	NA	NA	NA	420 U	420 U	NA	NA	NA	NA	**900**	430 U	430 U
Phenanthrene	NA	NA	NA	**130**	84 U	NA	NA	NA	NA	**16000**	**130**	**720**
Carbazole	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**330**	86 U	86 U
Anthracene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**3800**	86 U	**170**
Di-n-Butylphthalate	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	150 U	86 U	86 U
Fluoranthene	NA	NA	NA	**150**	**91**	NA	NA	NA	NA	**42000**	**320**	**970**
Pyrene	NA	NA	NA	**240**	**130**	NA	NA	NA	NA	**67000**	**570**	**1300**
Butylbenzylphthalate	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	150 U	86 U	86 U
3,3'-Dichlorobenzidine	NA	NA	NA	420 U	420 U	NA	NA	NA	NA	750 U	430 U	430 U
Benzo(a)anthracene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**18000**	**150**	**390**
bis(2-Ethylhexyl)phthalate	NA	NA	NA	**220**	**190**	NA	NA	NA	NA	**210**	86 U	86 U
Chrysene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**27000**	**230**	**500**
Di-n-Octyl phthalate	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	150 U	86 U	86 U
Benzo(b)fluoranthene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**22000**	**200**	**290**
Benzo(k)fluoranthene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**18000**	**170**	**330**
Benzo(a)pyrene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**27000**	**220**	**500**
Indeno(1,2,3-cd)pyrene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**22000**	**210**	**370**
Dibenz(a,h)anthracene	NA	NA	NA	83 U	84 U	NA	NA	NA	NA	**5800**	86 U	**89**
Benzo(g,h,i)perylene	NA	NA	NA	**120**	84 U	NA	NA	NA	NA	**30000**	**330**	**490**
VOLATILES (µg/kg)												
Method SW8260												
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloroethylvinylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-Pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	LB6 (0-0.5)	LB6(12-13.5)	LB6(17-18)	LB7(0-0.5)	LB7(12-13.5)	LB7(17-18)	LB16 (0-0.5)	LB16 (5-5.5)	LB16 (7.5-9.0)	Dup LB16 (7.5-9.0)	LB16 (21-22.5)	LB17 (0.5-1.0)	LB17 (7.5-9.0)	LB
Date Collected:	10/23/96	10/23/96	10/23/96	10/25/96	10/25/96	10/25/96	R923AY	R923AZ	R923BA	R923T	R923BB	R923Y	R923Z	
Lab ID:	Q650AC	Q650AE	Q650AF	Q650AU	Q650AW	Q650AX	03/12/97	03/12/97	03/12/97	03/12/97	03/12/97	03/11/97	03/11/97	
Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
1,1,2-Trichlorotrifluoroethane	NA	2.6 U	NA	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
m,p-Xylene	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
o-Xylene	NA	1.3 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
TPH (mg/kg)														
Method 8015														
TPH - HCID (Diesel)	71	25 U	57	540	25 U	25 U	NA	NA	NA	NA	NA	NA	NA	
TPH - HCID (Gasoline)	20 U	20 U	20 U	20 U	20 U	20 U	NA	NA	NA	NA	NA	NA	NA	
TPH - HCID (Oil)	180	50 U	120	770	50 U	50 U	NA	NA	NA	NA	NA	NA	NA	
Diesel Range Hydrocarbons	NA	NA	NA	930	NA	NA	45	58	6.3 U	6.2 J	19	5100	6.4 U	
Gasoline Range Hydrocarbons	NA	NA	NA	NA	NA	NA	5.0 U	5.0 U	5.1 U	5.0 J	4.9 U	44	5.0 U	
PRIORITY POLLUTANT METALS (mg/kg)														
Antimony (7041)	NA	6 UJ	NA	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arsenic (7060)	NA	6 U	NA	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Beryllium (6010)	NA	0.4	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Cadmium (6010)	NA	0.3 U	NA	1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chromium (6010)	NA	23.3	NA	53.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Copper (6010)	NA	21.6	NA	140	NA	NA	350	18.1	17.3	16.9	18.1	32.0	16.0	
Lead (7421)	NA	5	NA	149	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Mercury (7471)	NA	0.06 U	NA	0.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nickel (6010)	NA	24	NA	32	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Selenium (7740)	NA	13	NA	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Silver (6010)	NA	0.4 UJ	NA	0.4 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Thallium (7841)	NA	6 U	NA	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Zinc (6010)	NA	59.7	NA	318	NA	NA	143	52.9	48.7	50.2	55.9	46.6	49.8	
PCBs (µg/kg)														
Method SW8081														
Aroclor 1016	38 U	43 U	NA	40 U	44 U	NA	38 U	38 U	42 U	42 J	47 J	37 U	42 U	
Aroclor 1242	38 U	43 U	NA	40 U	44 U	NA	38 U	38 U	42 U	42 J	47 J	37 U	42 U	
Aroclor 1248	38 U	43 U	NA	40 U	44 U	NA	38 U	38 U	42 U	42 J	47 J	37 U	42 U	
Aroclor 1254	180	43 U	NA	620	44 U	NA	110	38 U	42 U	42 J	47 J	37 U	42 U	
Aroclor 1260	53	43 U	NA	300	44 U	NA	68 U	110 U	42 U	42 J	47 J	37 U	42 U	
Aroclor 1221	NA	85 U	NA	80 U	NA	NA	76 U	76 U	84 U	83 J	93 J	73 U	85 U	
Aroclor 1232	NA	43 U	NA	40 U	NA	NA	38 U	38 U	42 U	42 U	47 J	37 U	42 U	
DIOXINS AND FURANS (ng/kg)														
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	317 (10-11.5)	LB17 (18-19.5)	LB18 (0-0.5)	LB18 (7.5-9.0)	LB18 (18-19.5)	LB19 (0-0.5)	LB19 (7.5-9.0)	LB19 (18.3-20.2)	LB20 (0-0.5)	LB20 (2.5-4.0)	LB20 (7.5-9.0)	LB20 (16.3-17.0)	LB21 (0-0.5) L
Date Collected:	R923AA	R923AB	R923AC	R923AD	R923AE	R923AF	R923AG	R923AH	R923A	R923AJ	R923AK	R923AL	R923AM
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
1,1,2-Trichlorotrifluoroethane	2.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH (mg/kg)													
Method 8015													
TPH - HCID (Diesel)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH - HCID (Gasoline)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH - HCID (Oil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Hydrocarbons	6.4 U	**38**	**190**	6.2 U	**10**	**200**	6.6 U	18	**110**	5.6 U	6.2 U	5.1 J	**80**
Gasoline Range Hydrocarbons	NA	5.0 U	5.1 U	5.0 U	5.0 U	5.0 J	5.0 U	5.0 J	5.0 L	5.0 U	5.0 U	5.1 J	5.0 U
PRIORITY POLLUTANT METALS (mg/kg)													
Antimony (7041)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (7060)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (6010)	**17.9**	**18.8**	**31.7**	**16.9**	**21.5**	**30.0**	17.3	16.8	**542**	**17.8**	**23.4**	**16.4**	**71.0**
Lead (7421)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (7471)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium (7740)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium (7841)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc (6010)	**51.5**	**51.4**	**101**	**49.7**	**60.3**	78.2	**53.8**	**54.9**	**441**	**54.7**	**55.9**	**52.8**	**173**
PCBs (µg/kg)													
Method SW8081													
Aroclor 1016	43 U	44 U	41 U	42 J	45 U	39 U	44 J	44 U	37 U	37 U	41 U	33 U	42 J
Aroclor 1242	43 U	44 U	41 U	42 J	45 U	39 U	44 J	44 U	37 U	37 U	41 U	33 U	42 J
Aroclor 1248	43 U	44 U	**5000**	42 J	45 U	**2800**	44 J	44 U	37 U	37 U	41 U	33 U	**1300**
Aroclor 1254	43 U	44 U	41 U	42 J	45 U	39 U	44 J	44 U	**290**	37 U	41 U	33 U	42 J
Aroclor 1260	43 U	44 U	**210**	42 J	45 U	110	44 J	44 U	34 U	37 U	41 U	33 U	**220**
Aroclor 1221	85 U	88 U	82 U	85 J	90 U	78 U	85 J	88 U	74 U	75 U	82 U	67 U	83 J
Aroclor 1232	43 U	44 U	41 U	42 J	45 U	39 U	44 U	44 U	37 U	37 U	41 U	33 U	42 J
DIOXINS AND FURANS (ng/kg)													
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	LB21 (7.5-9.0)	LB21 (15.4-16.4)	LB22 (0-0.5)	LB22 (7.5-9.0)	LB22 (16.8-17.3)	LB23 (0-0.5)	Dup of LB23 (0-0.5)	LB23 (7.5-9.0)	LB23 (15.7-17.7)	LW5S (0-0.5)	LW5S (10-11.5)	LW5S (16.5-17.2)
						LS7 (0.0-0.5)						
Date Collected:	R923AN	R923AO	R923AP	R923AQ	R923AR	R923AS	R923AV	R923AT	R923AU	R923U	R923V	R923X
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/12/97	03/12/97	03/12/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
1,1,2-Trichlorotrifluoroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH (mg/kg)												
Method 8015												
TPH - HCID (Diesel)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH - HCID (Gasoline)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH - HCID (Oil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Hydrocarbons	6.7 U	6.6 U	**420**	**11**	**7.3**	**640**	**550**	6.6 U	6.5 U	**970**	**8.3**	**17**
Gasoline Range Hydrocarbons	5.1 U	5.0 U	4.9 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.1 U	5.0 U	5.0 U	5.0 U
PRIORITY POLLUTANT METALS (mg/kg)												
Antimony (7041)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (7060)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (6010)	**16.5**	**17.8**	**293**	**19.7**	**19.2**	**61.7**	**61.7**	**16.8**	**18.3**	**176**	**18.8**	**18.1**
Lead (7421)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (7471)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium (7740)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver (6010)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium (7841)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc (6010)	**51.3**	**53.2**	**397**	**54.9**	**58.7**	**214**	**201**	**52.5**	**55.4**	**479**	**56.9**	**54.9**
PCBs (µg/kg)												
Method SW8081												
Aroclor 1016	45 U	43 U	38 U	42 U	42 U	38 U	43 J	44 U	44 U	38 U	43 U	43 J
Aroclor 1242	45 U	43 U	38 U	42 U	42 U	38 U	43 J	44 U	44 U	38 U	43 U	43 J
Aroclor 1248	45 U	43 U	**600**	**40** J	42 U	14000	14000	44 U	44 U	**7400**	**66**	**61**
Aroclor 1254	45 U	43 U	38 U	42 U	42 U	1900 U(a)	2300 J(a)	44 U	44 U	38 U	43 U	43 J
Aroclor 1260	45 U	43 U	**300**	42 U	42 U	**380**	**320**	44 U	44 U	**220**	43 U	43 J
Aroclor 1221	90 U	87 U	77 U	84 U	84 U	76 U	83 J	88 U	87 U	76 U	87 U	86 J
Aroclor 1232	45 U	43 U	38 U	42 U	42 U	38 U	43 J	44 U	44 U	38 U	43 U	43 J
DIOXINS AND FURANS (ng/kg)												
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	LB6 (0-0.5)	LB6(12-13.5)	LB6(17-18)	LB7(0-0.5)	LB7(12-13.5)	LB7(17-18)	LB16 (0-0.5)	LB16 (5-6.5)	LB16 (7.5-9.0)	Dup LB16 (7.5-9.0)	LB16 (21-22.5)	LB17 (0.5-1.0)	LB17 (7.5-9.0)	LB
Date Collected:	10/23/96	10/25/96	10/23/96	10/25/96	10/25/96	10/25/96	R923AY	R923AZ	R923BA	R923	R923BB	R923Y	R923Z	
Lab ID:	Q650AC	Q650AE	Q650AF	Q650AU	Q650AW	Q650AX	03/12/97	03/12/97	03/12/97	03/12/97	03/12/97	03/11/97	03/11/97	
Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PAHs (µg/kg)														
Method SW8270-SIM														
Naphthalene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	10	6600	NA	
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	9.3 L	63000	NA	
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	22	1100 U	NA	
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	9.4	3000	NA	
Fluorene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	11	3800	NA	
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	210	15000 J2	NA	
Anthracene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	100	3600	NA	
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	7.6	8.3 U	8.3 J	350	2000 J2	NA	
Pyrene	NA	NA	NA	NA	NA	NA	NA	11	8.3 U	8.3 J	400	13000 J2	NA	
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	250	8700	NA	
Chrysene	NA	NA	NA	NA	NA	NA	NA	38	8.3 U	8.3 J	240	12000 J2	NA	
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	110	1500	NA	
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	170	1100 U	NA	
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	31	8.3 U	8.3 J	230	5600	NA	
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	8.4	8.3 U	8.3 J	80	1100 U	NA	
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	22	1100 U	NA	
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	9.2	8.3 U	8.3 J	80	1100 U	NA	
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	7.6 U	8.3 U	8.3 J	9.3 L	1100 U	NA	
BETX (µg/kg)														
Method SW8020														
Benzene	NA	NA	NA	NA	NA	NA	57 U	57 U	61 U	62 J	64 L	54 U	66 U	
Toluene	NA	NA	NA	NA	NA	NA	57 U	57 U	61 U	62 J	64 L	54 U	66 U	
Ethylbenzene	NA	NA	NA	NA	NA	NA	57 U	57 U	61 U	62 J	64 L	98	66 U	
m,p-Xylene	NA	NA	NA	NA	NA	NA	57 U	57 U	61 U	62 J	64 L	120	66 U	
o-Xylene	NA	NA	NA	NA	NA	NA	57 U	57 U	61 U	62 J	64 L	170 U	66 U	
CONVENTIONAL PARAMETERS														
Soil pH (EPA 150.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Solids (%) (EPA 160.3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total Organic Carbon (%) (Plumb, 1981)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample	LB17 (10-11.5)	LB17 (18-19.5)	LB18 (0-0.5)	LB18 (7.5-9.0)	LB18 (18-19.5)	LB19 (0-0.5)	LB19 (7.5-9.0)	LB19 (18.0-20.2)	LB20 (0-0.5)	LB20 (2.5-4.0)	LB20 (7.5-9.0)	LB20 (16.3-17.0)	LB21 (0-0.5)
Date Collected	R923AA	R923AB	R923AC	R923AD	R923AE	R923AF	R923AG	R923AH	R923AI	R923AJ	R923AK	R923AL	R923AM
Lab ID	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAHs (µg/kg)													
Method SW8270-SIM													
Naphthalene	NA	NA	NA	9.3 J	9.0 U	39 U	5.5 J	8.7 UJ	7.4	7.5 U	NA	NA	**12**
2-Methylnaphthalene	NA	NA	NA	9.3 J	9.0 U	39 U	5.5 U	8.7 UJ	6.2	7.5 U	NA	NA	**9.1**
Acenaphthylene	NA	NA	NA	9.3 J	9.0 U	**380**	5.5 U	**36** J2	10	7.5 U	NA	NA	**93**
Acenaphthene	NA	NA	NA	9.3 J	9.0 U	**42**	5.5 U	**12** J2	7.4 J	7.5 U	NA	NA	**22**
Fluorene	NA	NA	NA	9.3 J	9.0 U	**97**	5.5 J	**23** J2	7.4 J	7.5 U	NA	NA	**23**
Phenanthrene	NA	NA	NA	9.3 J	**24** J2	**3000** J2	5.5 J	**560** J2	37 J2	7.5 U	NA	NA	**500** J2
Anthracene	NA	NA	NA	9.3 J	**9.3**	**1200**	5.5 J	**300** J2	33	7.5 U	NA	NA	**520**
Fluoranthene	NA	NA	NA	9.3 J	71 J2	**7400** J2	**16** J2	**590** J2	140 J2	7.5 U	NA	NA	**1900** J2
Pyrene	NA	NA	NA	9.3 J	**94** J2	**8600** J2	**19** J2	**830** J2	170 J2	7.5 U	NA	NA	**1900** J2
Benzo(a)anthracene	NA	NA	NA	9.3 J	44	**2900**	5.5 J	**420** J2	96	7.5 U	NA	NA	**640**
Chrysene	NA	NA	NA	9.3 J	**39** J2	**3800** J2	5.5 J	**440** J2	150 J2	7.5 U	NA	NA	**1100** J2
Benzo(b)fluoranthene	NA	NA	NA	9.3 J	**23**	**3300**	5.5 J	**220** J2	190	7.5 U	NA	NA	**820**
Benzo(k)fluoranthene	NA	NA	NA	9.3 J	**26**	**3000**	5.5 J	**290** J2	140	7.5 U	NA	NA	**980**
Benzo(a)pyrene	NA	NA	NA	9.3 J	**42**	**4400**	5.5 J	**420** J2	190	7.5 U	NA	NA	**1000**
Indeno(1,2,3-cd)pyrene	NA	NA	NA	9.3 J	**18**	**4000**	5.5 U	**200** J2	160	7.5 U	NA	NA	**810**
Dibenzo(a,h)anthracene	NA	NA	NA	9.3 J	9.0 U	**610**	5.5 J	**31** J2	28	7.5 U	NA	NA	**160**
Benzo(g,h,i)perylene	NA	NA	NA	9.3 J	**21**	**4700**	5.5 J	**200** J2	170	**8.9**	NA	NA	**800**
Dibenzofuran	NA	NA	NA	9.3 J	9.0 U	39 U	5.5 J	8.7 UJ	7.4 U	7.5 U	NA	NA	5.3 U
BETX (µg/kg)													
Method SW8020													
Benzene	NA	68 U	64 U	64 J	69 U	60 U	65 J	64 U	57 U	57 U	62 U	65 U	62 J
Toluene	NA	68 U	64 U	64 J	69 U	60 U	65 J	64 U	57 U	57 U	62 U	65 U	62 J
Ethylbenzene	NA	68 U	64 U	64 J	69 U	60 U	65 J	64 U	57 U	57 U	62 U	65 U	62 J
m,p-Xylene	NA	68 U	64 U	64 J	69 U	60 U	65 J	64 U	57 U	57 U	62 U	65 U	62 J
o-Xylene	NA	68 U	64 U	64 J	69 U	60 U	65 J	64 U	57 U	57 U	62 U	65 U	62 J
CONVENTIONAL PARAMETERS													
Soil pH (EPA 150.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Solids (%) (EPA 160.3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (%) (Plumb, 1981)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FORMER CROSBY AND OVERTON TANK FARM AREA
TIME OIL NORTHWEST TERMINAL

Sample:	LB21 (7.5-9.0)	LB21 (15.4-16.4)	LB22 (0-0.5)	LB22 (7.5-9.0)	LB22 (16.6-17.3)	LB23 (0-0.5)	LS7 (0.0-0.5) Dup of LB23 (0-0.5)	LB23 (7.5-9.0)	LB23 (16.7-17.7)	LW5S (0-0.5)	LW5S (10-11.5)	LW5S (16.5-17.2)
Date Collected:	R923AN	R923AO	R923AP	R923AQ	R923AR	R923AS	R923AV	R923AT	R923AU	R923J	R923V	R923X
Lab ID:	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/11/97	03/12/97	03/12/97	03/12/97
Matrix:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAHs (µg/kg)												
Method SW8270-SIM												
Naphthalene	9.0 U	8.7 J	14 U	NA	NA	220 U	240 U	8.8 U	8.8 U	NA	NA	NA
2-Methylnaphthalene	9.0 U	8.7 J	14 U	NA	NA	220 U	240 U	8.8 U	8.8 U	NA	NA	NA
Acenaphthylene	9.0 U	8.7 J	100	NA	NA	220	240 U	8.8 U	10	NA	NA	NA
Acenaphthene	9.0 U	8.7 J	17	NA	NA	220 U	240 U	8.8 U	8.8 U	NA	NA	NA
Fluorene	9.0 U	8.7 J	23	NA	NA	220 U	240 U	8.8 U	8.8 U	NA	NA	NA
Phenanthrene	9.0 U	8.7 J	190 J2	NA	NA	10000 J2	4700 J2	40 J2	79 J2	NA	NA	NA
Anthracene	9.0 U	8.7 J	550	NA	NA	3800	4100	8.8 U	29	NA	NA	NA
Fluoranthene	9.0 U	8.7 J	560 J2	NA	NA	22000 J2	14000 J2	72 J2	220 J2	NA	NA	NA
Pyrene	9.0 U	8.7 J	680 J2	NA	NA	28000 J2	16000 J2	78 J2	250 J2	NA	NA	NA
Benzo(a)anthracene	9.0 U	8.7 J	240	NA	NA	8000	5600	19	94	NA	NA	NA
Chrysene	9.0 U	8.7 J	340 J2	NA	NA	12000 J2	7500 J2	27 J2	110 J2	NA	NA	NA
Benzo(b)fluoranthene	9.0 U	8.7 J	470	NA	NA	10000	7700	21	81	NA	NA	NA
Benzo(k)fluoranthene	9.0 U	8.7 J	380	NA	NA	9100	6400	20	96	NA	NA	NA
Benzo(a)pyrene	9.0 U	8.7 J	500	NA	NA	13000	9800	26	130	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.0 U	8.7 J	550	NA	NA	11000	8600	18	79	NA	NA	NA
Dibenzo(a,h)anthracene	9.0 U	8.7 J	100	NA	NA	1100	890	8.8 U	13	NA	NA	NA
Benzo(g,h,i)perylene	9.0 U	8.7 J	710	NA	NA	15000	12000	20	87	NA	NA	NA
Dibenzofuran	9.0 U	8.7 J	14 U	NA	NA	220 U	240 U	8.8 U	8.8 U	NA	NA	NA
BETX (µg/kg)												
Method SW8020												
Benzene	68 U	65 J	57 U	84 J	69 U	58 U	58 U	66 U	68 U	56 J	69 J	74 U
Toluene	68 U	65 J	57 U	84 J	69 U	58 U	58 U	66 U	68 U	56 J	69 J	74 U
Ethylbenzene	68 U	65 J	57 U	84 J	69 U	58 U	58 U	66 U	68 U	56 J	69 J	74 U
m,p-Xylene	68 U	65 J	57 U	84 J	69 U	58 U	58 U	66 U	68 U	56 J	69 J	74 U
o-Xylene	68 U	65 J	57 U	84 J	69 U	58 U	58 U	66 U	68 U	56 J	69 J	74 U
CONVENTIONAL PARAMETERS												
Soil pH (EPA 150.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Solids (%) (EPA 160.3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (%) (Plumb, 1981)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

U = Indicates compound was analyzed for, but was not detected at the given detection limit.
J = Indicates an estimated value of analyte detected and confirmed by analyst with low spectral match parameters.
J1 = Indicates an estimated value when that result is less than the calculated detection limit.
J2 = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
NA = Not analyzed.
(a) = During initial analysis of samples LB23 (0-0.5) and LS7 (0-0.5) the detector was saturated by Aroclor 1248 and Aroclor 1254. The samples were diluted and reanalyzed. Aroclor 1254 was diluted out in each reanalysis, but Aroclor 1248 was not. Aroclor 1254 is present in sample LB23 (0-0.5) at a concentration ranging between 360-1900 (µg/kg) and in sample LS7 (0-0.5) at a concentration ranging between 320-2000 (µg/kg).

BZTO104(e)016876

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

36-102

TRANSMITTAL

RECD AUG 6 2002

To: Oregon Dept. of Environmental Quality
2020 SW Fourth Ave. Suite 400
Portland, OR 97201-4987

Date: August 2, 2002

Attn: Mr. Tom Roick

Project No.: 231001.117

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Memorandum Re: Groundwater Action Interim Status Report - First Quarter 2002, Time Oil Northwest Terminal, Portland, Oregon (8/2/02)

The above-noted groundwater action interim status report is provided for your file.

LANDAU ASSOCIATES, INC.

Terry McGourty for
Rebekah Brooks
Senior Hydrogeologist

RB/tam

Enclosure

cc: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

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TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers, P.E., and Rebekah Brooks

DATE: August 2, 2002

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

This memorandum presents a summary of the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon (Figure 1) for the first quarter of 2002 (January 1 – March 29, 2002). System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm first quarter 2002 compliance with performance criteria for the upper water-bearing zone (upper zone) and the lower water-bearing zone (lower zone) at the site. Specific performance criteria include: 1) pumping of groundwater from an upper zone recovery well (HRW-1) when sufficient groundwater is present in the upper zone, 2) groundwater flow toward HRW-1 from the downgradient and upgradient directions, 3) continuous pumping from a lower zone recovery well (RW-2), except for brief periods of system maintenance, 4) reversal of the lower zone groundwater flow direction at the leading edge of the pentachlorophenol (PCP) plume, 5) chemical confirmation that continued migration of PCP in groundwater downgradient of RW-2 is not occurring, and 6) compliance with the requirements of the existing discharge permit. Figure 1 shows a site plan for the terminal. In addition to the discussion of system performance and status, a brief summary of data collected for the interim action is provided below.

SYSTEM PERFORMANCE AND STATUS

Relative to the six criteria presented above, the following information was derived from the operation of the groundwater interim action remedial system:

1) Startup activities for the groundwater interim action in the upper zone commenced during the first quarter 2002 resulting from increases in groundwater levels during the winter. On January 22, 2002, an attempt was made to begin to extract water from the upper zone at horizontal recovery well HRW-1. A total of approximately 1,812 gallons were extracted from HRW-1 from January 22 to 29, 2002 at an approximate pumping rate of 2.5 gpm, which repeatedly pumped the well dry. Repeated attempts to adjust the pumping rate downward in order to maintain an adequate head for extraction were unsuccessful. The pump in HRW-1 was replaced with a pump capable of extracting water at a lower flow rate and groundwater recovery was initiated again on February 28, 2002. From February 28 to March 29, 2002,

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groundwater was extracted from HRW-1 at an approximate flow rate of 0.8 gallons per minute (gpm). An additional 40,352 gallons of water was extracted from the upper zone during this time, with a total of 42,164 gallons of upper zone groundwater extracted from HRW-1 during the first quarter of 2002. The groundwater recovery pump in HRW-1 was operated for approximately 866 hours and discharged water to an aboveground storage tank (Tank 16804) for temporary storage until treated by the terminal's wastewater treatment system. A summary of the groundwater recovery from HRW-1 is included in Table 1.

2) Groundwater elevation data were collected from the upper zone monitoring wells on February 27 as part of the first quarter 2002 groundwater monitoring event and on March 5, 2002 for compliance with the HRW-1 start-up monitoring requirements. The groundwater elevation data are summarized in Table 2 and presented on Figures 2 (February 27) and 3 (March 5). The groundwater elevation data for the upper zone appear to indicate that the groundwater elevations have decreased throughout the site from February 27 to March 5, 2002, but localized decreases in water levels in close proximity to HRW-1 were not observed. Therefore, the decrease does not appear to be due to the extraction of groundwater from HRW-1.

3) With the exception of periodic shutdowns for system maintenance, groundwater has been extracted continuously from the lower zone during the first quarter of 2002 by operating the groundwater recovery pump in RW-2. Approximately 894,518 gallons of groundwater were recovered from RW-2 during the first quarter of 2002 at an estimated rate of 7.2 gpm. During the period from January 2 to March 29, 2002, the recovery pump operated for approximately 2,063 hours and discharged water to Tank 16804 for temporary storage until treated by the terminal's wastewater treatment system. A summary of the groundwater recovery from RW-2 is included in Table 1.

4) Groundwater elevation data were collected from the lower zone on February 27, 2002. The groundwater elevation data are summarized in Table 2 and presented on Figure 4. Based on the groundwater elevation data collected, the groundwater flow direction has been reversed downgradient of the leading edge of the PCP plume in the lower zone.

5) Groundwater samples were collected at the site on February 26 through 28, 2002. Historically, the extent of groundwater impact has been estimated based on the extent of dissolved-phase PCP. The extent of PCP present in the upper and lower zone is depicted on Figures 5 and 6, respectively, based on data collected during the February 2002 groundwater sampling event. The analytical data indicate that lower zone monitoring wells downgradient of RW-2 do not exhibit detectable concentrations of PCP, confirming the hydraulic capture of lower zone groundwater in that direction.

6) The industrial wastewater discharge permit (City of Portland Permit No. 400.121400.121) for discharge of the extracted groundwater following treatment at the terminal's wastewater treatment plant includes the following discharge limitations:

Parameter	Permitted Limit
PCP	40 micrograms/liter (µg/L)
Benzene	50 µg/L
BETX (benzene, ethylbenzene, toluene, and xylenes)	750 µg/L
pH	5 to 11.5

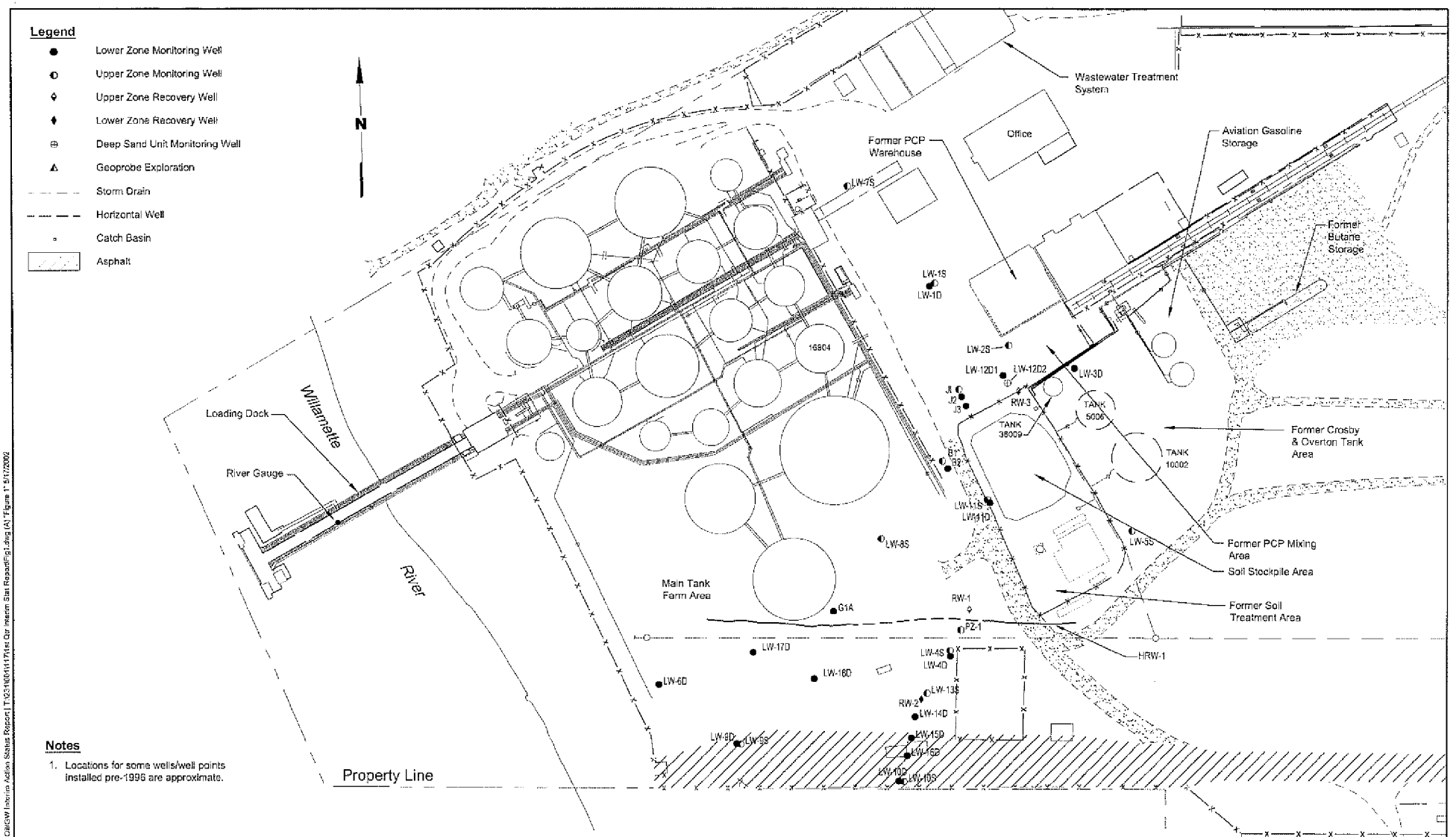
Laboratory analyses for the listed parameters were completed in the fourth quarter of 2001 and none of the permitted limits were exceeded. The wastewater treatment system effluent was sampled during the first week of April 2002 for analysis of PCP. The analytical data will be reported in the second quarter 2002 interim action status report.

SCHEDULED OPERATION OF SYSTEM

During the second quarter of 2002, we anticipate the continued extraction of groundwater from the upper (HRW-1) and lower (RW-2) zones. We will attempt to optimize the recovery of groundwater from HRW-1 to reverse the groundwater flow direction downgradient of HRW-1. The continued rate of recovery of groundwater from HRW-1 may be dependent on the seasonal fluctuation of the groundwater elevation in the upper zone. The groundwater levels in HRW-1 may also be influenced by the flood stage of the Willamette River located adjacent to and southwest of the interim action area (Figure 7). We will continue to monitor the system to evaluate the system operation relative to the performance criteria referenced in the startup monitoring plan (Landau Associates 2000).

REFERENCES

Landau Associates. 2000. *Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon.* July 14.



Notes

1. Locations for some wells/well points installed pre-1996 are approximate.

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Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 1

Time Oil/GW Interim Action Status Report | T:\23100\41171\4c Qtr Interim Stat Report\Fig1.dwg (A) "Figure 1" 5/17/2002

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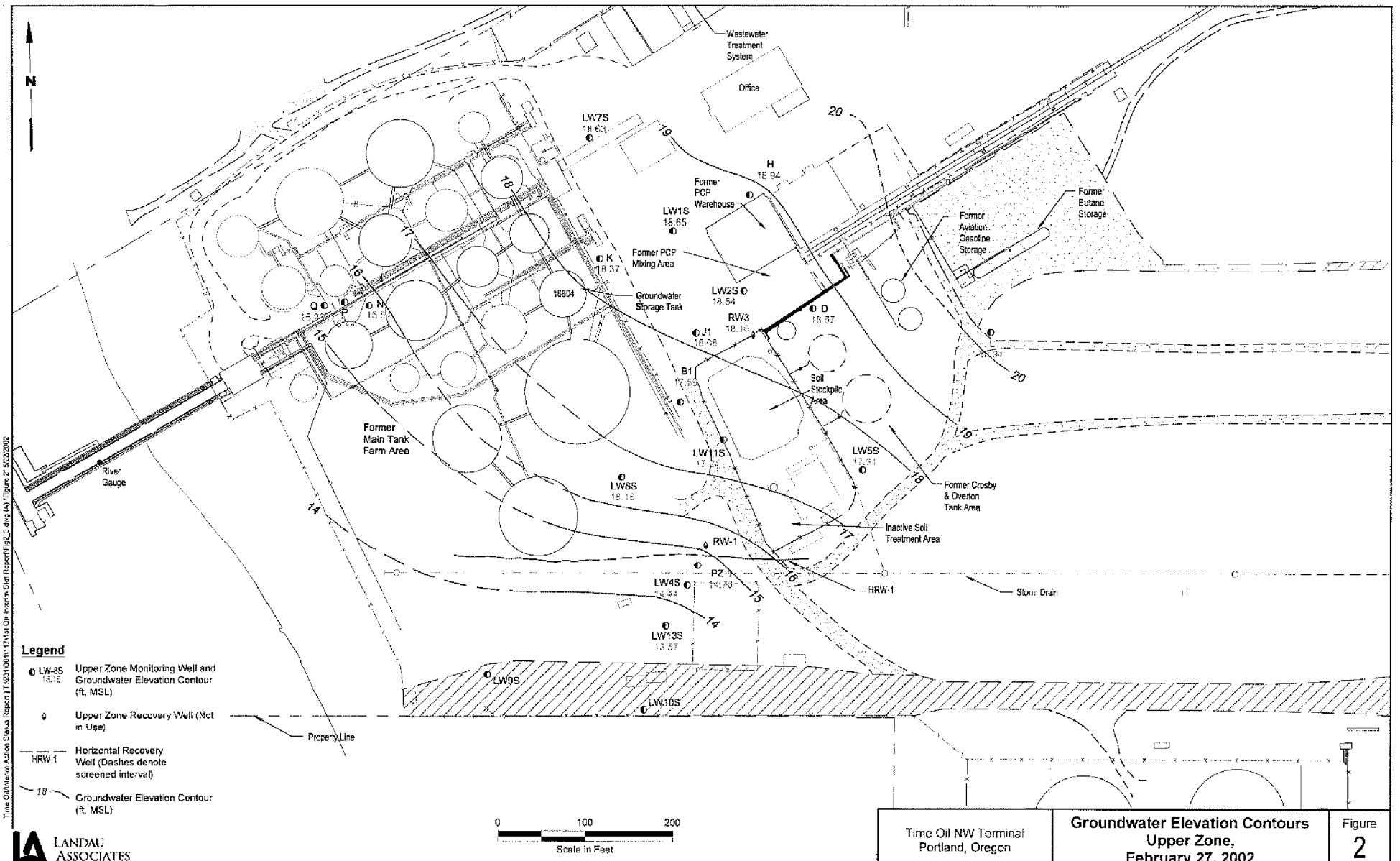

Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours
Upper Zone,
February 27, 2002

Figure
2

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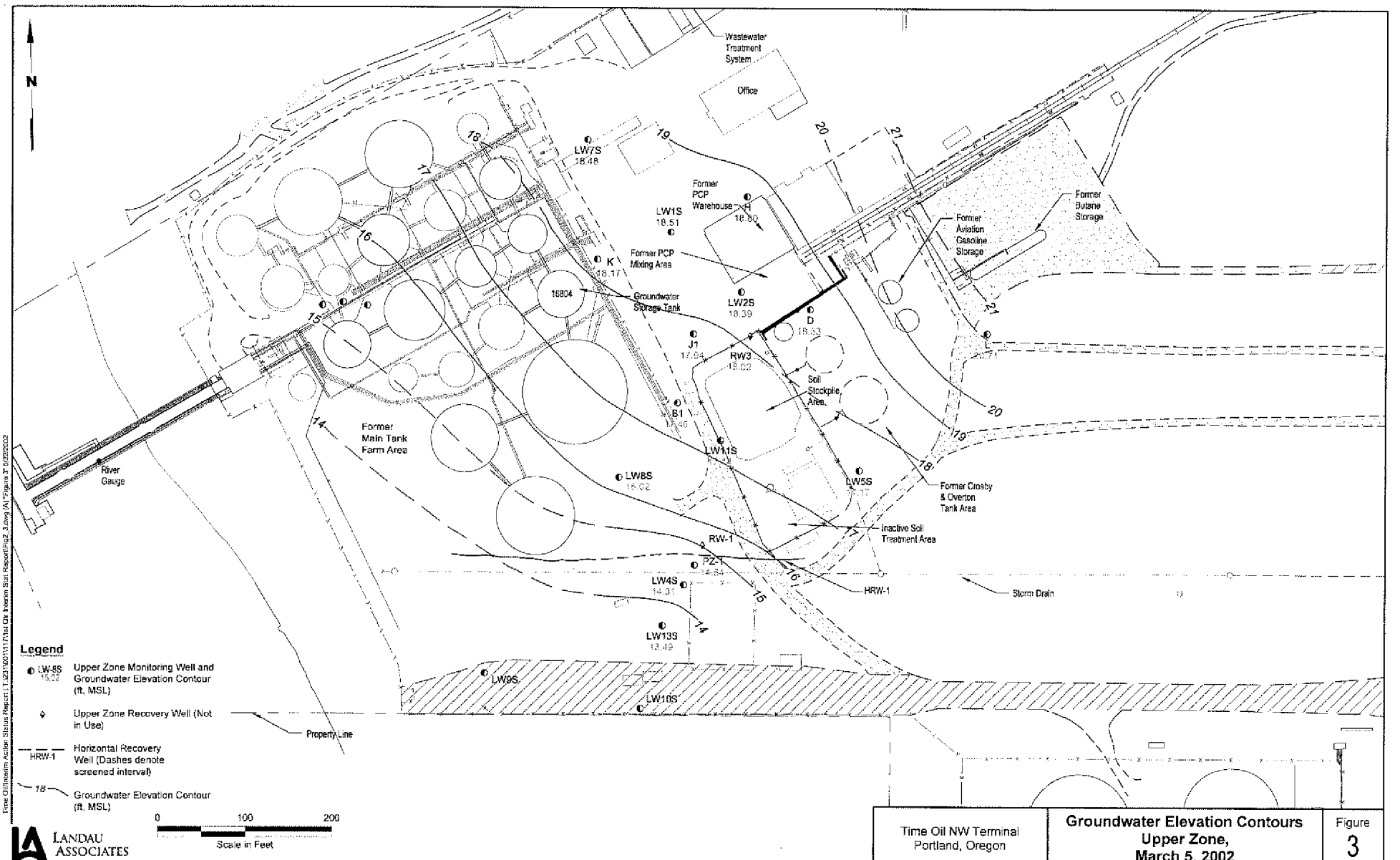

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Legend

- G1A 7.75 — Lower Zone Monitoring Well and Groundwater Elevation (ft,MSL)
- Lower Zone Recovery Well
- 7.8 — Groundwater Elevation Contour (ft, MSL)

Note

Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.

0 100 200
Scale in Feet

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Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Lower Zone, February 27, 2002**	Figure 4

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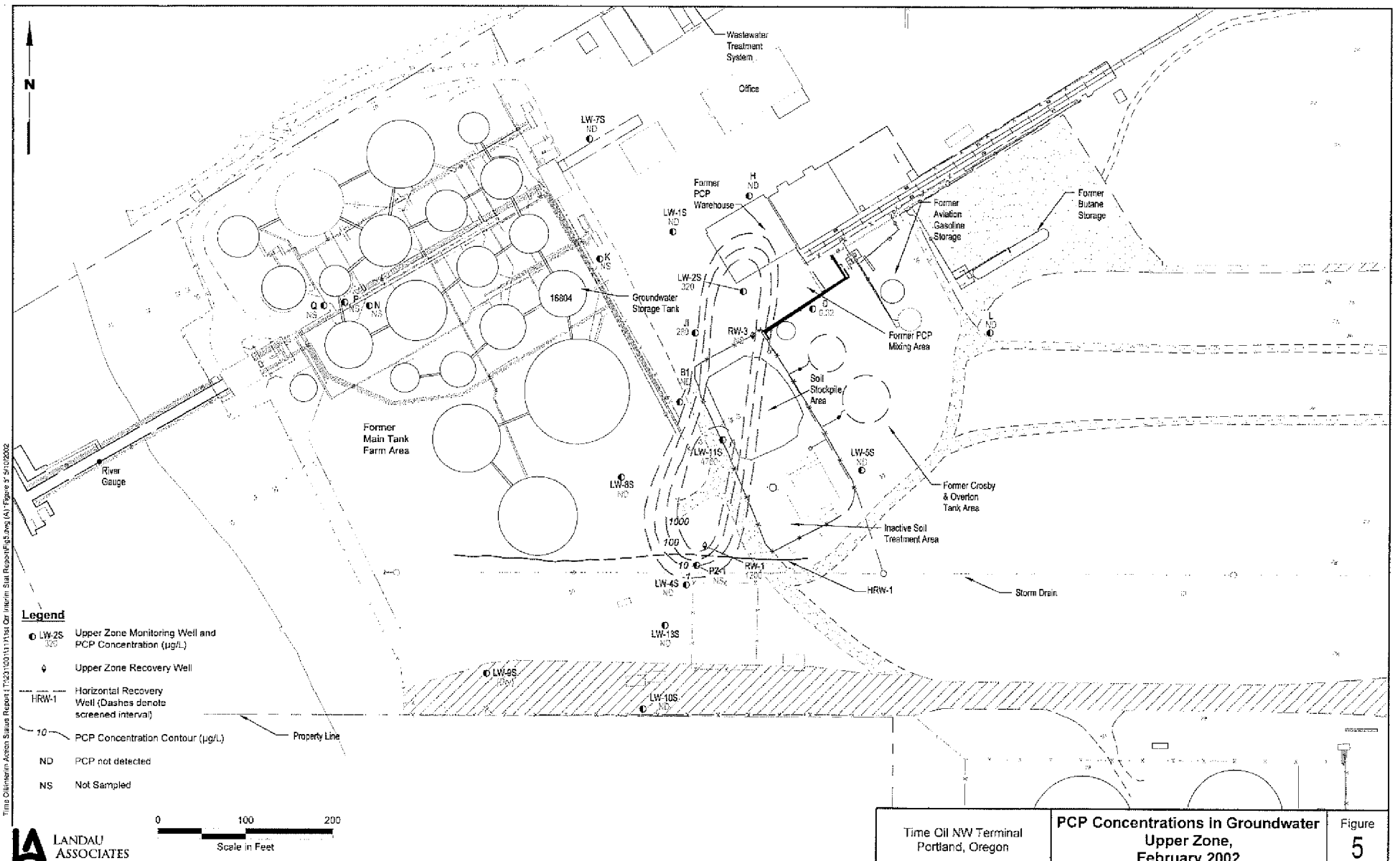

Time Oil NW Terminal
Portland, Oregon

PCP Concentrations in Groundwater Upper Zone, February 2002

Figure 5

Time Oil/Interim Action Status Report | T:\231\0311\1\1st Qtr Interim Stat Report\Fig5.dwg (A) Figure 5 3/1/2002

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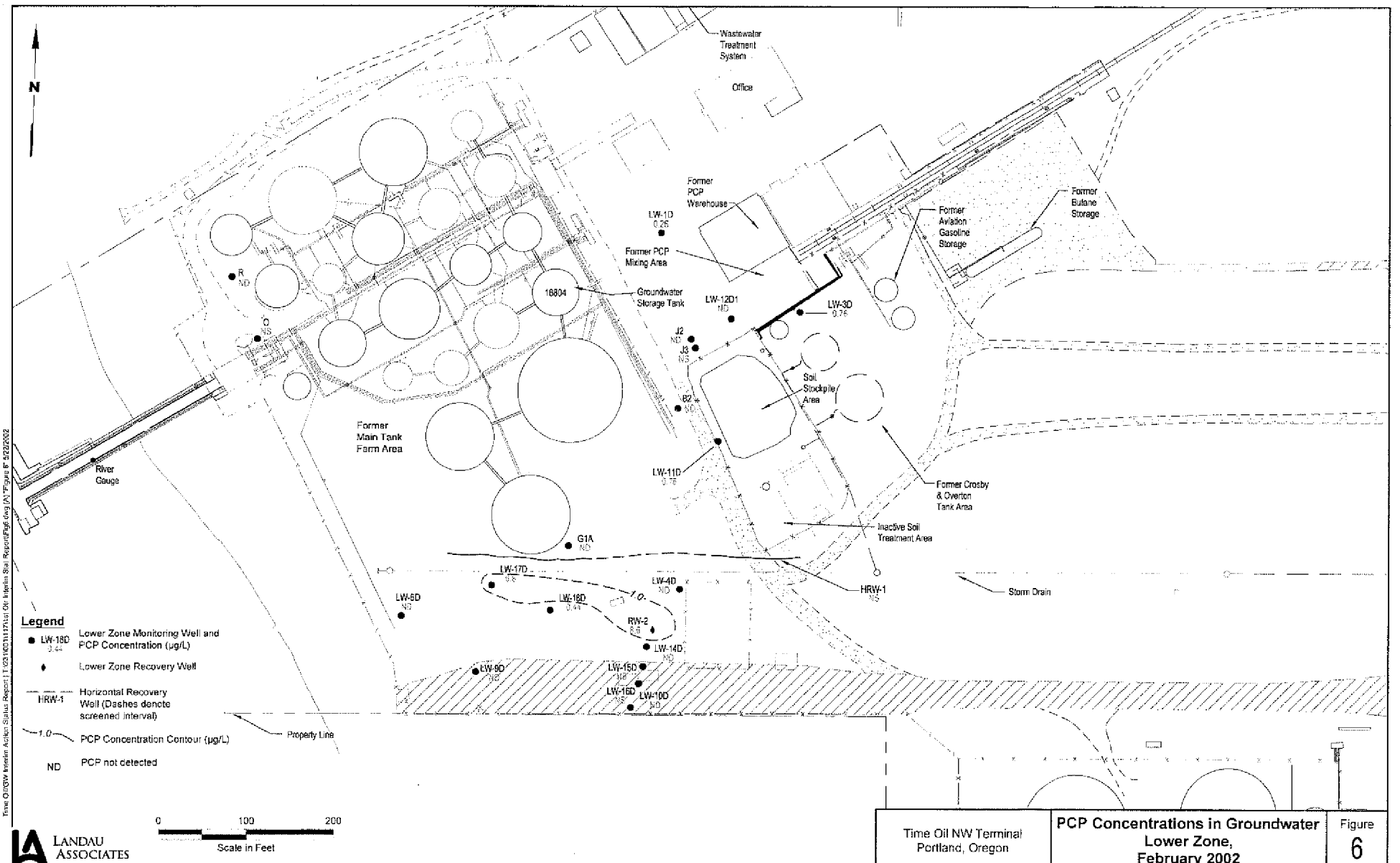

Time Oil/GW Interim Action Status Report | T:\23\ICD\1117\1s\ Oil\ Interim Stat Report\Fig6.dwg (A) *Figure 6* 5/22/2002

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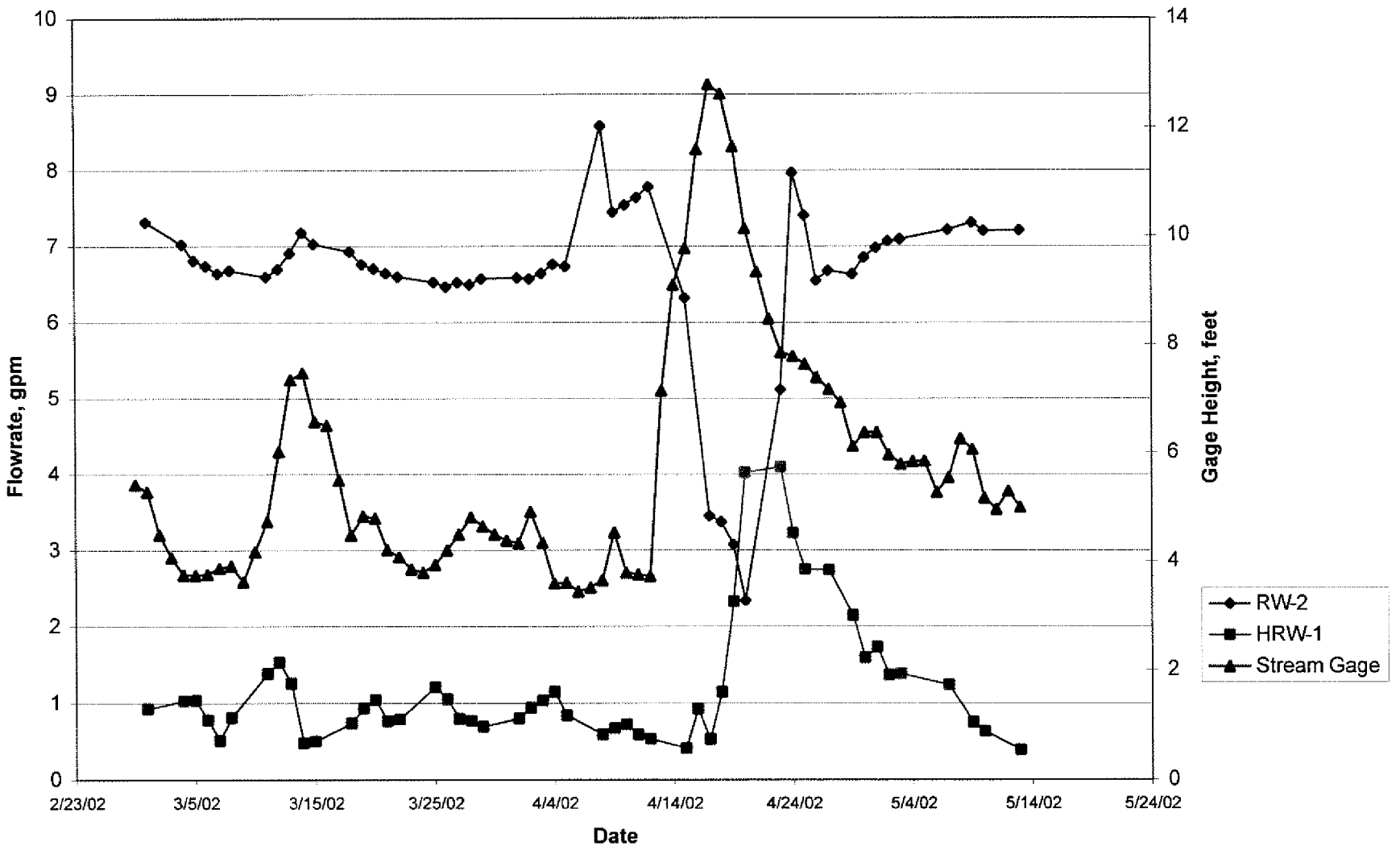

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Time Oil NW Terminal Portland, Oregon	**Relationship Between Groundwater Recovery and River Stage**	Figure 7

TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
UPPER AND LOWER WATER-BEARING ZONES
TIME OIL NORTHWEST TERMINAL

Monitoring Period	RW-2 Discharge				HRW-1 Discharge				Treatment System Discharge			Comments
	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	
Fourth Quarter 2000												
October 2000	439,003			0.35					0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/9/00	95	0.24					467,478	11/7/00	ND (a)	
December 2000	348,720	12/20/00	39	0.11					497,656	12/6/00	5.89	
										12/20/00	9.73	
Quarterly Totals	*1,093,324*			*0.70*					*965,134*			
First Quarter 2001												
January 2001	416,140	1/18/01	38.8	0.13					239,207	1/18/01	14.3	
February 2001	335,008	2/13/01	30	0.08					184,192			
March 2001	332,963	3/7/01	ND (b)	0.03					517,332	3/7/01	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*					*940,731*			
Second Quarter 2001												
April 2001	377,931			0.04					275,519			
May 2001	344,252	5/22/01	12.3	0.04					195,522	5/22/01	5.29	
June 2001	361,846	6/4/01	0.68	0.04					563,853			
Quarterly Totals	*1,084,029*			*0.11*					*1,034,894*			
Third Quarter 2001												
July 2001	351,509			0.01					559,015			
August 2001	486,123	8/13/01	5	0.02					66,876			
Quarterly Totals	*837,632*			*0.03*					*625,891*			
Fourth Quarter 2001												
October 2001	393,168	10/11/01	ND (a)	0.01					484,158	10/11/01	ND (a)	
November 2001	319,798			0.01					118,786	11/1 & 11/15/01	ND (a)	
December 2001	361,058	12/6/01	ND (c)	0.01					717,769	12/6/01	ND (c)	
Quarterly Totals	*680,856*			*0.01*					*836,555*			
First Quarter 2002												
January 2002	331,224			0.02	1,812			0.01	340,688			Recovered groundwater from HRW-1 from January 22-29. Re-initiated groundwater recovery from HRW-1 on February 28.
February 2002	282,480	2/27/02	8.6	0.02	58			0.00	437,943			HRW-1 mass removal estimates for January and February are based on the March 12 sample event.
March 2002	280,814			0.02	40,294	3/12/02	786	0.26	234,816			RW-2 mass removal estimates for January and March are based on February 27 sample event.
Quarterly Totals	*894,518*			*0.04*	*42,164*			*0.28*	*1,013,447*			

(a) PCP not detected above the detection limit of 5 µg/L; concentration-dependent calculations based on half the detection limit.
(b) PCP not detected above the detection limit of 25 µg/L; concentration-dependent calculations based on half the detection limit.
(c) PCP not detected above the detection limit of 5.25 µg/L; concentration-dependent calculations based on half the detection limit.

TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
Deep Wells:							
B2	02/27/02	14:35	30.31	22.90	7.41	----	
G1A	02/27/02	13:39	29.72	21.96	7.76	----	
J2	02/27/02	14:31	29.65	22.21	7.44	----	
J3	02/27/02	14:32	29.58	21.52	8.06	----	
LW1D	02/27/02	14:17	28.31	20.31	8.00	----	
LW3D	02/27/02	14:20	30.80	23.13	7.67	----	
LW4D	02/27/02	12:04	30.17	22.65	7.52	----	
	03/05/02	11:36	30.17	22.94	7.23	----	
LW6D	02/27/02	13:35	30.84	23.62	7.22	----	
LW9D	02/27/02	13:47	30.98	22.97	8.01	----	
LW10D	02/27/02	13:49	31.12	23.58	7.54	----	
LW11D	02/27/02	14:57	29.04	21.80	7.24	----	
LW12D1	02/27/02	14:28	30.02	21.88	8.14	----	
LW12D2	02/27/02	14:29	29.24	22.38	6.86	----	
LW14D	02/27/02	13:55	30.54	23.57	6.97	----	
LW15D	02/27/02	13:52	30.85	23.42	7.43	----	
LW16D	02/27/02	13:54	28.40	20.94	7.46	----	
LW17D	02/27/02	13:37	27.82	19.82	8.00	----	
	03/05/02	11:30	27.82	20.46	7.36	----	
LW18D	02/27/02	13:43	27.82	20.44	7.38	----	
O	02/27/02	13:15	32.03	24.08	7.95	----	
R	02/27/02	13:17	30.47	22.50	7.97	----	
RW2	02/27/02	13:57	30.68	26.02	4.66	----	
Shallow Wells:							
B1	02/27/02	14:34	29.74	12.15	17.59	----	
	03/05/02	11:06	29.74	12.28	17.46	----	
B *	02/27/02	14:33	29.04	12.27	16.77	----	
C *	02/27/02	14:44	28.89	8.94	19.95	----	

TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
D	02/27/02	14:21	30.04	11.37	18.67	----	
	03/05/02	11:00	30.04	11.51	18.53	----	
G*	02/27/02	13:38	30.24	dry	----	----	
H	02/27/02	14:18	27.08	8.14	18.94	----	
	03/05/02	10:58	27.08	8.28	18.80	----	
J1	02/27/02	14:30	29.70	11.62	18.08	----	
	03/05/02	11:04	29.70	11.76	17.94		
K	02/27/02	14:17	29.42	11.05	18.37	----	
	03/05/02	10:55	29.42	11.25	18.17	----	
L	02/27/02	14:42	28.10	7.16	20.94	----	
	03/05/02	11:12	28.10	7.39	20.71	----	
LW1S	02/27/02	14:19	27.96	9.31	18.65	----	
	03/05/02	10:56	27.96	9.45	18.51	----	
LW2S	02/27/02	14:19	29.56	11.02	18.54	----	
	03/05/02	10:59	29.56	11.17	18.39	----	
LW4S	02/27/02	14:01	30.26	15.82	14.44	----	
	03/05/02	11:35	30.26	15.95	14.31	----	
LW5S	02/27/02	14:39	30.79	13.48	17.31	----	
	03/05/02	11:13	30.79	13.62	17.17	----	
LW7S	02/27/02	14:15	28.10	9.47	18.63	----	
	03/05/02	10:52	28.10	9.62	18.48	----	
LW8S	02/27/02	14:37	31.28	15.12	16.16	----	No Product
	03/05/02	11:09	31.28	15.26	16.02	----	
LW9S	02/27/02	13:48	31.04	dry	----	----	
	03/05/02	11:15	31.04	dry	----	----	
LW10S	02/27/02	13:50	30.75	17.77	12.98	----	
	03/05/02	11:32	30.75	17.84	12.91	----	
LW11S	02/27/02	14:59	29.10	11.86	17.24	----	No Product
	03/05/02	11:40	29.10	11.96	17.14	----	
LW13S	02/27/02	13:58	30.17	16.60	13.57	----	
	03/05/02	11:33	30.17	16.68	13.49	----	
LW101S	02/27/02	14:52	29.41	5.70	23.71	----	
LW102S	02/27/02	14:48	25.77	2.14	23.63	----	
LW103S	02/27/02	14:50	29.07	5.26	23.81	----	
LW104S	02/27/02	14:46	26.57	4.07	22.50	----	

TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
GROUNDWATER INTERIM ACTION STATUS - FIRST QUARTER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft, MSL) (a)	DTW (b) (ft)	GW Elevation (ft, MSL)	LNAPL Thickness (ft)	NOTES
N	02/27/02	13:25	31.40	15.76	15.64	----	
P	02/27/02	13:22	29.96	14.60	15.44	0.10	Strong ethanol-like odor
PZ-1	02/27/02	14:02	28.04	13.28	14.76	----	
	03/05/02	11:34	28.04	13.40	14.64	----	
Q	02/27/02	13:20	30.36	15.07	15.29	----	Strong petroleum odor, no produ
RW1	02/27/02	14:03	31.46	16.12	15.34	----	
	03/05/02	11:38	31.46	16.33	15.13	----	
RW3	02/27/02	14:26	29.96	11.80	18.16	----	
	03/05/02	11:02	29.96	11.94	18.02	----	
Other Wells:							
River Gauge	02/27/02	14:12	28.13	22.27	5.86	----	
	03/05/02	11:25	28.13	21.42	6.71		

---- No measurable product or odor observed.
* Well Point

(a) Reference Elevation is the north side of the top of the 2-in well casing. Reference elevation surveys were conducted by Tec Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.

(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].

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TRANSMITTAL

DEQ'D AUG 0 6 2002

To: Oregon Dept. of Environmental Quality
2020 SW Fourth Ave. Suite 400
Portland, OR 97201-4987

Date: August 2, 2002

Attn: Mr. Tom Roick

Project No.: 231001.116

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Technical Memorandum re: Startup Monitoring - HRW-1, Groundwater Interim Action, Time Oil Northwest Terminal, Portland, Oregon (8/2/02)

The above-noted document is provided for your file.

LANDAU ASSOCIATES, INC.

Terry McDonald for

Rebekah Brooks
Senior Hydrogeologist

RB/tam
8/2/02 S:\WPROC\231\TRANSMIT.FAX\DEQTrn.doc
Enclosure

cc: Kevin Murphy, Time Oil Co.
Patricia Dost, Schwabe Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

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TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers, P.E., and Rebekah Brooks

DATE: August 2, 2002

RE: STARTUP MONITORING - HRW-1 GROUNDWATER INTERIM ACTION TIME OIL NORTHWEST TERMINAL PORTLAND, OREGON

INTRODUCTION

This technical memorandum presents an evaluation of changes to hydraulic conditions in the upper water-bearing zone (upper zone) resulting from implementation of a groundwater interim action in the upper zone at horizontal recovery well HRW-1 at the Time Oil Northwest Terminal in Portland, Oregon. The period of time addressed by this technical memorandum extends from February 27 to June 1, 2002. A vicinity map of the terminal and surrounding area is presented on Figure 1. Groundwater recovery from HRW-1, screened in the upper groundwater zone, and an associated vertical extraction well (RW-2), screened in the lower groundwater zone, was initiated to address pentachlorophenol (PCP) plumes in the upper and lower zone groundwater. The decision to recover groundwater at the terminal was based on data collected by Time Oil Co. for a remedial investigation/feasibility study (RI/FS) under a Voluntary Cleanup Program (VCP) agreement with the Oregon Department of Environmental Quality (DEQ). Groundwater recovery within the lower zone at RW-2 began in October 2000; an evaluation of upper and lower zone hydraulic responses to groundwater extraction in the lower zone at RW-2 only was included in a technical memorandum dated January 26, 2001, previously submitted to DEQ (Landau Associates 2001).

The evaluations summarized in this technical memorandum include a hydraulic capture zone evaluation, a mass removal rate estimate for dissolved-phase PCP removed through HRW-1, and the concentration of PCP in the treatment system discharge relative to permitted limits. The hydraulic capture zone evaluation was performed to determine if the recovery of groundwater from HRW-1 results in the capture of groundwater from both the upgradient (northeast) and downgradient (southwest) directions in the upper zone groundwater. Upper zone monitoring locations are shown on Figure 2. Startup monitoring and the associated evaluations were performed in general accordance with the procedures described in the groundwater interim action startup plan (Landau Associates 2000).

BASELINE CONDITIONS

Water level data were collected prior to operation of recovery well HRW-1 to provide a baseline of pre-pumping groundwater conditions in the upper zone. Prior to initiation of groundwater recovery on February 28, 2002, groundwater levels were measured using a manual water level indicator probe on February 27, 2002 at the following upper zone monitoring locations: B1, D, H, J1, K, L, N, P, Q, LW-1S, LW-2S, LW-4S, LW-5S, LW-7S, LW-8S, LW-11S, LW-13S, PZ-1, and RW-3. A summary of the baseline groundwater elevation data collected on February 27, 2002 is provided in Table 1 and a groundwater elevation contour map for the upper zone groundwater prior to initiation of HRW-1 is provided on Figure 3.

In addition to the manual groundwater gauging data collected on February 27, 2002, a pressure transducer was installed in monitoring well RW-1 immediately prior to the initiation of groundwater recovery from HRW-1. The pressure transducer was connected to a datalogger to collect pressure readings on 30-second intervals to monitor for changes in water column depth in RW-1 due to the recovery of groundwater from HRW-1. The pressure transducer was removed from RW-1 after approximately 90 minutes because pressure readings indicated that groundwater elevations in RW-1 were not altered by the recovery of groundwater from HRW-1. Manual groundwater gauging prior to the installation and after the removal of the pressure transducer confirmed that the groundwater elevation in RW-1 was not altered by the recovery of groundwater from HRW-1 after a period of approximately 4 hours.

OPERATING CONDITIONS

Groundwater extraction from recovery well HRW-1 began at 11:25 A.M. on February 28, 2002 at a groundwater extraction rate of approximately 1.0 gallon per minute (gpm). Operation of HRW-1 has continued since February 28, 2002 without interruption, with the exception of periods (less than an hour each) when the digital flow meter associated with HRW-1 was serviced. The rate of groundwater extraction from HRW-1 from February 28, 2002 until the date of this report has varied from approximately 0.20 to 4.15 gpm. Manual groundwater level measurements were collected on March 5, April 5, and May 29, 2002, to evaluate the effects of recovery of groundwater from HRW-1 on upper zone groundwater elevations and flow. Groundwater levels were measured from the monitoring wells listed in the previous section.

Groundwater elevations observed in the upper zone during groundwater extraction from HRW-1 are summarized in Table 1. Upper zone groundwater elevation contours derived from the March 5,

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April 5, and May 29, 2002 data are shown on Figures 4, 5, and 6, respectively. The data do not appear to indicate that the extraction of groundwater from HRW-1 is depressing groundwater elevations at the monitoring locations. On May 15, 2002, the submersible pump in HRW-1 went into an overload condition and the pump remained offline from May 15 to 22, 2002. The motor on the pump was subsequently replaced on May 22, 2002. At the time the pump motor was replaced, the groundwater in HRW-1 appeared to exhibit a moderate to high level of solids. After the pump motor was replaced, the pump was restarted on May 22, 2002. From May 22 to May 30, 2002 active groundwater recovery flow rate from HRW-1 varied from approximately 1.4 to 1.8 gpm, and the pump reportedly cycled on and off up to 208 times per day (as observed on the weekend from May 24 to 28, 2002. In an effort to protect the integrity of the motor, the submersible pump was shut off on June 1, 2002. The pump will remain offline until HRW-1 is redeveloped and the pump can be returned to operation without potentially causing damage to the pump motor.

RECOVERED GROUNDWATER

In the period between February 28, 2002 and June 1, 2002, 138,718 gallons of groundwater were extracted from HRW-1 and pumped to the water treatment facility located onsite. Groundwater was recovered from HRW-1 at an average flow rate of approximately 1.05 gpm, with the active flow rate varying from approximately 0.2 to 4.15 gpm. Samples of the water extracted from HRW-1 were collected on March 5, April 5, and May 29, 2002 and analyzed by U.S. Environmental Protection Agency (EPA) Method SW8270D to determine the concentration of pentachlorophenol (PCP). The analytical data indicated that PCP concentrations in the extracted groundwater was 786 micrograms per liter (µg/L) on March 5, 2002; 94.2 µg/L on April 5, 2002, and 452 µg/L on May 29, 2002. The average concentration of PCP in HRW-1 was 444 µg/L. Based on the average concentration of PCP in the extracted groundwater and a total volume of groundwater extracted (138,718 gallons), it is estimated that 0.5 pounds of PCP were removed from the groundwater from February 28 until June 1, 2002, due to the extraction of groundwater from HRW-1. The groundwater extracted from HRW-1 is combined with the groundwater extracted from RW-2 prior to being pumped to the water treatment facility onsite. On April 5 and April 22, 2002, the effluent water from the water treatment facility was sampled and analyzed for PCP content using EPA Method SW8270D. The concentration of PCP in the effluent sample was 34.4 µg/L on April 5 and 9.33 µg/L on April 22, 2002. The permitted discharge limit for PCP in the treatment facility effluent is 40 µg/L. Analytical reports for the water samples collected are provided in Attachment 1.

BZTO104(e)016895

SUMMARY AND CONCLUSIONS

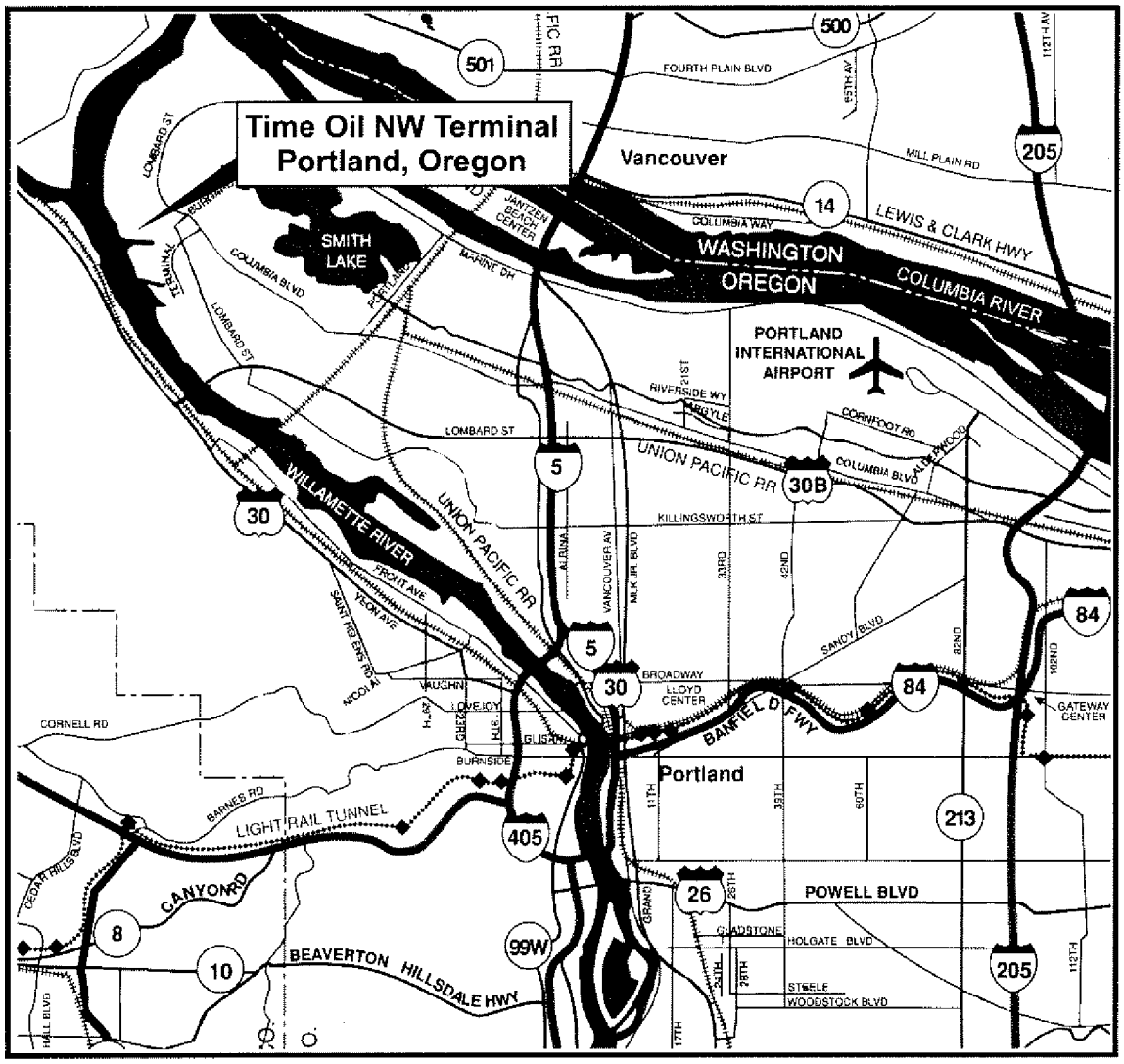
As of the completion of the latest round (May 29, 2002) of upper zone groundwater elevation monitoring, extraction of groundwater from recovery well HRW-1 did not appear to create a hydraulic capture zone that fully contains the upper zone groundwater PCP plume, as defined by the first quarter 2002 groundwater data (Figure 7). However, as indicated on Figure 7, PCP impacts were not detected downgradient of HRW-1. Subsequent to the April 5, 2002 groundwater gauging event, the rate of groundwater extraction from HRW-1 was increased to attempt to create a hydraulic capture zone to reduce the potential for PCP-impacted groundwater in the upper zone to continue to migrate downgradient. During June of 2002, it is anticipated that HRW-1 will be redeveloped to attempt to decrease the solids content of the groundwater being pumped and the submersible pump will be removed and maintained. Following well redevelopment and pump maintenance, the submersible pump should be re-activated and additional upper zone groundwater flow studies (e.g., vertical piezometers installed above HRW-1 screen) will be conducted to further evaluate the effectiveness of intercepting PCP-impacted groundwater in the upper zone using HRW-1. The results of these evaluations will be presented in future interim action quarterly status reports.

REFERENCES

Landau Associates. 2000. *Report, Startup Plan, Groundwater Interim Action, Time Oil Northwest Terminal.*

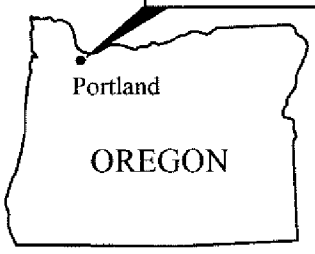
Landau Associates. 2001. Technical Memorandum re: Groundwater Interim Action Startup Monitoring – RW-2, Time Oil Northwest Terminal, Portland, Oregon. Prepared for Time Oil Co. January 26.

N



Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



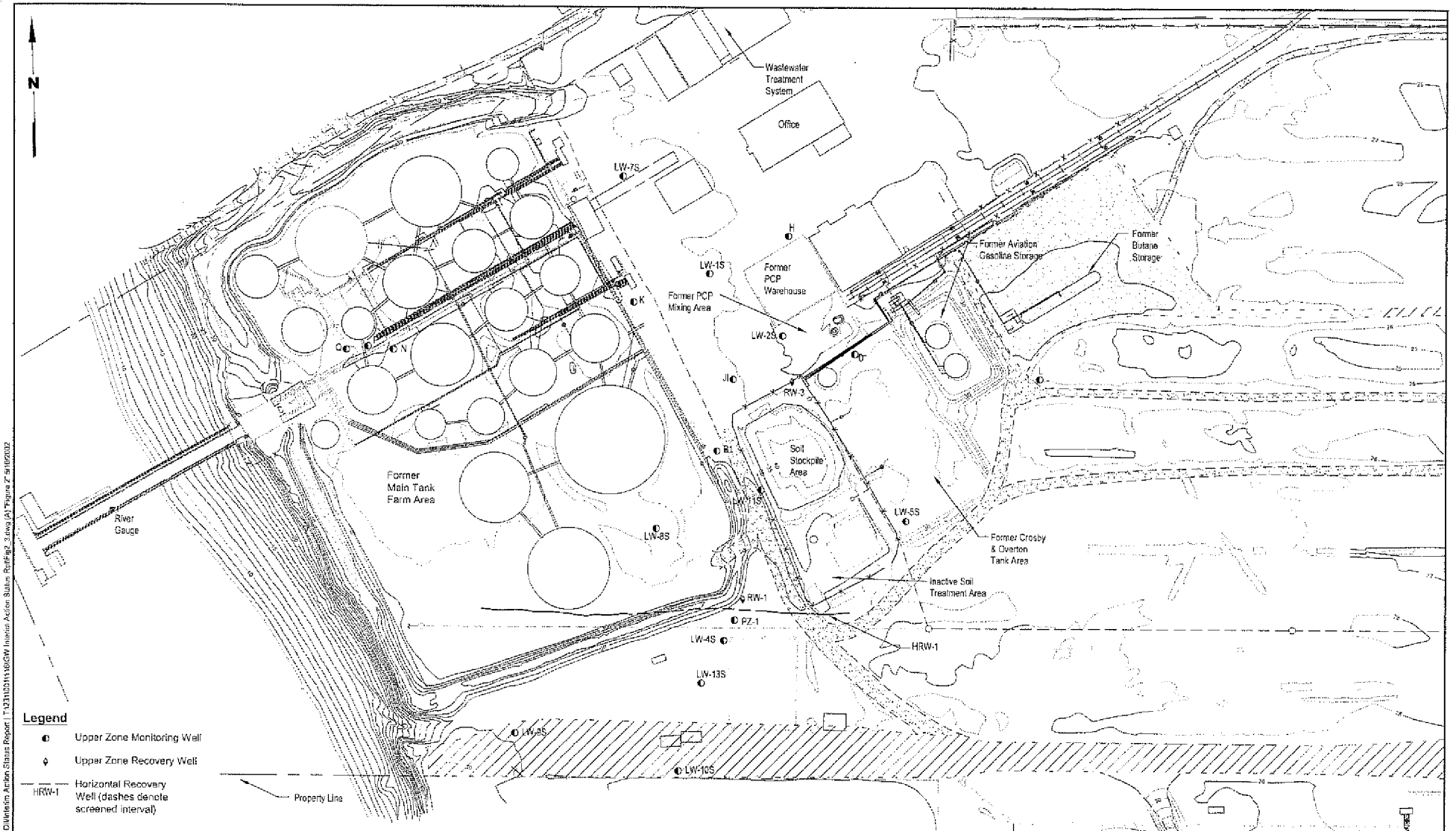
0 2 4
Approximate Scale in Miles

Time Oil | T:\231\001\Vicinity Map.cdr (C) 05/10/2002

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

BZTO104(e)016897

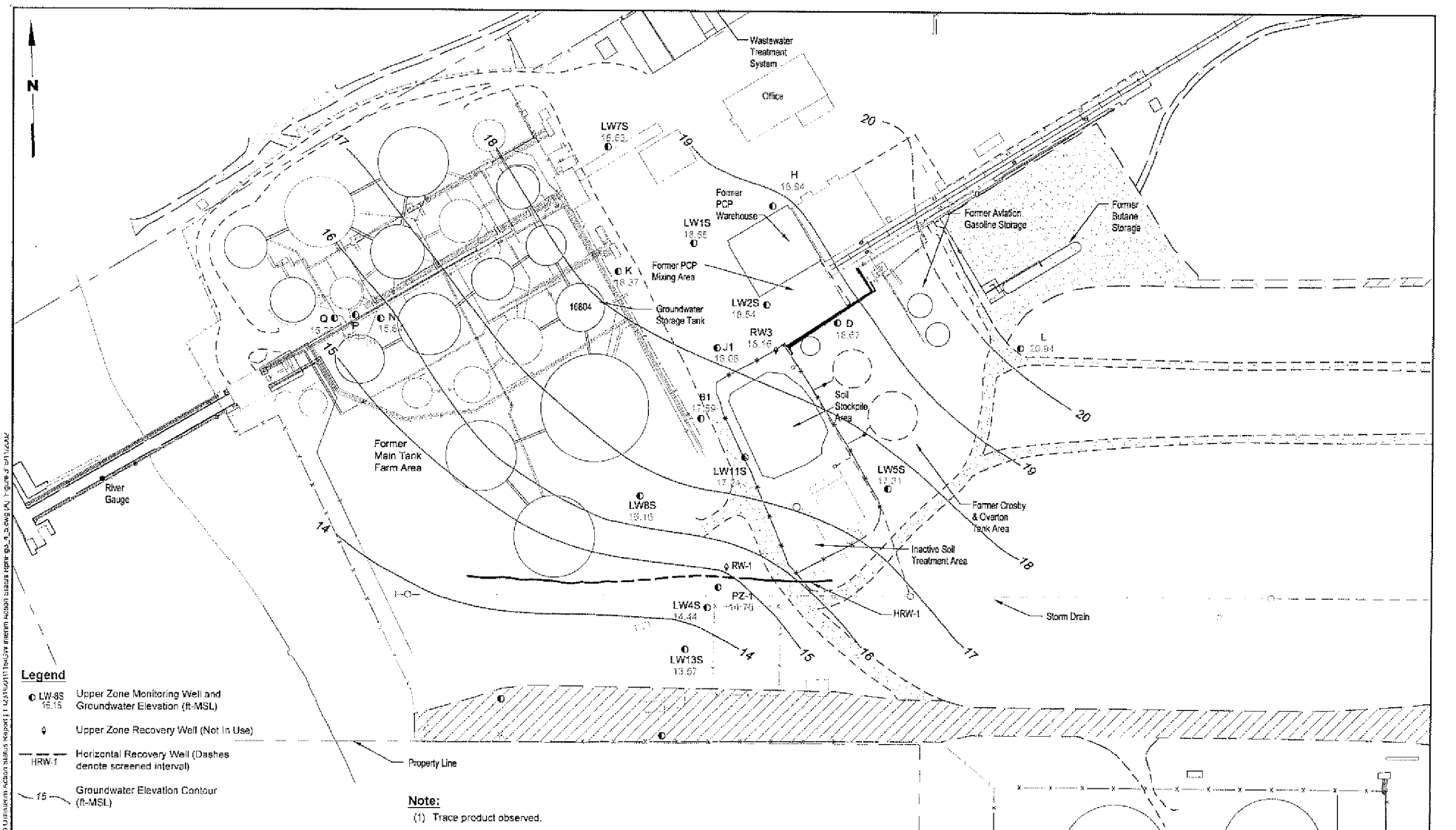


LANDAU ASSOCIATES

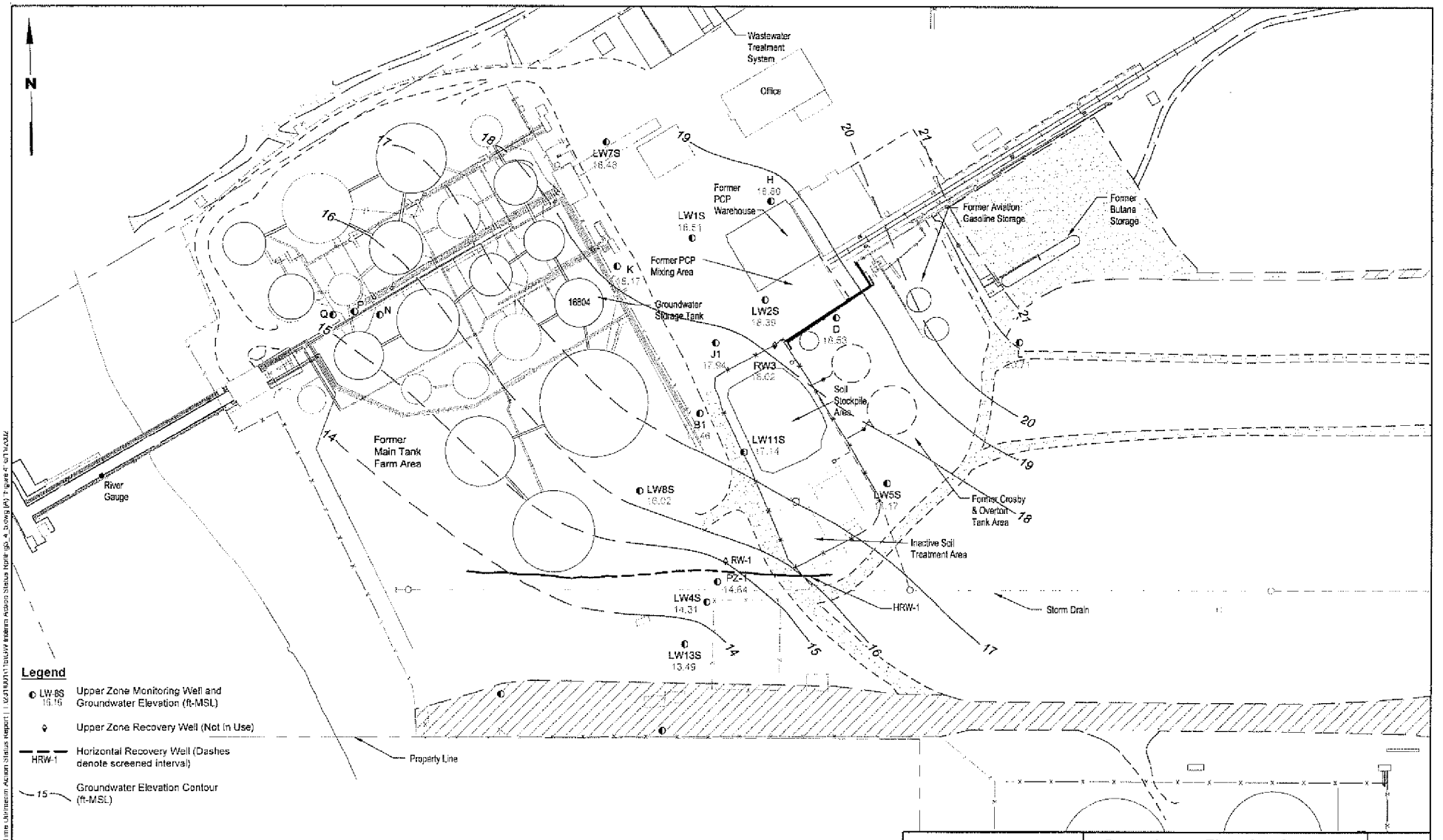
Time Oil Northwest Terminal Portland, Oregon	**Groundwater Interim Action Upper Zone Monitoring Locations**	Figure 2

Time Oil Interim Action Status Report | T:\231\0311\16\GW Interim Action Status Rpt\Fig2_3.dwg (A) *Figure 2* 9/18/2002

BZTO104(e)016898



BZTO104(e)016899

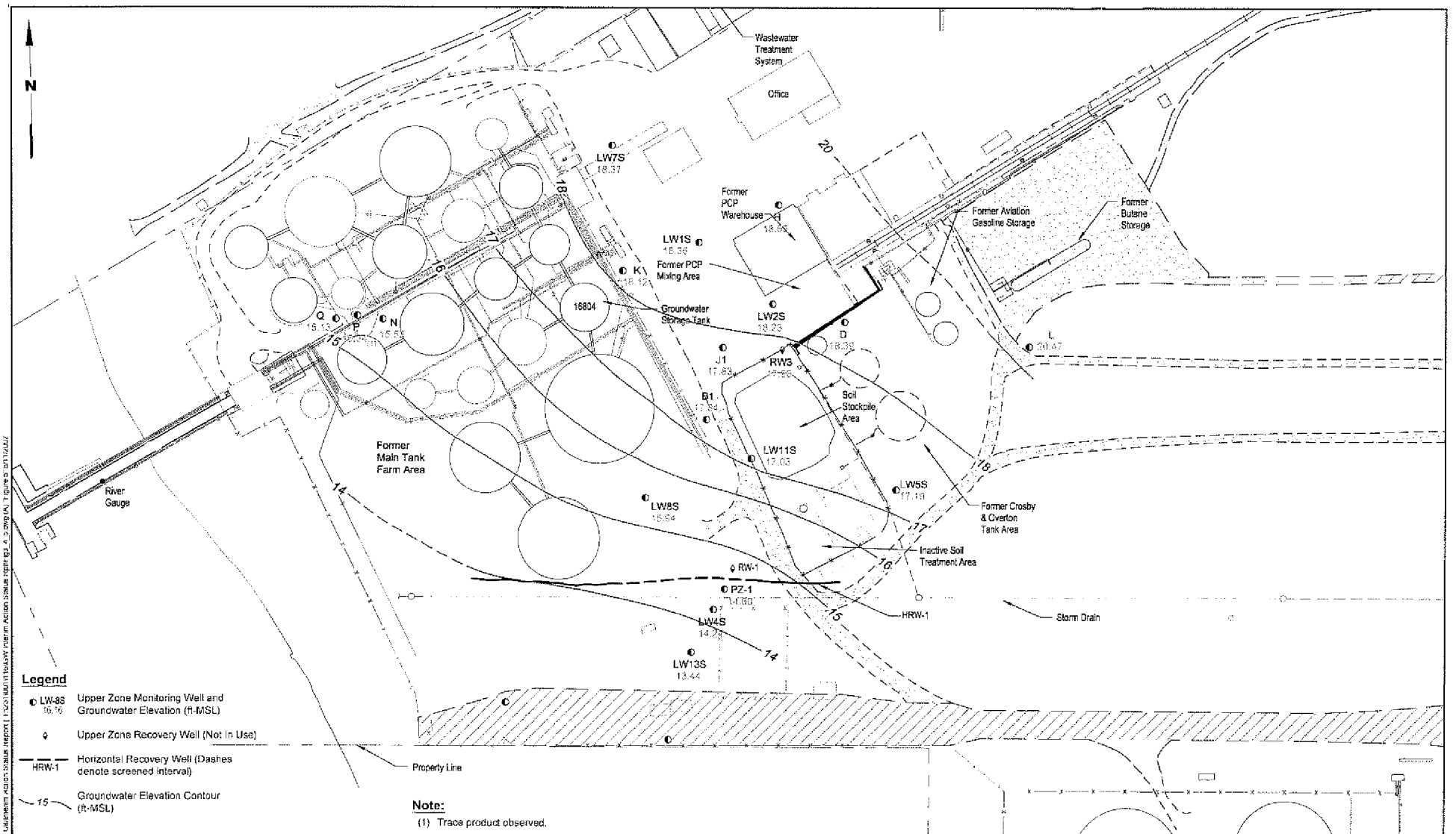


Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours Upper Zone, March 5, 2002

Figure 4

BZTO104(e)016900

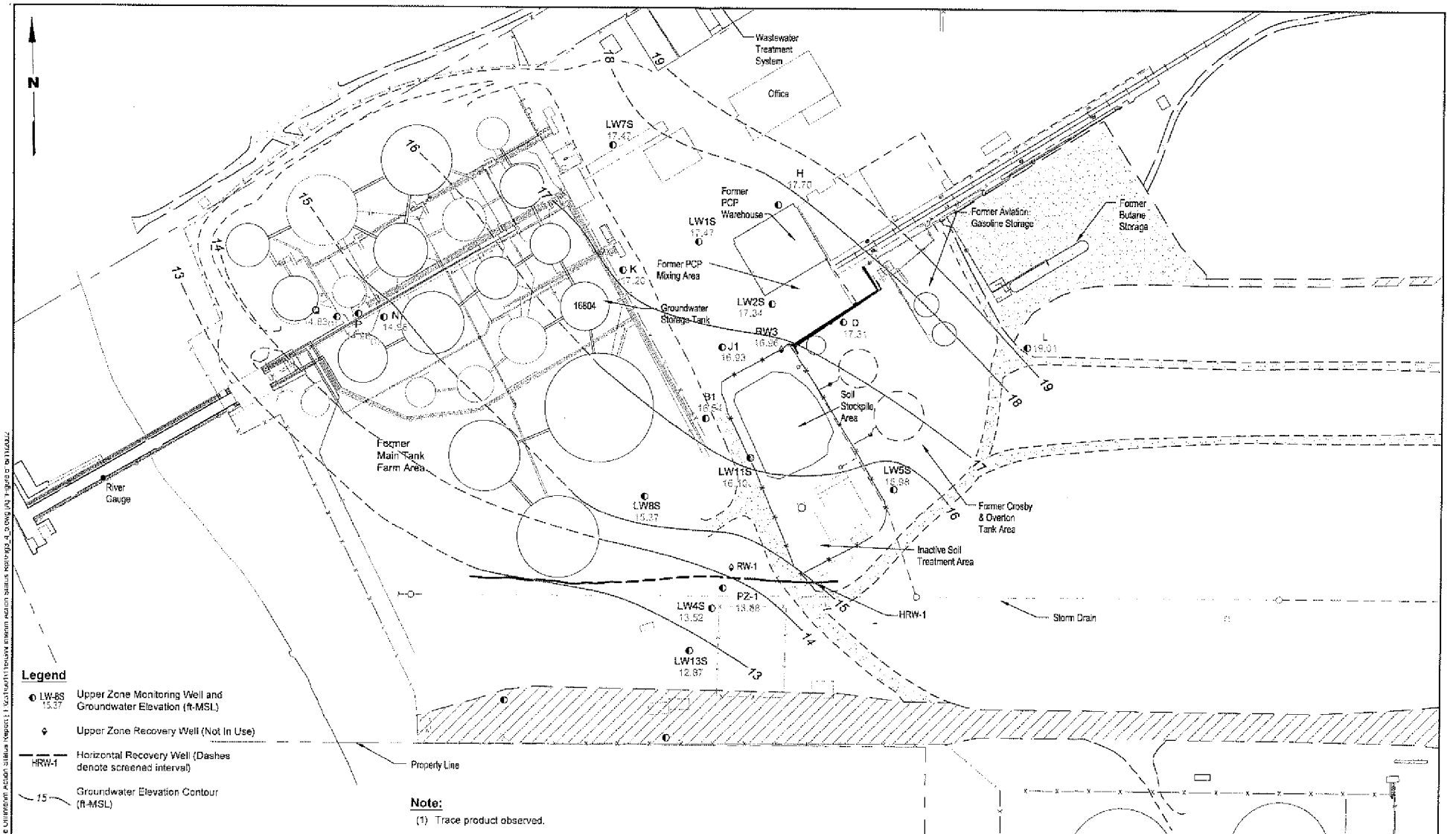


Time Oil NW Terminal
Portland, Oregon

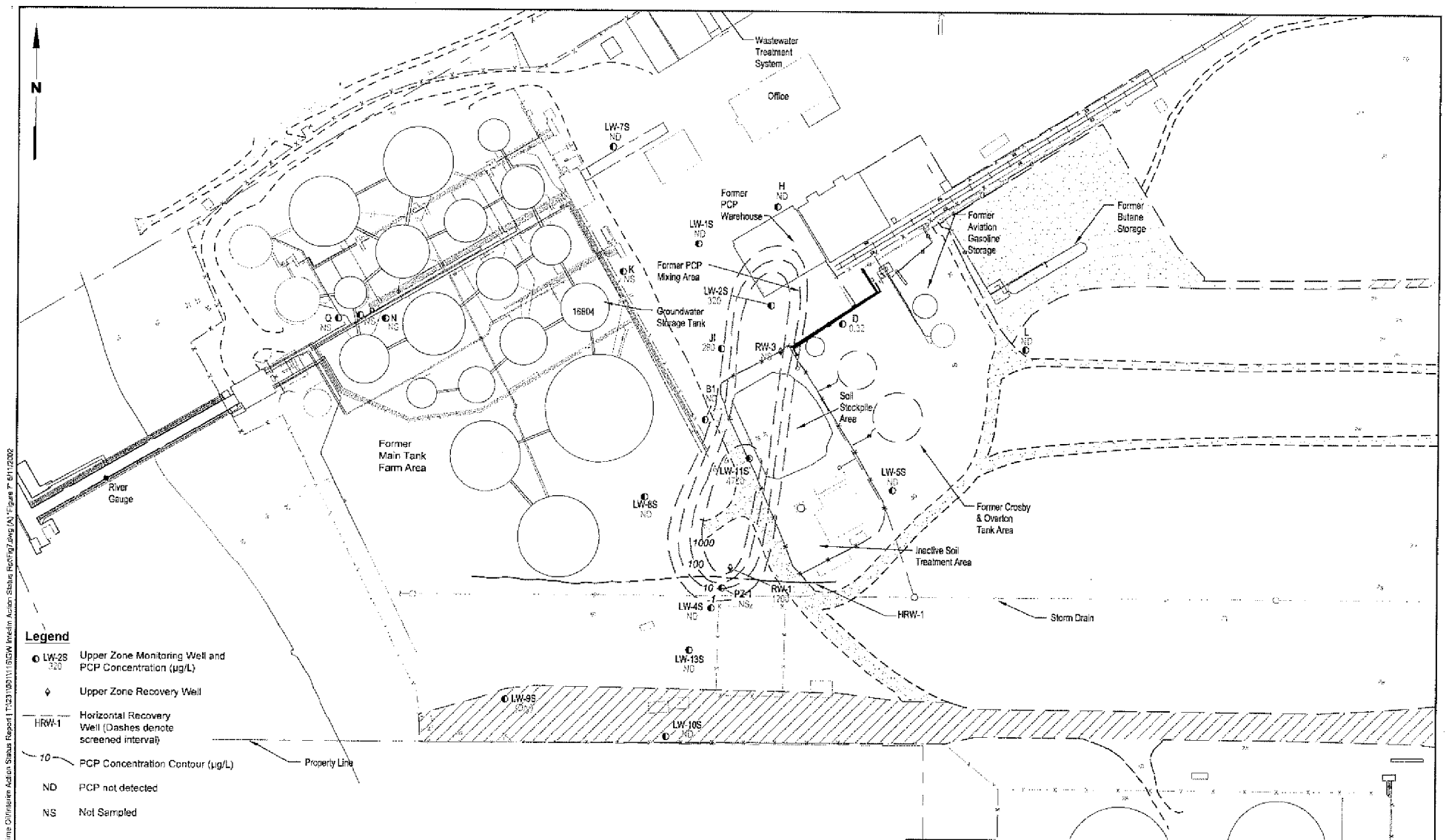
Groundwater Elevation Contours
Upper Zone,
April 5, 2002

Figure
5

BZTO104(e)016901



BZTO104(e)016902



BZTO104(e)016903

TABLE 1
SUMMARY OF WATER LEVEL MEASUREMENTS
HRW-1 STARTUP
TIME OIL NORTHWEST TERMINAL

Well	Reference Elevation (ft) (a)	DTW (ft) (b)	Date	Groundwater Elevation	Well	Reference Elevation (ft) (a)	DTW (ft) (b)	Date	Groundwater Elevation
B1	29.74	12.15	02/27/02	17.59	LW1S	27.96	9.31	02/27/02	18.65
		12.28	03/05/02	17.46			9.45	03/05/02	18.51
		12.40	04/05/02	17.34			9.60	04/05/02	18.36
		13.20	05/29/02	16.54			10.49	05/29/02	17.47
D	30.04	11.37	02/27/02	18.67	LW2S	29.56	11.02	02/27/02	18.54
		11.51	03/05/02	18.53			11.17	03/05/02	18.39
		11.65	04/05/02	18.39			11.33	04/05/02	18.23
		12.73	05/29/02	17.31			12.22	05/29/02	17.34
H	27.08	8.14	02/27/02	18.94	LW4S	30.26	15.82	02/27/02	14.44
		8.28	03/05/02	18.80			15.95	03/05/02	14.31
		8.45	04/05/02	18.63			16.02	04/05/02	14.24
		9.38	05/29/02	17.70			16.74	05/29/02	13.52
J1	29.70	11.62	02/27/02	18.08	LW5S	30.79	13.48	02/27/02	17.31
		11.76	03/05/02	17.94			13.62	03/05/02	17.17
		11.87	04/05/02	17.83			13.60	04/05/02	17.19
		12.77	05/29/02	16.93			14.81	05/29/02	15.98
K	29.42	11.05	02/27/02	18.37	LW7S	28.10	9.47	02/27/02	18.63
		11.25	03/05/02	18.17			9.62	03/05/02	18.48
		11.30	04/05/02	18.12			9.73	04/05/02	18.37
		12.22	05/29/02	17.20			10.63	05/29/02	17.47
L	28.10	7.16	02/27/02	20.94	LW8S	31.28	15.12	02/27/02	16.16
		7.39	03/05/02	20.71			15.26	03/05/02	16.02
		7.63	04/05/02	20.47			15.34	04/05/02	15.94
		9.09	05/29/02	19.01			15.91	05/29/02	15.37
N	31.40	15.76	02/27/02	15.64	LW11S	29.10	11.86	02/27/02	17.24
		NM	03/05/02	NM			11.96	03/05/02	17.14
		15.88	04/05/02	15.52			12.07	04/05/02	17.03
		16.42	05/29/02	14.98			13.00	05/29/02	16.10
P	29.96	14.60 (c)	02/27/02	15.44	LW13S	30.17	16.60	02/27/02	13.57
		NM	03/05/02	NM			16.68	03/05/02	13.49
		14.70 (c)	04/05/02	15.34			16.73	04/05/02	13.44
		15.00 (c)	05/29/02	14.96			17.30	05/29/02	12.87
Q	30.36	15.07	02/27/02	15.29	RW3	29.96	11.80	02/27/02	18.16
		NM	03/05/02	NM			11.94	03/05/02	18.02
		15.23	04/05/02	15.13			12.06	04/05/02	17.90
		15.53 (c)	05/29/02	14.83			13.00	05/29/02	16.96
					PZ-1	28.04	13.28	02/27/02	14.76
							13.40	03/05/02	14.64
							13.44	04/05/02	14.60
							14.16	05/29/02	13.88

NM = Not measured.

(a) Reference Elevation (Ref. Elev) is the north side of the top of the 1.25-, 2- or 4-inch well casing; reference elevation surveys were conducted by Zarosinski-Tatone Engineers, Inc., Portland, Oregon.

(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].

(c) Trace amount (less than 0.10) of product was measured in well. Where LNAPL thickness was measured, groundwater elevation was adjusted to account for the presence of LNAPL in the well using the method in *"Estimation of Free Hydrocarbon Volume from Fluid Levels in Monitoring Wells"* [Lenhard and Parker 1990; Groundwater 28(1):57-67].

ATTACHMENT 1

Analytical Reports

Specialty Analytical

19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

RECEIVED
APR - 1 2002
LANDAU ASSOCIATES, INC.

March 14, 2002

Kevin Murphy
Time Oil Co.
2737 West Commodore Way
Seattle, WA 981991233

TEL: (206) 286-6443
FAX (206) 285-7833

RE: NW Terminal / 231001.116

Dear Kevin Murphy:

Order No.: 0203036

Specialty Analytical received 1 sample on 3/5/2002 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Dan Marrin
Operations Manager

Technical Review

Specialty Analytical

Date: *14-Mar-02*

CLIENT:	Time Oil Co.	Client Sample ID:	HRW-1
Lab Order:	0203036	Collection Date:	3/5/2002
Project:	NW Terminal / 231001.116		
Lab ID:	0203036-01	Matrix:	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PHENOLS BY EPA 8270 SIM		SW8270D				Analyst: bda
Pentachlorophenol	786	100		µg/L	200	3/12/2002
Surr: 2,4,6-Tribromophenol	40.0	34-133	D	%REC	200	3/12/2002

Specialty Analytical

Date: *14-Mar-02*

CLIENT: Time Oil Co.
Work Order: 0203036
Project: NW Terminal / 231001.116

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270AFLL_W

Sample ID MBLK-6580 | SampType: MBLK | TestCode: 8270AFLL_W | Units: µg/L | Prep Date: 3/6/2002 | Run ID: 5973G_020312B
Client ID: ZZZZZ | Batch ID: 6580 | TestNo: SW8270D | Analysis Date: 3/12/2002 | SeqNo: 124620

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	ND	0.500									
Surr: 2,4,6-Tribromophenol	11.99	1.00	20	0	60	34	133	0	0		

Sample ID LCS-6580 | SampType: LCS | TestCode: 8270AFLL_W | Units: µg/L | Prep Date: 3/6/2002 | Run ID: 5973G_020312B
Client ID: ZZZZZ | Batch ID: 6580 | TestNo: SW8270D | Analysis Date: 3/12/2002 | SeqNo: 124621

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	3.08	0.500	5	0	61.6	15.5	102	0	0		

Sample ID LCSD-6580 | SampType: LCSD | TestCode: 8270AFLL_W | Units: µg/L | Prep Date: 3/6/2002 | Run ID: 5973G_020312B
Client ID: ZZZZZ | Batch ID: 6580 | TestNo: SW8270D | Analysis Date: 3/12/2002 | SeqNo: 124622

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	3.13	0.500	5	0	62.6	15.5	102	3.08	1.61	20	

Sample ID CCV-6580 | SampType: CCV | TestCode: 8270AFLL_W | Units: µg/L | Prep Date: | Run ID: 5973G_020312B
Client ID: ZZZZZ | Batch ID: 6580 | TestNo: SW8270D | Analysis Date: 3/12/2002 | SeqNo: 124623

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	17.58	0.500	20	0	87.9	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

BZTO104(e)016908

KEY TO FLAGS

A. This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards.

A1. This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2. This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against lube oil calibration standards.

A3. Results determined to be non detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

B. The blank exhibited a positive result greater than the reporting limit for this compound.

C. The result confirmed by secondary column or GC/MS analysis.

CN. See case narrative.

CR. Result for this analyte maybe biased due to interferences. Confirmation by GC/MS or other technique is recommended.

D. Surrogate was diluted outside reporting range.

E. Result exceeds the calibration range for the compound. The result should be considered an estimate.

F. The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

G. Result may be biased high due to biogenic interferences. Silica gel clean-up recommended.

H. Sample was analyzed outside recommended holding times.

HT. At clients request, sample was analyzed outside method recommended holding time.

J. The result for this analyte is between the MDL and the PQL, and should be considered an estimated concentration.

K. Diesel result is biased high due to amount of oil contained in the sample.

L. Diesel result is biased high due to amount of gasoline contained in the sample.

M. Oil result is biased high due to amount of diesel contained in the sample.

MC. Sample concentration is greater than 4x the spiked value; the spiked value is considered insignificant.

MI. Outside control limits due to Matrix Interference.

MSA. Value determined by Method of Standard Addition.

N. Sample appears to contain biogenic material biasing quantification.

O. Laboratory Control Standard (LCS) exceeded laboratory control limits, meets CCV criteria. Data meets EPA requirements.

P. Detected levels of Methylene Chloride may be due to laboratory contamination, due to previous analysis or background levels.

Q. Detection limits elevated due to sample matrix.

R. RPD control limits were exceeded.

RF. Duplicate failed, due to result being at or near method reporting limit.

RP. Matrix spike values exceed established QC limits, post digestion spike is in control.

S. Recovery outside control limits.

*. The result for this parameter was greater than the maximum contaminant level or the TCLP regulatory limit.

rev. October 23, 2001

☑ Seattle (Edmonds) (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (Lake Oswego) (503) 443-6010
☐ _____

Landau Associates

Chain-of-Custody Record

Date 3/5/02
Page 1 of 1

Project Name TIME OIL
Project No 231001.116
Project Location/Event NW TERMINAL / HARBOR STARTUP
Sampler's Name CHRISTY JOHNSON
Project Contact MARTIN SOLVERS
Send Results To MARTIN SOLVERS & KEVIN MORAFF

Testing Parameters: TPH (8270SIM)

Turnaround Time
☑ Standard
☐ Accelerated
☐ _____

Sample I.D.	Date	Time	Matrix	No. of Containers	TPH (8270SIM)	Observations/Comments
HRW-1	3/5/02	1200	WATER	2	/	

Special Shipment/Handling or Storage Requirements: STORED ON ICE

Method of Shipment: HAND DELIVERED

Relinquished by	Received by	Relinquished by	Received by
Signature: [signature]	Signature: [signature]	Signature	Signature
Printed Name: CHRISTY JOHNSON	Printed Name: M. FRENCH	Printed Name	Printed Name
Company: LANDAU	Company: SPECIALTY	Company	Company
Date 3/5/02 Time 1625	Date 3/5/02 Time 1625	Date ____ Time ____	Date ____ Time ____

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev 4/01

BZTO104(e)016910

Specialty Analytical

19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

FACSIMILE

DATE: 4/17/02 TIME: 10:20 AM

TO: Martin Powers

COMPANY: Landau - Seattle

FROM: Dan

SUBJECT: New Terminal Results

NUMBER OF PAGE(S) _____ INCLUDING THIS COVER PAGE.

ADDITIONAL MESSAGE:

If you have any questions or receive this fax in error, please call us immediately at (503) 612-9007.

Specialty Analytical, An Oregon Corporation

Specialty Analytical

19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

April 16, 2002

Kevin Murphy
Time Oil Co.
2737 West Commodore Way
Seattle, WA 981991233

TEL: (206) 286-6443
FAX (206) 285-7833

RE: NW Terminal / 231001

Order No.: 0204038

Dear Kevin Murphy:

Specialty Analytical received 4 samples on 4/5/2002 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Dan Marrin

Dan Marrin
Operations Manager

Technical Review

Specialty Analytical

Date: *16-Apr-02*

CLIENT: Time Oil Co.
Project: NW Terminal / 231001
Lab Order: 0204038

Lab ID: 0204038-01
Client Sample ID: Treatment / Effluent
Collection Date: 4/5/2002 9:00:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PHENOLS BY EPA 8270 SIM		SW8270D				Analyst: bda
Pentachlorophenol	34.4	0.500		µg/L	1	4/10/2002 4:17:00 PM
Surr: 2,4,6-Tribromophenol	89.0	20.1-139		%REC	1	4/10/2002 4:17:00 PM

Lab ID: 0204038-02
Client Sample ID: Treatment / Influent
Collection Date: 4/5/2002 9:05:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PHENOLS BY EPA 8270 SIM		SW8270D				Analyst: bda
Pentachlorophenol	52.2	2.00		µg/L	4	4/11/2002 11:44:00 AM
Surr: 2,4,6-Tribromophenol	81.0	20.1-139		%REC	4	4/11/2002 11:44:00 AM

Lab ID: 0204038-03
Client Sample ID: SDM-1
Collection Date: 4/5/2002 9:35:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
HOLD PER CLIENT REQUEST		PER CLIENT				Analyst: cld
Hold	HOLD				1	4/8/2002

Lab ID: 0204038-04
Client Sample ID: HRW-1
Collection Date: 4/5/2002 9:45:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PHENOLS BY EPA 8270 SIM		SW8270D				Analyst: bda
Pentachlorophenol	94.2	5.00		µg/L	10	4/11/2002 12:10:00 PM
Surr: 2,4,6-Tribromophenol	11.6	20.1-139	S,D	%REC	10	4/11/2002 12:10:00 PM

Date: 16-Apr-02

Specialty Analytical

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270AFLL_W

CLIENT: Time Oil Co.
Work Order: 0204038
Project: NW Terminal / 231001

Sample ID MB-6699 | SampType: MBLK | TestCode: 8270AFLL_W Units: µg/L | Prep Date: 4/9/2002 | Run ID: 5973G_020410A
Client ID: ZZZZZ | Batch ID: 6699 | TestNo: SW8270D | Analysis Date 4/10/2002 | SeqNo: 128444

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	ND	0.500									
Surr: 2,4,6-Tribromophenol	14.17	1.00	20	0	70.8	20.1	139	0	0		

Sample ID LCS-6699 | SampType: LCS | TestCode: 8270AFLL_W Units: µg/L | Prep Date 4/9/2002 | Run ID: 5973G_020410A
Client ID: ZZZZZ | Batch ID: 6699 | TestNo: SW8270D | Analysis Date 4/10/2002 | SeqNo: 128442

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	31.6	1.00	40	0	79	42.3	103	0	0		

Sample ID LCSD-6699 | SampType: LCSD | TestCode: 8270AFLL_W Units: µg/L | Prep Date: 4/9/2002 | Run ID: 5973G_020410A
Client ID: ZZZZZ | Batch ID: 6699 | TestNo: SW8270D | Analysis Date: 4/10/2002 | SeqNo: 128443

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	38.92	1.00	40	0	97.3	42.3	103	31.6	20.8	20	R

Sample ID CCV-6699 | SampType: CCV | TestCode: 8270AFLL_W Units: µg/L | Prep Date: | Run ID: 5973G_020410A
Client ID: ZZZZZ | Batch ID: 6699 | TestNo: SW8270D | Analysis Date: 4/10/2002 | SeqNo: 128446

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	9.2	0.500	10	0	92	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

SPECIALTY
JUL 01 02 02
04/11/02 02:20 NO.110 04/06
BZTO104(e)016914

KEY TO FLAGS

A This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards.

A1. This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2. This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against lube oil calibration standards.

A3. Results determined to be non detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

B The blank exhibited a positive result greater than the reporting limit for this compound.

C The result confirmed by secondary column or GC/MS analysis.

CN. See case narrative.

CR. Result for this analyte maybe biased due to interferences. Confirmation by GC/MS or other technique is recommended.

D Surrogate was diluted outside reporting range.

E. Result exceeds the calibration range for the compound. The result should be considered an estimate.

F. The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

G. Result may be biased high due to biogenic interferences. Silica gel clean-up recommended.

H. Sample was analyzed outside recommended holding times.

HT. At clients request, sample was analyzed outside method recommended holding time.

J. The result for this analyte is between the MDL and the PQL, and should be considered an estimated concentration.

K. Diesel result is biased high due to amount of oil contained in the sample.

L. Diesel result is biased high due to amount of gasoline contained in the sample.

M. Oil result is biased high due to amount of diesel contained in the sample.

MC. Sample concentration is greater than 4x the spiked value; the spiked value is considered insignificant.

MI Outside control limits due to Matrix Interference.

MSA. Value determined by Method of Standard Addition.

N. Sample appears to contain biogenic material biasing quantification.

O Laboratory Control Standard (LCS) exceeded laboratory control limits, meets CCV criteria. Data meets EPA requirements.

P. Detected levels of Methylene Chloride may be due to laboratory contamination, due to previous analysis or background levels.

Q. Detection limits elevated due to sample matrix

R. RPD control limits were exceeded.

RF. Duplicate failed, due to result being at or near method reporting limit.

RP. Matrix spike values exceed established QC limits, post digestion spike is in control.

S Recovery outside control limits.

*. The result for this parameter was greater than the maximum contaminant level or the TCLP regulatory limit.

rev. October 23, 2001

Landau Associates
5285 SW Meadows Road
Suite 315
Lake Oswego, OR 97035
(503) 443-6010

Chain-of-Custody Record

Date 4/5/02
Page 1 of 1

Project Name: TIME OIL
Project No. 231001
Landau Project Manager: MARTIN POWERS
Project Location: NW TERMINAL PORTLAND, OR
Sampler's Name: CHRISTY JOHNSON

Testing Parameters: TCP 8270D SIM

Turnaround Time
- [x] Standard
- [ ] Accelerated

Sample I.D.	Date	Time	Matrix	No. of Containers	TCP 8270D SIM	Observations/Comments
TREATMENT EFFLUENT	4/5/02	900	WATER	1	/	PLEASE SEND RESULTS TO MARTIN POWERS EDMONDS, WA & KEVIN MURPHY TIME OIL
TREATMENT INFLUENT	↓	905	↓	1	/	
SDM-1	↓	935	↓	1	HOLD	
HRW-1	↓	945	↓	1	/	

Special Shipment/Handling or Storage Requirements: STORED ON ICE

Method of Shipment: HAND DELIVERED

Relinquished by	Received by	Relinquished by	Received by
Signature: Christy Johnson	Signature:	Signature:	Signature: Denise Chamberlin
Printed Name: CHRISTY JOHNSON	Printed Name:	Printed Name:	Printed Name: Denise Chamberlin
Company: LANDAU ASSOC	Company:	Company:	Company:
Date: 4/5/02 Time: 1110	Date: Time:	Date: Time:	Date: 4/5/02 Time: 11:15

(M) 8/95

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

BZTO104(e)016916

Specialty Analytical

19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

May 01, 2002

Kevin Murphy
Time Oil Co.
2737 West Commodore Way
Seattle, WA 981991233

TEL: (206) 286-6443
FAX (206) 285-7833

RE: Waste Water Treatment

Dear Kevin Murphy: Order No.: 0204109

Specialty Analytical received 4 samples on 4/22/2002 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Dan Marrin
Operations Manager

Technical Review

Specialty Analytical

Date: *01-May-02*

CLIENT: Time Oil Co.
Project: Waste Water Treatment
Lab Order: 0204109

Lab ID: 0204109-01
Client Sample ID: Effluent Reactor B
Collection Date: 4/22/2002 11:05:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
SEMI-VOLATILE COMPOUNDS- ACID FRACTION		E8270B-AF				Analyst: bda
Pentachlorophenol	9.33	5.00		µg/L	1	4/24/2002 10:52:00 AM
Surr: 2,4,6-Tribromophenol	61.2	34-133		%REC	1	4/24/2002 10:52:00 AM

Lab ID: 0204109-02
Client Sample ID: Influent Reactor B
Collection Date: 4/22/2002 11:05:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
SEMI-VOLATILE COMPOUNDS- ACID FRACTION		E8270B-AF				Analyst: bda
Pentachlorophenol	7.56	5.00		µg/L	1	4/24/2002 11:19:00 AM
Surr: 2,4,6-Tribromophenol	66.0	34-133		%REC	1	4/24/2002 11:19:00 AM

Lab ID: 0204109-03
Client Sample ID: BioReactor B
Collection Date: 4/22/2002 11:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BIOLOGICAL OXYGEN DEMAND- 5 DAY		E405.1				Analyst: sub
Biochemical Oxygen Demand	9.56	2.00		mg/L	1	4/23/2002
CHEMICAL OXYGEN DEMAND		E410.4				Analyst: mgh
Chemical Oxygen Demand	19.7	10.0		mg/L	1	4/25/2002
TOTAL DISSOLVED SOLIDS		E160.1				Analyst: mgh
Total Dissolved Solids	349	10.0		mg/L	1	4/22/2002
ORGANIC CARBON, TOTAL		E415.2				Analyst: mgh
Organic Carbon, Total	7.31	2.00		mg/L	2	4/24/2002
TOTAL SUSPENDED SOLIDS		E160.2				Analyst: mgh
Total Suspended Solids	272	5.00		mg/L	1	4/22/2002
VOLATILE SUSPENDED SOLIDS		E160.4				Analyst: mgh
Volatile Suspended Solids	52.0	10.0		mg/L	1	4/24/2002

Specialty Analytical

Date: *01-May-02*

CLIENT: Time Oil Co.
Project: Waste Water Treatment

Lab Order: 0204109

Lab ID: 0204109-04
Client Sample ID: Influent Feed & Neutrient

Collection Date: 4/22/2002 11:30:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BIOLOGICAL OXYGEN DEMAND- 5 DAY		**E405.1**				Analyst: sub
Biochemical Oxygen Demand	18.8	2.00		mg/L	1	4/23/2002

Specialty Analytical

ANALYTICAL QC SUMMARY REPORT

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

TestCode: 8270AF_W

Sample ID MB-6752 | SampType: MBLK | TestCode: 8270AF_W | Units: µg/L | Prep Date: 4/23/2002 | Run ID: 5973G_020424A
Client ID: ZZZZZ | Batch ID: 6752 | TestNo: E8270B-AF | Analysis Date: 4/24/2002 | SeqNo: 129693

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	ND	5.00									
Surr: 2,4,6-Tribromophenol	61.54	1.00	100	0	61.5	34	133	0	0		

Sample ID LCS-6752 | SampType: LCS | TestCode: 8270AF_W | Units: µg/L | Prep Date: 4/23/2002 | Run ID: 5973G_020424A
Client ID: ZZZZZ | Batch ID: 6752 | TestNo: E8270B-AF | Analysis Date: 4/24/2002 | SeqNo: 129696

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	36.42	5.00	50	0	72.8	23.8	118	0	0		

Sample ID LCSD-6752 | SampType: LCSD | TestCode: 8270AF_W | Units: µg/L | Prep Date: 4/23/2002 | Run ID: 5973G_020424A
Client ID: ZZZZZ | Batch ID: 6752 | TestNo: E8270B-AF | Analysis Date: 4/24/2002 | SeqNo: 129692

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	27.78	5.00	50	0	55.6	23.8	118	36.42	26.9	20	R

Sample ID CCV-6752 | SampType: CCV | TestCode: 8270AF_W | Units: µg/L | Prep Date: | Run ID: 5973G_020424A
Client ID: ZZZZZ | Batch ID: 6752 | TestNo: E8270B-AF | Analysis Date: 4/24/2002 | SeqNo: 129691

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	36.34	5.00	40	0	90.8	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

05/02 '02 13:13 NO.301 04/11
503 612 8572
SPECIALTY
BZTO104(e)016920

ANALYTICAL QC SUMMARY REPORT

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

TestCode: COD

Sample ID MB-R19621 | SampType: MBLK | TestCode: COD | Units: mg/L | Prep Date: | Run ID: COD_020425A
Client ID: ZZZZZ | Batch ID: R19621 | TestNo: E410.4 | Analysis Date: 4/25/2002 | SeqNo: 130012

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	ND	10.0									

Sample ID LCS-R19621 | SampType: LCS | TestCode: COD | Units: mg/L | Prep Date: | Run ID: COD_020425A
Client ID: ZZZZZ | Batch ID: R19621 | TestNo: E410.4 | Analysis Date: 4/25/2002 | SeqNo: 130011

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	98.8	10.0	104	0	95	81.4	114	0	0		

Sample ID 0204109-03C MS | SampType: MS | TestCode: COD | Units: mg/L | Prep Date: | Run ID: COD_020425A
Client ID: BioReactor B | Batch ID: R19621 | TestNo: E410.4 | Analysis Date: 4/25/2002 | SeqNo: 130009

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	127.4	20.0	104	19.7	104	85.4	118	0	0		

Sample ID 0204109-03C MSD | SampType: MSD | TestCode: COD | Units: mg/L | Prep Date: | Run ID: COD_020425A
Client ID: BioReactor B | Batch ID: R19621 | TestNo: E410.4 | Analysis Date: 4/25/2002 | SeqNo: 130010

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	133.9	20.0	104	19.7	110	85.4	118	127.4	5.02	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

SPECIALTY
BZTO104(e)016921

ANALYTICAL QC SUMMARY REPORT

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

TestCode: TDS_W

Sample ID MB-R19553 | SampType: MBLK | TestCode: TDS_W | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422F
Client ID: ZZZZZ | Batch ID: R19553 | TestNo: E160.1 | Analysis Date: 4/22/2002 | SeqNo: 129433

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	10.0									

Sample ID LCS-R19553 | SampType: LCS | TestCode: TDS_W | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422F
Client ID: ZZZZZ | Batch ID: R19553 | TestNo: E160.1 | Analysis Date: 4/22/2002 | SeqNo: 129432

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids	1099	10.0	1101	0	99.8	93.1	105	0	0		

Sample ID 0204088-02A DUP | SampType: DUP | TestCode: TDS_W | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422F
Client ID: ZZZZZ | Batch ID: R19553 | TestNo: E160.1 | Analysis Date: 4/22/2002 | SeqNo: 129430

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids	2204	20.0	0	0	0	0	0	2142	2.85	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

05/02 '02 13:15 NO.301 06/11
503 612 8572
SPECIALTY
BZTO104(e)016922

ANALYTICAL QC SUMMARY REPORT

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

TestCode: TOC_W

Sample ID	SampType	TestCode	Units	Prep Date	Run ID	Client ID	Batch ID	TestNo	Analysis Date	SeqNo
MB-R19593	MBLK	TOC_W	mg/L		TOC-APOLLO_020424A	ZZZZZ	R19593	E415.2	4/24/2002	129706
LCS-R19593	LCS	TOC_W	mg/L		TOC-APOLLO_020424A	ZZZZZ	R19593	E415.2	4/24/2002	129705
0204109-03C MS	MS	TOC_W	mg/L		TOC-APOLLO_020424A	BioReactor B	R19593	E415.2	4/24/2002	129702
0204109-03C MSD	MSD	TOC_W	mg/L		TOC-APOLLO_020424A	BioReactor B	R19593	E415.2	4/24/2002	129703
CCV	CCV	TOC_W	mg/L		TOC-APOLLO_020424A	ZZZZZ	R19593	E415.2	4/24/2002	129704

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Total	ND	1.00									
Organic Carbon, Total	9.314	1.00	10	0	93.1	84.7	110	0	0		
Organic Carbon, Total	17.55	2.00	10	7.308	102	85.2	115	0	0		
Organic Carbon, Total	17.32	2.00	10	7.308	100	85.2	115	17.55	1.35	20	
Organic Carbon, Total	9.696	1.00	10	0	97	90	110	0	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

05/02 '02 13:15 NO.301 07/11
503 612 8572
SPECIALTY
BZTO104(e)016923

ANALYTICAL QC SUMMARY REPORT

TestCode: TSS_WW

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

Sample ID: MB-R19551 | SampType: MBLK | TestCode: TSS_WW | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422E
Client ID: ZZZZZ | Batch ID: R19551 | TestNo: E160.2 | Analysis Date: 4/22/2002 | SeqNo: 129380

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Suspended Solids	ND	5.00									

Sample ID: LCS-R19551 | SampType: LCS | TestCode: TSS_WW | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422E
Client ID: ZZZZZ | Batch ID: R19551 | TestNo: E160.2 | Analysis Date: 4/22/2002 | SeqNo: 129379

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Suspended Solids	291	5.00	354	0	82.2	65.7	105	0	0		

Sample ID: 0204109-03A-DUP | SampType: DUP | TestCode: TSS_WW | Units: mg/L | Prep Date: | Run ID: WETCHEM_020422E
Client ID: BioReactor B | Batch ID: R19551 | TestNo: E160.2 | Analysis Date: 4/22/2002 | SeqNo: 129378

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Suspended Solids	272	5.00	0	0	0	0	0	272	0	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

05/02 '02 15:16 NO.301 08/11
503 612 8572
SPECIALTY
BZTO104(e)016924

ANALYTICAL QC SUMMARY REPORT

TestCode: VSS_W

CLIENT: Time Oil Co.
Work Order: 0204109
Project: Waste Water Treatment

Sample ID 0204109-03A DUP | SampType: DUP | TestCode: VSS_W | Units: mg/L | Prep Date: | Run ID: WETCHEM_020424B
Client ID: BioReactor B | Batch ID: R19573 | TestNo: E160.4 | Analysis Date: 4/24/2002 | SeqNo: 129601

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Volatile Suspended Solids	50	10.0	0	0	0	0	0	52	3.92	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

05/02 '02 15:17 NO.301 09/11
503 612 8572
SPECIALTY
BZTO104(e)016925

KEY TO FLAGS

A. This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards.

A1. This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2. This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against lube oil calibration standards.

A3. Results determined to be non detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

B. The blank exhibited a positive result greater than the reporting limit for this compound.

C. The result confirmed by secondary column or GC/MS analysis.

CN. See case narrative.

CR. Result for this analyte maybe biased due to interferences. Confirmation by GC/MS or other technique is recommended.

D. Surrogate was diluted outside reporting range.

E. Result exceeds the calibration range for the compound. The result should be considered an estimate.

F. The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

G. Result may be biased high due to biogenic interferences. Silica gel clean-up recommended.

H. Sample was analyzed outside recommended holding times.

HT. At clients request, sample was analyzed outside method recommended holding time

J. The result for this analyte is between the MDL and the PQL, and should be considered an estimated concentration.

K. Diesel result is biased high due to amount of oil contained in the sample.

L. Diesel result is biased high due to amount of gasoline contained in the sample.

M. Oil result is biased high due to amount of diesel contained in the sample.

MC. Sample concentration is greater than 4x the spiked value, the spiked value is considered insignificant.

MI. Outside control limits due to Matrix Interference.

MSA. Value determined by Method of Standard Addition.

N. Sample appears to contain biogenic material biasing quantification.

O. Laboratory Control Standard (LCS) exceeded laboratory control limits, meets CCV criteria. Data meets EPA requirements.

P. Detected levels of Methylene Chloride may be due to laboratory contamination, due to previous analysis or background levels.

Q. Detection limits elevated due to sample matrix.

R. RPD control limits were exceeded.

RF. Duplicate failed, due to result being at or near method reporting limit.

RP. Matrix spike values exceed established QC limits, post digestion spike is in control.

S. Recovery outside control limits.

*. The result for this parameter was greater than the maximum contaminant level or the TCLP regulatory limit.

rev. October 23, 2001

CHAIN OF CUSTODY RECORD

Page 1 of 1

Specialty Analytical
19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007 - Phone
(503) 612-8572 - Fax

Contact Person/Project Manager: KEVIN MURPHY
Company: Time Oil Co.
Address: P.O. Box 24447, Terminal Station
Seattle, WA. 98124-9990
Phone: 206-282-2001 Fax: Kevin M. 1-206-285-7833; Kevin P. 1-425-776-6409; Skip W. 503-286-1616
Project No. Project Name: Water Treatment
Invoice To P.O. No.

Collected By:
Signature: Harley Wilton
Printed: Harley Wilton
Signature
Printed

Turn Around Time
☒ Normal
☐ Rush _____ Specify

Rush Analyses Must Be Scheduled With The Lab In Advance

For Laboratory Use
Lab Job No. 0204109-01
Shipped Via: Specialty Analytical
Air Bill No.
Temperature On Receipt 16 °C
Specialty Analytical Containers? (Y)/N
Specialty Analytical Trip Blanks? (Y)/N

Date	Time	Sample I.D.	Matrix	No. of Containers	Pentachlorophenol	VSS	TSS	BOD	TDS	COD	TOC				Comments	Lab I.D.
4-22-02	1100	Effluent Reactor B	WATER		✓											-01
4-22-02	1105	Influent Reactor B	WATER		✓											-02
4-22-02	1115	BioReactor B	WATER					✓								-03
4-22-02	1115	BioReactor B	WATER			✓	✓		✓							-04
4-22-02	1115		WATER													
4-22-02	1115		WATER													
4-22-02	1115		WATER													
4-22-02	1115		WATER													
4-22-02	1115		WATER													
4-22-02	1130	BioReactor B	WATER							✓	✓					-05
4-22-02	1130	Influent Final Effluent	WATER					✓								-06

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time
Harley Wilton	4-22-02	1130	Melissa Wall	Melissa Wall	4/22/02	1200
Company:			Company: Specialty Analytical	Company: Specialty Analytical		
				Received For Lab By: C. Meister	Date 4-22-02	Time 1:00 PM

Unless Reclaimed, Samples Will Be Disposed of 60 Days After Receipt.

Copies: White-Original Yellow-Project File Pink-Customer Copy

SPECIALTY 503 612 8572 05/02 '02 13:18 NO.501 P1
BZTO104(e)016927

Specialty Analytical

19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

June 06, 2002

Kevin Murphy
Time Oil Co.
2737 West Commodore Way
Seattle, WA 981991233

TEL: (206) 286-6443
FAX (206) 285-7833

RE: NW Terminal / 231001.118

Dear Kevin Murphy:

Order No.: 0205165

Specialty Analytical received 1 sample on 5/29/2002 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Dan Marrin

Dan Marrin
Operations Manager

Technical Review

Specialty Analytical

Date: *06-Jun-02*

CLIENT: Time Oil Co.
Lab Order: 0205165
Project: NW Terminal / 231001.118

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
HRW-1	**0205165-01A**			**Date Collected**		**5/29/2002**
PHENOLS BY EPA 8270D MOD.		SW8270D				Analyst: bda
Pentachlorophenol	452	10.0		µg/L	20	6/4/2002 6:12:00 PM
Surr: 2,4,6-Tribromophenol	32.2	34.8-124	S,D	%REC	20	6/4/2002 6:12:00 PM

Date: 06-Jun-02

Specialty Analytical

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270AFLL_W

CLIENT: Time Oil Co
Work Order: 0205165
Project: NW Terminal / 231001.118

Sample ID: MB-6910 | SampType: MBLK | TestCode: 8270AFLL_W | Units: pg/L | Prep Date: 5/30/2002 | Run ID: 5973G_020604A
Client ID: ZZZZZ | Batch ID: 6910 | TestNo: SW8270D | Analysis Date: 6/4/2002 | SeqNo: 134767

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	ND	0.500									

Sample ID: LCS-6910 | SampType: LCS | TestCode: 8270AFLL_W | Units: pg/L | Prep Date: 5/30/2002 | Run ID: 5973G_020604A
Client ID: ZZZZZ | Batch ID: 6910 | TestNo: SW8270D | Analysis Date: 6/4/2002 | SeqNo: 134768

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	43.76	2.00	40	0	109	36.3	116	0	0		

Sample ID: LCSD-6910 | SampType: LCSD | TestCode: 8270AFLL_W | Units: pg/L | Prep Date: 5/30/2002 | Run ID: 5973G_020604A
Client ID: ZZZZZ | Batch ID: 6910 | TestNo: SW8270D | Analysis Date: 6/4/2002 | SeqNo: 134769

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	44.28	2.00	40	0	111	36.3	116	43.76	1.18	20	

Sample ID: CCV-6910 | SampType: CCV | TestCode: 8270AFLL_W | Units: pg/L | Prep Date: | Run ID: 5973G_020604A
Client ID: ZZZZZ | Batch ID: 6910 | TestNo: SW8270D | Analysis Date: 6/4/2002 | SeqNo: 134766

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pentachlorophenol	10.58	0.500	10	0	106	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

SPECIALTY 503 612 8572 06/07 '02 06:25 NO.748 05/06

BZTO104(e)016930

CHAIN OF CUSTODY RECORD

Specialty Analytical
19761 S.W. 95th Place
Tualatin, OR 97062
(503) 612-9007 - Phone
(503) 612-8572 - Fax

Contact Person/Project Manager: MARTIN POWERS
Company: LANDAU ASSOC.
Address: 130 - 2ND AVE SOUTH
EDMONDS, WA 98020
Phone: 425 7780907 Fax:
Project No: 23101.118 Project Name: TIME OIL
Invoice To: TIME OIL - KEVIN MURPHY P.O. No.:

Collected By: Christy Johnson
Signature: Christy Johnson
Printed: CHRISTY L JOHNSON

Signature:
Printed:

Turn Around Time
☒ Normal
☐ Rush _____
Specify

Rush Analyses Must Be Scheduled With The Lab In Advance

For Laboratory Use
Lab Job No. 0205165
Shipped Via: Client
Air Bill No:
Temperature On Receipt: 4 °C
Specialty Analytical Containers? Y / N
Specialty Analytical Trip Blanks? Y / N

Date	Time	Sample I.D.	Matrix	No. of Containers	Analyses: RP (8270SIM)	Comments	Lab I.D.
5/29/02	1300	4RW-1	WATER	1	✓	PLEASE SEND RESULTS TO MARTIN POWERS LAI EDMONDS & KEVIN MURPHY TIME OIL	

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time
Christy Johnson Company: LANDAU ASSOC	5/29/02	1500	Company:	Company:		

Unless Reclaimed, Samples Will Be Disposed of 60 Days After Receipt.

Received For Lab By: Cindy Day — Date: 5/29/02 — Time: 5:00

Copies: White-Original Yellow-Project File Pink-Customer Copy

SPECIALTY 503 612 8572 06/07 '02 06:20 NO.148 04/04

BZTO104(e)016931

86-102

LANDAU ASSOCIATES

August 21, 2002

REC'D AUG 2 6 2002

Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon

RE: RESPONSE TO DEQ COMMENTS ON REMOVAL ACTION PLAN FOR WAREHOUSE DEMOLITION AND SOIL EXCAVATION TIME OIL NORTHWEST TERMINAL

Dear Tom:

On behalf of Time Oil Co, this letter provides acceptance of the conditions included in the Oregon Department of Environmental Quality's (DEQ) approval letter, dated July 24, 2002, for the *Removal Action Plan, Warehouse Demolition and Soil Excavation* at the Time Oil Northwest Terminal and response to DEQ's comments. It is Time Oil's intent to continue the remedial investigation/feasibility study process under the DEQ Voluntary Cleanup Program for the terminal with the ultimate goal of a final remedial action for any contaminated soil and groundwater that is remaining following the removal actions.

Responses to specific DEQ comments follow:

1. *Disposal of contaminated materials at the Swan Hills facility is acceptable to DEQ, contingent upon receipt of approvals from Environmental Canada and the U.S. Environmental Protection Agency (EPA).*

   Response: Approval from Environment Canada and the U.S. Environmental Protection Agency will be obtained prior to disposal of soil at the Swan Hills facility in Swan Hills, Alberta. We anticipate receipt of approvals by Friday, August 23, 2002.

2. *Page 2-7. Results of the leachate testing and a rationale for the proposed soil removal goals must be provided in an update letter/report for DEQ review. We will do our best to anticipate and inform you of any concerns regarding the proposed cleanup level. However, final approval of the cleanup will be based on future completion of the RI/FS and selection of a final remedy for the site including public notice and chance to comment.*

   Response: We have just started to receive preliminary results from the leachate testing. A rationale for the proposed soil removal goal will be provided to DEQ following evaluation of the results, but prior to soil excavation in the former PCP mixing area.

3. *Page 2-9. Because the wells are in a contaminated area they should be abandoned by redrilling, rather than grouting the existing well casing, in accordance with the Department of Water Resources rules.*

Response: Wells LW-2S, LW-12D1, LW-12D2, RW-3, and F were abandoned on August 7 and 8, 2002. The abandonment method was overdrilling, including use of step-down methods for the deep wells.

4. *Page 2-11. The washing, characterization and disposal of concrete wall and warehouse demolition debris should be conducted consistent with the approach formerly approved by DEQ's Voluntary Cleanup and Hazardous Waste programs. That approval (DEQ, October 29, 1997) was based on Time Oil's proposal for management of contaminated debris form the East Property (Time Oil, October 14, 1997) and previous documents regarding the East Property removal actions. As part of that work, pressure washed materials such as rocks/concrete/asphalt/brick were demonstrated to have residual PCP concentrations below risk-based concentrations (5 mg/kg PCP) and were approved for disposal at a permitted solid waste facility (e.g., Hillsboro Landfill). Wood was to be tested to determine whether it could be similarly washed or if residual PCP concentrations would require disposal as a hazardous waste. Based on our July 23rd conference call it is our understanding that the demolition process will include:*

- *sampling cores from permeable materials (wood) for analysis,*
- *pressure washing of non-permeable materials (including concrete),*
- *pressure washing of dust in the building interior and disposal of wash water through the onsite water treatment system,*
- *post-wash sampling of worst-case areas where PCP formulation was most prevalent, and*
- *disposal of contaminated materials as hazardous waste or solid waste depending on the residual PCP concentrations.*

In order for debris to be recycled or disposed of at a construction debris landfill, Time Oil must demonstrate through wipe sampling, coring or other means (in worst case areas of the building as noted above) that surfaces do not contain residual PCP or dioxin.

Response: The five steps listed in DEQ's comment letter will be used in the warehouse demolition process. As discussed with Kevin Murphy of Time Oil by telephone, the following verification samples will be collected of various media from the warehouse or concrete walls following decontamination:

- Two core samples will be collected of the wood timbers from the warehouse following decontamination and analyzed for PCP.
- Two wipe samples will be collected from metal surfaces of the warehouse following decontamination and analyzed for PCP. The metal wipe samples will be collected from locations where PCP formulation was most prevalent. As discussed with DEQ, because PCP and dioxin results can be correlated, the PCP analyses results will be used to demonstrate whether decontamination is complete and dioxin wipe samples will not be necessary.
- Two concrete drill cutting samples will be collected from the concrete walls on the east and south sides of the former PCP mixing area or from the concrete foundation of the warehouse following decontamination (but before removal) and analyzed for PCP. The concrete samples will be collected from locations where PCP formulation was most prevalent.

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As confirmed in an email from Tom Roick of DEQ on July 31, 2002, demolition debris from the warehouse and other removed items (e.g., metal, concrete, etc.) will be disposed, as follows, if verification sampling results indicate that PCP is not detected:

- Wood timbers at a permitted construction debris landfill or Subtitle D solid waste landfill
- Concrete at a construction debris landfill or Subtitle D solid waste landfill
- Metal at a recycling facility.

5. *Page 2-14. DEQ agrees with the verification sampling approach. The number of confirmation samples proposed is the minimum that should be collected from the excavation area.*

   Response: The number of verification samples proposed for the excavation area within the former PCP mixing area will be the minimum number collected.

6. *Page 2-15. As discussed in our July 23rd conference call, stormwater in the loading and stockpile areas must be managed to prevent releases of contaminants to the stormwater system and Willamette River.*

   Response: The plan for stormwater management in the loading and stockpile areas during removal is addressed in the Removal Action Plan, Soil Stockpile (Landau Associates, February 2002).

7. *Page 2-16/2-17. Air monitoring and "acceptable levels" of air particulates should be specified at a minimum in the site Health and Safety Plan.*

   Response: Air monitoring and "acceptable levels" of air particulates will be specified in the Health and Safety Plan prepared for removal actions at the terminal by Envirocon, the remediation contractor.

8. *Page 2-19. A conservative approach should be used in determining the overburden soil that will be removed and considered clean fill for replacing in the excavation. Documentation of this process will be important for the removal report and residual risk assessment. An alternative is to conduct confirmation sampling of the overburden stockpile prior to replacement in the excavation.*

   Response: During soil excavation within the former PCP mixing area, overburden soil or "clean fill" at depths from 0 to 10 ft below ground surface (BGS) will be segregated from PCP-impacted soil in areas where excavation and backfill were conducted in 1989. This is conservative because excavation and backfill were actually conducted to a total depth of 12 ft BGS in certain areas. Also, approximately 2,500 yd^3 of soil was removed from the original excavation, but only 1,200 yd^3 of clean fill will be segregated from the impacted soil and re-used as backfill for this removal action.

9. *Time Oil should be aware of the potential for discovery of cultural resources. Cultural resources can include archeological and historical resources such as ceremonial artifacts, traditional cultural properties, objects at burial sites, or human remains. There are state and federal laws that may apply to cultural resources at Portland Harbor upland sites. For more information*

BZTO104(e)016934

about the requirements under these laws, contact the State Historic Preservation Office (SHPO) at 503-378-4168.
Information on the state laws can be found at SHPO website:
http://www.prd state.or.us/laws_shpo.html If cultural resources are discovered during investigation or cleanup activities, work should stop immediately in the vicinity of the find and Kim Cox, Portland Harbor Project Coordinator at 503-229-6590, should be notified within 24 hours of the discovery.
As a reminder, Time Oil will need to complete an annual report for the waste sent off site. There will be hazardous waste generator fees associated with the removal. We look forward to Time Oil's successful completion of this removal action.

Response: Because excavation has already occurred previously in the former PCP mixing area, we do not anticipate encountering any cultural resources during the removal action. However, if any are encountered, we will comply with Oregon regulations for discovery and will contact the proper authorities.

With submittal of this response letter, we will proceed with the warehouse demolition and site preparation activities for the soil removal. Implementation of soil removal activities will proceed upon receipt of approval of soil disposal from the federal agencies. Please call Kevin Murphy (206-286-6443) or me (425-778-0907)if you have any questions.

LANDAU ASSOCIATES, INC.

Martin Powers for

Rebekah Brooks
Project Manager

RB/tam

cc: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

BZTO104(e)016935

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 03 2002

August 27, 2002

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

EPA Notice No.: 452/02

MR. ROBERT FISHER
BEAZER EAST INC./TIME OIL COMPANY
ONE OXFORD
SUITE 3000
PITTSBURGH, PA 15219
EPA I.D. No.: ORD009597543

Dear MR. FISHER:

This is to acknowledge receipt of your notice, dated June 20, 2002, of intent to export hazardous waste to Canada as required by Title 40, Code of Federal Regulations, Part 262, Subpart E, Section 262.53 promulgated pursuant to the Resource Conservation and Recovery Act (RCRA). In accordance with the U.S.-Canada Bilateral Agreement on the Transboundary Movement of Hazardous Waste, the U.S. Environmental Protection Agency (EPA) forwarded your notice to the Government of Canada and Canada has no objection to your shipment(s) of hazardous waste.

This letter constitutes the EPA Acknowledgment of Consent for the export of the following hazardous waste as specified in your notice:

> Waste Description: CONTAMINATED SOIL. EPA Waste Code: F027. DOT Shipping Name: HAZARDOUS WASTE, SOLID, NOS; DOT Hazard Class: 9; DOT I.D. No.: NA3077. Total Volume to be Exported: 15,000 TONS. Estimated Frequency: 750 loads per YEAR.

You may ship this waste to the following consignee:

> SENSOR ENVIRONMENTAL SERVICES LTD.
> SWAN HILLS TREATMENT CENTRE
> BOX 1400
> SWAN HILLS, ALBERTA
> CANADA TOG 2CO

Shipments may occur during the period from August 21, 2002 to July 18, 2003.

Internet Address (URL) • http //www.epa gov
Recycled/Recyclable • Printed with Vegetable Oil Based Inks on Recycled Paper (Minimum 50% Postconsumer content)

BZTO104(e)016936

You are also reminded of the following **special RCRA requirements for export shipments of hazardous waste.** Specific details of these requirements are contained in Title 40 of the Code of Federal Regulations, Part 262, Subpart E.

1. If the major terms of the original notice of intent to export on which this consent is based should change, you must **renotify** EPA. Please mail your renotification to: USEPA, Ariel Rios Building, Mail Code 2222A, 1200 Pennsylvania Avenue, NW, Washington, D.C. **20460**, with "ATTENTION: IMPORT-EXPORT PROGRAM" prominently displayed on the front of the envelope. (262.53(c)) Alternately, notices may be sent by courier to the same office at the Ariel Rios Building, Room 5124, 1200 Pennsylvania Avenue, NW, Washington, DC **20004.**

2. The Uniform Hazardous Waste **Manifest** Form for each shipment must identify the **point of departure** from the United States in Item 15, Special Handling Instructions. (262.54(c))

3. The following statement must be added to the end of the first sentence of the **certification** set forth in Item 16 of the Uniform Hazardous Waste Manifest Form: "and conforms to the terms of the attached EPA Acknowledgment of Consent". (262.54(d))

4. A **copy** of this Acknowledgment of Consent must be attached to the U.S. hazardous waste manifest that accompanies each shipment of hazardous waste. (262.54(h))

5. You must provide the waste transporter with an additional copy of the U.S. hazardous waste manifest accompanying the shipment for delivery to a **U.S. Customs** official at the point the hazardous waste leaves the United States in accordance with 263.20(g)(4) and (262.54(i)).

6. You must file an **exception report** with the USEPA, Ariel Rios Building, Mail Code 2222A, 1200 Pennsylvania Avenue, NW, Washington, DC **20460**, ATTN: IMPORT-EXPORT PROGRAM, if you have not received a copy of the manifest signed by the transporter stating the date and place of departure from the U.S. within forty five (45) days from the date it was accepted by the initial transporter; if within ninety (90) days from the date the waste was accepted by the initial transporter, the primary exporter has not received written confirmation from the consignee that the hazardous waste was received; or if the waste is returned to the United States. (262.55). Alternately, exception reports may be sent by courier to the same office at the Ariel Rios Building, Room 5124, 1200 Pennsylvania Avenue, NW, Washington, DC **20004.**

7. You must file an **annual report** by March 1 of each year with the USEPA, Ariel Rios Building, Mail Code 2222A, 1200 Pennsylvania Avenue, NW, Washington, DC **20460**, ATTN: IMPORT-EXPORT PROGRAM, summarizing all hazardous waste shipments exported during the previous calendar year. The report must include all items listed in 262.56. Alternately, annual reports may be sent by courier to the same office at the Ariel Rios

BZTO104(e)016937

Building, Room 5124, 1200 Pennsylvania Avenue, NW, Washington, DC 20004.

All shipments of hazardous waste must conform to all applicable State and Federal hazardous waste regulations and transportation requirements as well as these specific export requirements.

Any questions you may have concerning this Acknowledgment of Consent or other export requirements may be directed to Mr. Scott Nelson (Phone 202/564-5032), or Mr. Bob Small (Phone 202/564-5043), EPA, Office of Enforcement and Compliance Assurance.

Sincerely,

Robert G. Heiss
Director
Import-Export Program
Enforcement, Planning, Targeting and
Data Division
Office of Compliance (2222A)

BZTO104(e)016938

August 28, 2002

LANDAU ASSOCIATES

RECD SEP 0 3 2002

Oregon Department of Environmental Quality
Northwest Region, Voluntary Cleanup & Site Assessment
2020 Southwest Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Attn: Mr. Tom Roick, Remedial Action Specialist

RE: SUBMISSION OF BENCH SCALE TREATABILITY STUDY REPORT
***IN SITU* CHEMICAL OXIDATION PILOT STUDY**
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

Enclosed is one copy of a report prepared by In Situ Oxidative Technologies (ISOTEC) providing the results of the bench scale treatability study completed in advance of the *in situ* chemical oxidation (ISCO) pilot study of the upper zone groundwater at the Time Oil Northwest Terminal. The bench scale study was conducted in accordance with the ISCO pilot study work plan (Landau Associates June 2002) and the subsequent response (Landau Associates July 2002) to Oregon Department of Environmental Quality (DEQ) comments on the work plan.

The information presented within the report indicates that the chemical oxidant utilized (a form of Fenton's Reagent) in the laboratory study was successful in causing a high degree of destruction of volatile and semivolatile organic compounds (including chlorinated phenols). The next step in evaluating the full-scale use of ISCO to remediate impacted groundwater and saturated zone soil at the site is to conduct a field pilot study as outlined in the work plan. We are currently scheduled to commence the field pilot study during the week of September 16, 2002. Landau Associates and Time Oil Co. look forward to any comments you may have regarding the enclosed report and to continuing to work with you to develop an appropriate remedial approach for the groundwater at the site.

LANDAU ASSOCIATES, INC.

Martin T. Powers

Martin T. Powers, P.E.
Senior Engineer

MTP/tam
8/28/02 S:\WPROC\231\001\118\ISCO BenchScale_ltr.doc

Enclosure

cc: Kevin Murphy, Time Oil Co. (w/o encl)
Patty Dost, Schwabe, Williamson & Wyatt (w/o encl)
Rod Struck, Oregon Department of Environmental Quality (w/o encl)
Mike Tischuk, Beazer East, Inc. (w/o encl)

LANDAU ASSOCIATES

REC'D AUG 13 2002

86-102

August 9, 2002

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the July 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
8/9/02 S:\WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
July 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the June 2001 monthly report to DEQ.

- Await approval from EPA and Environment Canada for treatment and disposal of stockpile soil and excavated soil at the Swan Hills facility in Swan Hills, Alberta, Canada.

- Met with DEQ to present and discuss the scope for the warehouse demolition and *in situ* soil Removal Action Plan (RAP). Submitted the RAP to DEQ. Received approval from DEQ for the removal action, in addition to disposal of the soil stockpile, under the conditions provided in its July 24, 2002 comment letter.

- Prepared letter to DEQ providing notice and describing upcoming additional sampling events that were beyond the scope of plans previously reviewed by DEQ.

- Completed negotiation with remediation contractors for treatment/disposal of the stockpiled material. Contractor has responded to questions from Alberta and Environment Canada in support of the Importation Permit.

- Evaluated conducting a surface (6-inch) soil scrape within the former Crosby & Overton tank area to remove PCB and PAH-impacted soil with subsequent treatment/disposal at a thermal desorption facility (TPS Technologies, Tacoma, WA) in conjunction with other soil removal activities at the terminal. A brief summary of this work will be provided to DEQ.

- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an average flow rate of 7.2 gpm. Continued implementation of the groundwater interim action in the upper zone at HRW-1, at an average flow rate of 1.1 gpm. Approximately a total of 7.62 million gallons of groundwater have been treated and discharged from the interim action, with a total of about 188,000 gallons treated in July 2002. Analytical results from samples collected from the treatment system effluent indicate PCP is degraded to nondetectable concentrations or concentrations less than the permitted discharge limitations (2.19 µg/L on July 24, 2002).

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.

- Submitted the *First Quarter 2002 Groundwater Interim Action Status Report* and a technical memorandum documenting startup activities at HRW-1 to DEQ.

- Continued client reviews of the *First Quarter 2002 Groundwater Report*.

- Provided response to DEQ's comments on the work plan for conducting a pilot test for remediation of upper zone groundwater using ISCO techniques to DEQ. Received approval from DEQ to conduct the ISCO pilot test.

- Submitted UIC application to DEQ for injection wells to be used for the ISCO pilot test.

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- Completed performance of the ISCO bench-scale study and received preliminary results.
- Revised the storm water pollution control plan (SWPCP) for the terminal.
- Received 2nd quarter 2002 groundwater data and begin processing and validation.
- Provided a request for proposal and scope of work to potential bidders for the remedial action on the east property. Reviewed the proposal, selected a contractor (Envirocon), and began preparation for mobilization for field activities.
- Conducted field work for Phase III CPT investigation and additional sampling events in the former PCP mixing area (pre-removal investigation) and Bell Terminal.
- Reviewed and commented on DEQ's draft press releases regarding the RAP and the ISCO pilot project.

RESULTS COLLECTED

- Preliminary results for the pre-removal investigation and the additional investigation at the Bell Terminal. Final results will be provided to DEQ following validation.
- Preliminary results from the ISCO bench-scale study. Final results will be provided to DEQ with the report from ISOTEC.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- RW-2 overheated several times during July and shut down. This does not appear to be due to a lack of water present and may be due to the high ambient temperature within the control building where the temperature is measured. We are assessing whether a ventilation system may need to be installed in the control building.
- Since July 25th, the dry run protection for the pump in HRW-1 did not seem to work properly unless the pump was operated at full speed. We made that adjustment and now the pump goes into dry run shutdown as designed; however, the piezometer readings directly overlying the well indicate that there should be sufficient water to pump from the horizontal well. The pump was pulled on August 2nd and observations indicate that there is likely biofouling on the pump and in the well. It is possible that the well is "plugged" and not allowing water in the upper zone to enter the horizontal well at a rate sufficient to maintain pumping. The horizontal well may need to be flushed out with chemicals to decrease biological growth.
- The initial samples collected for the pre-removal investigation (PRI) for the purpose of demonstrating leaching concentrations to groundwater from soil in the former PCP mixing area did not yield sample results near the 5 ppm cleanup action level. Therefore, for SPLP analysis of PCP and dioxins/furans, a sample that contained 4.5 ppm PCP from a PRI data gap location was used instead. A second sample was composited using soil that yielded nondetect results and soil containing about 120 ppm PCP in an attempt to obtain a result closer to the cleanup action level. The resulting total PCP result for this sample was 9 ppm. To obtain additional samples for this demonstration, seven additional samples were subsequently collected for this purpose. The second set of preliminary PRI sample results indicated either nondetect PCP concentrations or concentrations exceeding 10 ppm PCP. One

BZTO104(e)016942

sample that contained about 12 ppm PCP is being analyzed using the SPLP technique (PCP and dioxins/furans). Two additional samples were composited using soil with nondetect results and soil containing higher PCP concentrations (about 19 ppm and 63 ppm) for SPLP analyses. Results of the additional SPLP analyses are expected to be received in mid-August.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Receive approval from EPA and Environment Canada for treatment and disposal of stockpile soil and excavated soil at the Swan Hills facility in Swan Hills, Alberta, Canada.
- Continue implementation of the groundwater interim action in the lower zone at RW-2. Continue full-scale treatment and discharge to POTW.
- Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system, including measurement of groundwater elevations in selected wells and sampling of treatment system influent/effluent.
- Modify operation of the submersible pump in HRW-1, as necessary, to optimize upper zone groundwater recovery without damaging the pump.
- Submit the *First Quarter 2002 Groundwater Report* to DEQ.
- Provide a letter to DEQ agreeing to the conditions provided in DEQ's comments on the RAP for warehouse demolition and *in situ* soil excavation.
- Receive and evaluate results for the ISCO bench-scale study. Provide a report from ISOCTEC documenting the results to DEQ.
- Evaluate and complete validation of 2nd quarter 2002 groundwater data and prepare the quarterly groundwater report.
- Begin mobilization, site preparation activities, and possibly removal actions for the soil stockpile and *in situ* soil removal, including: well abandonment; decontamination area setup; warehouse demolition; pipeline, aboveground tank, and concrete wall removal; and soil stockpile removal and disposal.
- Begin mobilization and conduct soil removal for the east property remedial action.
- Submit a revised storm water pollution control plan (SWPCP) for the terminal to the city of Portland.

BZTO104(e)016943

LANDAU ASSOCIATES

September 10, 2002

REC'D S... 3 2002
86-102

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the August 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
9/10/02 S:\WPROC\231\TRANSMIT.FAX\Monthly Rpt_Ltr doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
August 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the July 2002 monthly report to DEQ.

- Provided a letter to DEQ agreeing to the conditions provided in DEQ's comments on the removal action plan (RAP) for warehouse demolition and *in situ* soil excavation. Received approval from DEQ to proceed with the RAP, contingent on EPA and Environment Canada approval.

- Received approval from EPA and Environment Canada for treatment and disposal of soil stockpile and excavated soil at the Swan Hills facility in Swan Hills, Alberta, Canada.

- Conducted site preparation and mobilization activities including decontamination area setup for the stockpile and east property removal actions.

- Abandoned wells F, LW-2S, LW-12D1, LW-12D2, and RW-3 in preparation for soil removal in the former PCP mixing area.

- Conducted initial decontamination of metal siding, wood timbers, and concrete floor within the former PCP warehouse and of the concrete wall located on the east side of the former PCP mixing area. Collected wipe samples from the metal siding and wood or concrete core samples to verify decontamination procedure.

- Provided a brief summary to DEQ for work to be conducted within the former Crosby & Overton tank area to remove PCB and PAH-impacted soil with subsequent treatment/disposal at a thermal desorption facility (TPS Technologies, Tacoma, WA) in conjunction with other soil removal activities at the terminal. Received verbal authorization from DEQ to proceed.

- Began conducting a surface (6-inch) soil scrape within the former Crosby & Overton tank area in accordance with the area defined in the work summary. Conducted deeper soil excavation to remove visibly-impacted soil in areas around the footprints of the former tanks. Collected soil verification samples within the excavation areas. Soil was transported to TPS Technologies in Tacoma, Washington for treatment and disposal.

- Continued implementation of the groundwater interim action in the lower zone at RW-2, at an average flow rate of 6.0 gpm. Approximately a total of 7.92 million gallons of groundwater have been treated and discharged from the interim action, with a total of about 301,600 gallons treated in August 2002. Analytical results from samples collected from the treatment system effluent on August 20, 2002 indicated the concentration of PCP was 9.15 micrograms per liter (µg/L) at the point of discharge to the sanitary sewer. The concentration reported is well below the permitted limit of 40 µg/L.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system..

- Conducted the third quarter 2002 groundwater monitoring event, August 26-28, 2002.

- Submitted the *First Quarter 2002 Groundwater Report* to DEQ.

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- Continued validation of the 2nd quarter 2002 groundwater data and began preparation of the 2nd quarter 2002 groundwater report and groundwater interim action status report.

- Received approval of the UIC application submitted to DEQ for the injection wells to be used for the ISCO pilot test.

- Provided the results of the ISCO bench-scale study performed by ISOTEC to DEQ.

- Submitted the revised storm water pollution control plan (SWPCP) for the terminal to the city of Portland.

- Completed a design for a stormwater intercept system to keep upper zone groundwater from entering the storm drain system. Inspected storm drain manholes to provide information needed for design.

- Conducted field mobilization activities and completed initial excavation of soil from soil removal areas on the east property, including survey of boundaries of soil removal areas. Soil was transported to TPS Technologies in Portland, Oregon for treatment and disposal.

- Received and evaluated results from the CPT investigation in the Phase III study area. Began preparation of a report documenting the results.

- Submitted a self monitoring report to the City of Portland for the groundwater treatment system based on samples collected from the system discharge on August 20, 2002. Based on analytical data, the system was in compliance with the discharge permit.

RESULTS COLLECTED

- Final pre-removal investigation results. Results will be provided to DEQ before the soil removal action in the former PCP mixing area commences.

- Results from the media sampling associated with the former PCP warehouse. The results will be provided to DEQ prior to soil excavation within the former PCP mixing area.

- Groundwater treatment system discharge samples collected on August 20, 2002.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- All results for media samples associated with the former PCP warehouse exceeded PCP concentrations of 1 ppm, except for the sample from the concrete wall from the eastern boundary of the former PCP mixing area. The warehouse will be decontaminated a second time using hot water pressure washing and additional verification samples will be collected to demonstrate that decontamination is complete.

- During soil removal on the east property, several areas of asbestos-containing soil were encountered. The material was segregated and stockpiled until sample results positively confirmed the presence of asbestos. Time Oil is planning to dispose of this material at a facility authorized to accept asbestos.

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- RW-2 overheated several times during July 2002 and stopped operating. A ventilation fan has been placed in the pump control building in an attempt to control the potential for overheating due to the ambient temperature in the building. RW-2 operated continuously in August 2002.

- The pump in HRW-1 was pulled on August 2nd and observations indicate that there is likely biofouling on the pump and in the well. It is possible that the well is "plugged" and not allowing water in the upper zone to enter the horizontal well at a rate sufficient to maintain pumping. The horizontal well may need to be flushed out with chemicals to decrease biological growth. Currently, we are assessing the value of controlling the biological growth in HRW-1 in comparison with the potential full-scale implementation of an ISCO treatment program. The ISCO treatment program would also include an intercept system to prevent impacted groundwater from infiltrating to the storm sewer system and discharging to the Willamette River.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Continue implementation of the groundwater interim action in the lower zone at RW-2. Continue full-scale treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.

- Begin soil stockpile removal and transport to the Swan Hills facility.

- Submit the 2nd quarter 2002 groundwater interim action status report and groundwater monitoring report to client for review.

- Begin site preparation activities for the removal action in the former PCP mixing area, including: warehouse demolition; pipeline, aboveground tank, and concrete wall removal.

- Perform second decontamination of former PCP warehouse.

- Begin *in situ* soil excavation in the former PCP mixing area.

- Complete soil removal on the east property and collect soil verification samples. Evaluate soil verification sample data and assess whether additional excavation is necessary.

- Receive and evaluate verification samples from the Crosby & Overton soil scrape area.

- Implement the ISCO pilot test study. Implement a temporary stormwater intercept system in conjunction with the ISCO pilot test to determine if it will provide a feasible method for recovering PCP-impacted groundwater prior to discharge to the Willamette River.

- Dependent on the success of the temporary stormwater intercept system, either construct a permanent stormwater intercept system or attempt to decrease the biological growth in HRW-1 to make the recovery of groundwater from HRW-1 more reliable.

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TRANSMITTAL

To: Oregon Dept. of Environmental Quality
2020 SW Fourth Ave. Suite 400
Portland, OR 97201-4987

Date: September 26, 2002

Attn: Mr. Tom Roick

Project No.: 231001.179

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Technical Memorandum re: Pre-Removal Investigation Results, Time Oil Northwest Terminal (9/26/02)

The above-noted document is provided for your file.

LANDAU ASSOCIATES, INC.

Terry McDonald

for Rebekah Brooks, P.G.
Senior Hydrogeologist

RB/tam
9/26/02 S:\WPROC\231\TRANSMIT.FAX\DEQTm.doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

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TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Tom Roick, Oregon Department of Environmental Quality

FROM: Rebekah Brooks RBB

DATE: September 26, 2002

RE: PRE-REMOVAL INVESTIGATION RESULTS TIME OIL NORTHWEST TERMINAL

INTRODUCTION

On behalf of Time Oil Co. (Time Oil), this technical memorandum presents the results of the pre-removal investigation (PRI) conducted at the Time Oil Northwest Terminal within the former pentachlorophenol (PCP) mixing area prior to completion of the removal action. The investigation was conducted on August 9, 10, and 30, 2002 in accordance with the July 2, 2002, *Removal Action Plan (RAP), Warehouse Demolition and Soil Excavation* (Landau Associates 2002), and as approved by the Oregon Department of Environmental Quality (DEQ) in its comment letter, dated July 24, 2002.

The PRI included:

- Analyzing "clean fill" or overburden within the former PCP mixing area to determine whether the material can be reused as backfill
- Analyzing soil to provide additional data coverage near the perimeter of the proposed excavation
- Analyzing soil for demonstration that groundwater concentrations will not be adversely impacted by residual soil PCP concentrations of 5 mg/kg or less, which will be left in place at the completion of the removal action.

The following sections provide a discussion of the results from each of the PRI sampling efforts. Figure 1 shows the locations of the PRI samples. Table 1 provides the analytical results for the PRI samples. Laboratory analytical data and the associated data validation report will be provided to DEQ under separate cover.

CLEAN FILL RESULTS

To determine whether the clean fill or overburden that was used to backfill the 1989 excavation within the former PCP mixing area can be reused as backfill, soil samples were collected from four locations (PRI-06, -07, -09, and -11). These samples were located within the area identified as containing approximately 12 ft of backfill from the 1989 excavation. Soil samples were collected over a 1-ft sample interval from three depths at each location: 3-4, 7-8, and 11-12 ft below ground surface (BGS). Samples

collected from these depths are expected to be representative of soil concentrations within each 5-ft lift used for excavation. Each sample was analyzed for PCP, polycyclic aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPH) by HCID.

The analytical results for the clean fill indicated that the analyzed constituents were observed at nondetect or low level concentrations. As shown in Table 1 and on Figure 2, concentrations for PCP ranged from nondetect to 2.35 mg/kg (PRI-06 at 11-12 ft BGS). PAH concentrations ranged from nondetect to 120 µg/kg (pyrene, PRI-06 at 7-8 ft BGS). All TPH-HCID results were nondetect. Based on these results, the clean fill is appropriate for reuse as backfill in the former PCP mixing area after the *in situ* soil excavation is complete. As described in the RAP, the clean fill will be removed prior to and segregated from the impacted soil during excavation within the former PCP mixing area.

ADDITIONAL DATA RESULTS

To provide additional data coverage in areas where the limits of excavation are proposed, soil samples were collected from three depths (3-4, 7-8, and 11-12 ft BGS) at four locations (PRI-04, -10, -13, and -14) and from the surface soil (0-0.5 ft BGS) at three locations (PRI-01, -02, and -15) (Figure 1). The samples were analyzed for PCP. The PCP results at the four locations where samples were collected at depth ranged from nondetect concentrations to less than 1 mg/kg, except at locations PRI-13 and -14. At PRI-13, PCP concentrations were nondetect at the 4 and 8 ft depths, but PCP was detected at 118 mg/kg at the 12 ft depth. At PRI-14, the PCP concentration was 0.181 mg/kg at the 4 ft depth, but was 3.37 and 4.51 at the 8 and 12 ft depths, respectively. PCP concentrations in all of the surface soil samples were less than 0.4 mg/kg. PCP concentrations for the PRI locations are shown with the PCP data from previous investigations on Figure 2.

Based on these results, the results collected for the groundwater protection demonstration (see next section), and a 5 mg/kg cleanup action level for PCP, the limits for each tier (0-5 ft, 5-10 ft, and 10-15 ft BGS) were revised, as shown on Figure 3. The changes included: extending the limits of excavation for each tier at the southwest corner of the excavation to encompass the elevated concentrations detected at the 11-12 ft depth at PRI-13 and PRI-23, decreasing the limit of the excavation in the northeast and southeast portions of the excavation to exclude low PCP concentrations observed at PRI-04, -10, -15, -21, and PRI-22, and increasing the 10-15 ft excavation boundary to include the concentrations between 2 and 5 mg/kg at PRI-14 (see next section and Figure 2). A small area was also added for the 0-5 ft excavation at the northwest corner of the former PCP warehouse where a PCP concentration of 5.7 mg/kg was observed at a depth of 3.5 ft BGS. In the RAP, approximately 2,800 yd^3 was predicted for the removal action. The additional data results from the PRI sampling refined this volume to approximately 2,400 yd^3. Any residual impacted soil left below the maximum excavation depth (water table) that is within the

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groundwater fluctuation range (approximately 11 to 14 ft BGS), will be subsequently addressed through implementation of an *in situ* groundwater remediation technology.

GROUNDWATER PROTECTION DEMONSTRATION

To demonstrate that groundwater concentrations will not be adversely impacted by residual soil concentrations left in place following the removal action, soil samples were initially collected at five locations and depths near the proposed horizontal extent of the *in situ* excavation boundary where current soil PCP concentrations were expected to be in the range of approximately 5 to 20 mg/kg (PRI-03, -05, -08, -12, -16). Sample depths ranged from 0 to 10 ft BGS. All samples were initially analyzed for total PCP and PCP using the synthetic precipitation leaching procedure (SPLP). The sample results are summarized in Table 2. A sample collected as an additional data point [PRI-14(11-12)] was also analyzed using SPLP because the total PCP sample result (4.51 mg/kg) was close to the cleanup action level of 5 mg/kg. Total PCP sample results for these locations ranged from nondetect to 2.44 mg/kg; SPLP results were all nondetect, except for the sample from PRI-14, which equaled 3.31 µg/L.

In an attempt to obtain additional samples that contained PCP concentrations within the range of interest, an additional sampling round was conducted. For this round, an additional seven samples were collected (PRI-19 through -25) at depths ranging from 4 to 12 ft BGS and analyzed for total PCP, with one exception. The sample from PRI-20 was not analyzed because field observations indicated that the soil was likely impacted and not within the concentration range of interest. PCP results from the second round of sampling ranged from nondetect to 62.9 mg/kg, with the closest concentration to the proposed 5 mg/kg cleanup action level occurring at PRI-24 at a depth of 12 ft BGS (12.3 mg/kg). Based on the total PCP results for the first and second sampling round, two samples were selected for total dioxin/furan analysis and for SPLP PCP and dioxin/furan analyses: PRI-14 at a depth of 11-12 ft BGS and PRI-24 at a depth of 11-12 ft BGS. In addition, three samples were composited by the laboratory and consisted of mixtures of samples containing elevated concentrations of PCP (PRI-13 at 11-12 ft BGS, PRI-19 at 11-12 ft BGS, and PRI-23 at 11-12 ft BGS) with samples containing nondetect concentrations of PCP, in an attempt to obtain more samples that represented PCP concentrations closer to the 5 mg/kg cleanup action level. The composite samples were analyzed for total and SPLP PCP and total and SPLP dioxins/furans. The results of these analyses are summarized in Table 2.

As shown in Table 2 and illustrated on Figures 4 and 5, there is a poor correlation between total PCP and dioxin/furan concentrations and the corresponding SPLP concentrations for the samples analyzed. For example, the sample containing a total PCP concentration of 4.5 mg/kg contained a SPLP concentration of 3.31 µg/L, and the sample containing 12.3 mg/kg total PCP contained a SPLP concentration of 138 µg/L, but the sample containing 5.7 mg/kg total PCP contained a SPLP

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concentration of 183 µg/L. Also, the results for the samples that were not composited appear to have a more consistent trend where total concentrations for both PCP and dioxins/furans increase with an increase in SPLP concentrations, as shown on Figures 4 and 5. This observation is exemplified by the poor correlation between the composited samples with similar total PCP results of 9.04 and 9.06 mg/kg with the corresponding SPLP concentrations of 39.7 and 241 µg/L, respectively. Also, composite samples containing total dioxin/furan concentrations of 3,215 and 986 ng/kg yielded similar SPLP results of 968 and 988 pg/L, respectively. The difference in the results for the composite samples could be a result of inability of the laboratory to thoroughly homogenize the samples, given the sample volume available, or typical heterogeneity of a soil matrix. Based on this information, the composite data appear questionable and were not used further for the protection of groundwater evaluation.

Comparison of the data to the leachate reference concentration for PCP (80 µg/L) (OAR 340-122-045; Appendix 1) indicates that the sample with the PCP concentration closest to the proposed cleanup level [PRI-14(11-12); total PCP result of 4.51 mg/kg and SPLP PCP result of 3.31 µg/L] would be protective of groundwater. (There are no Appendix 1 values for dioxins/furans). The main pathway of concern at the terminal from soil concentrations within the former PCP mixing area is groundwater to surface water. Given the distance of the source area to the Willamette River, attenuation factors in groundwater, such as dilution, dispersion, adsorption, and degradation, would likely reduce groundwater concentrations originating within the former PCP mixing area before discharge to the river. Recommendations for future monitoring well locations to be installed as part of Phase III remedial investigation (RI) activities will likely include placement of several wells at downgradient locations in close proximity to the Willamette River. These wells, in addition to the existing monitoring wells at comparable downgradient locations, will be used to evaluate groundwater concentrations prior to discharge into the river. Also, we will be evaluating the effects of the *in situ* oxidation process on PCP and dioxin/furan concentrations in soil and groundwater, which may act as a mechanism to lower overall concentrations at the terminal.

The SPLP results show that residual PCP within the soil of the former PCP mixing area at concentrations less than 5 mg/kg would be protective of groundwater. As stated earlier, any residual impacted soil within the zone of groundwater fluctuation will be addressed with an *in situ* groundwater remediation technology. Time Oil prefers that the removal action is the final remedial action for impacted soil within the former PCP mixing area; therefore, Time Oil proposes to excavate soil for the removal action, where practicable, to a PCP concentration of 2 mg/kg, as shown on Figure 3. This will increase the excavation volume by about 50 yd^3 and is not cost prohibitive. As stated in DEQ's approval letter for the RAP, it is Time Oil's intent to complete the RI/FS to evaluate residual soil contamination

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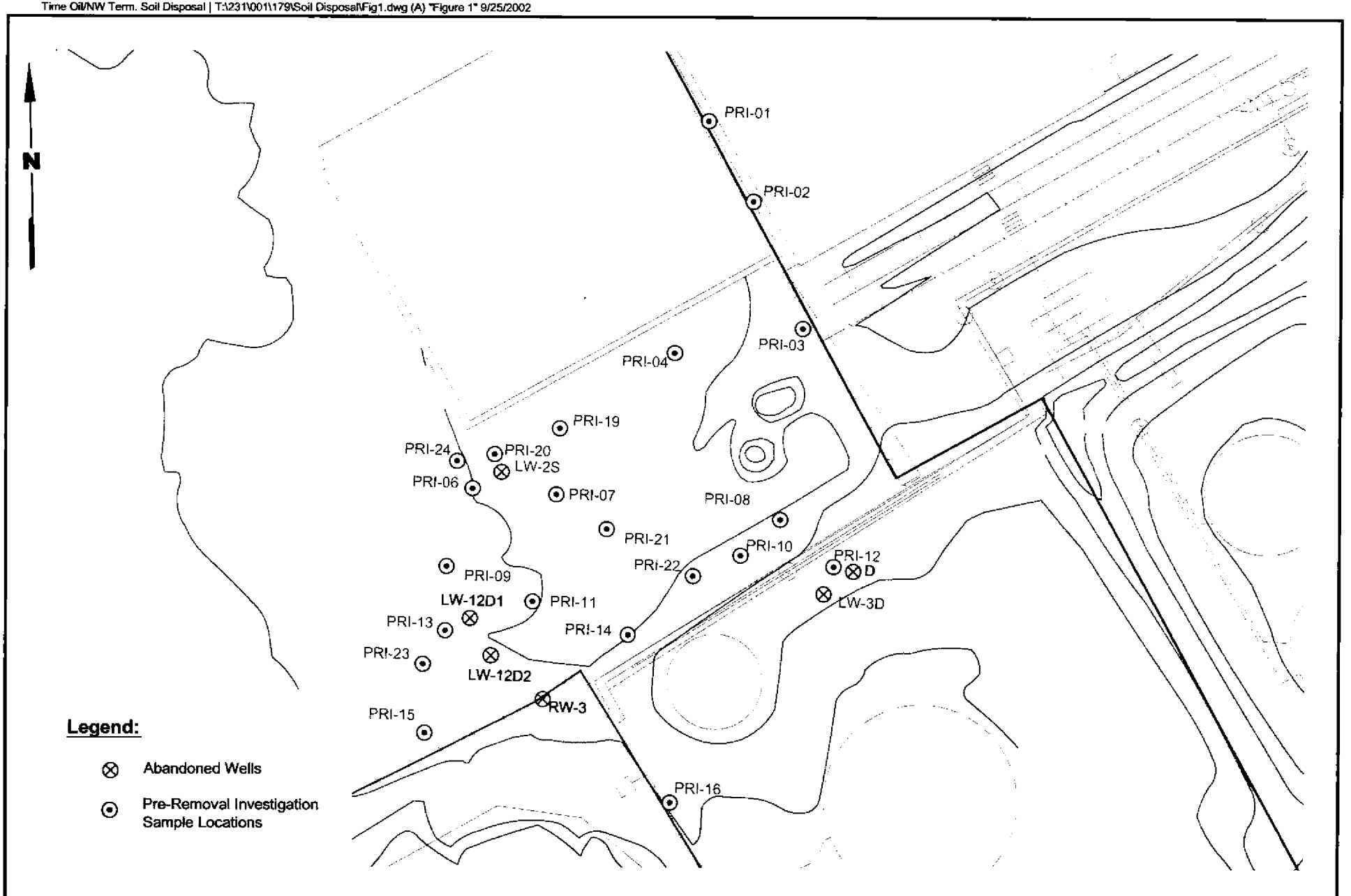
and to determine a final remedial action for contaminated soil and groundwater at the terminal, including performance of a risk assessment and evaluation of the groundwater to surface water pathway.

****

We are planning to begin excavation in the former PCP mixing area this week, so we would appreciate approval to proceed as soon as feasibly possible. Again, we appreciate your willingness to work with us to expedite the schedule.



0 30 60
Scale in Feet

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Time Oil NW Terminal
Portland, Oregon

Pre-Removal Investigation Sample Locations

Figure
1

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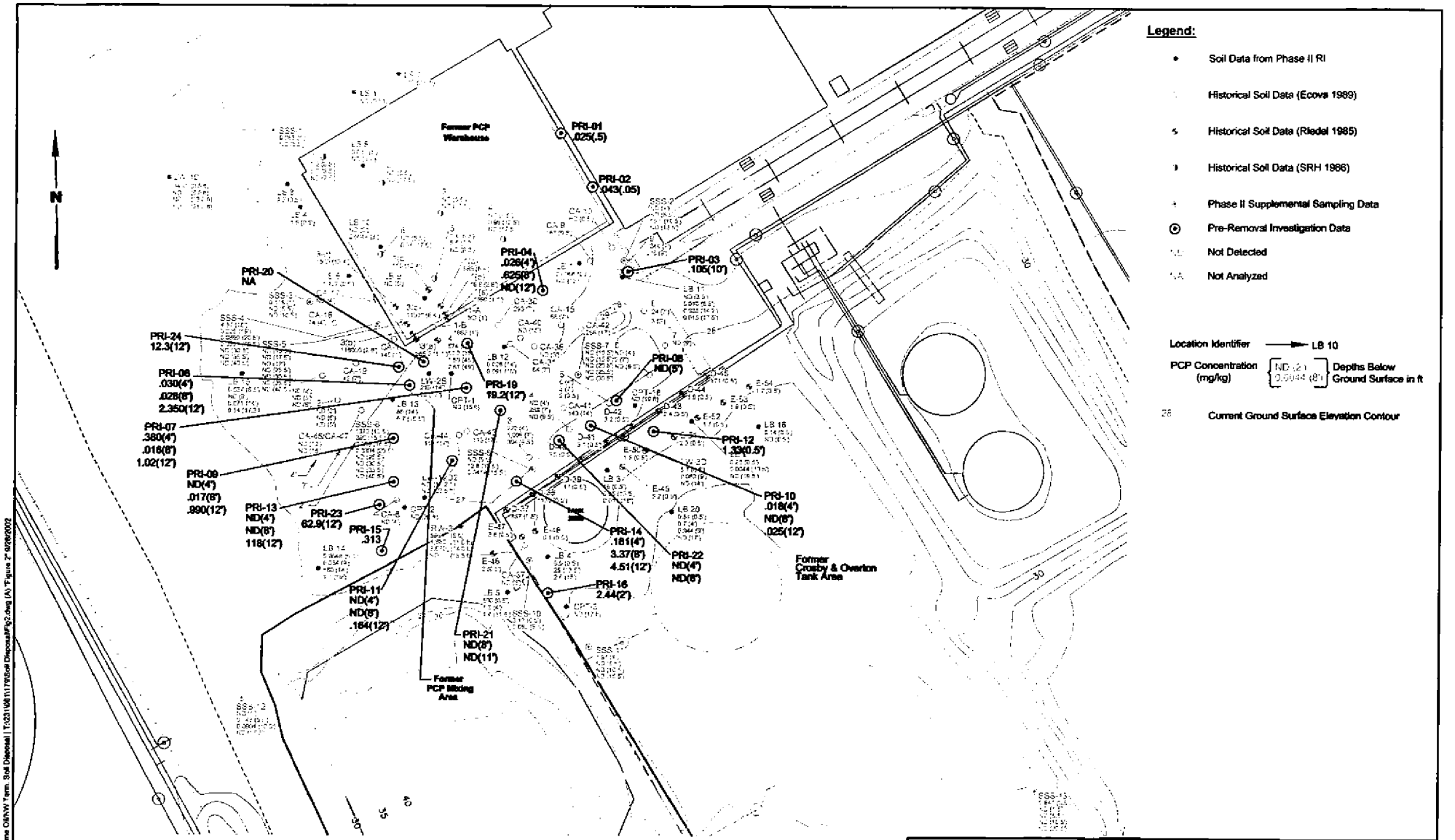

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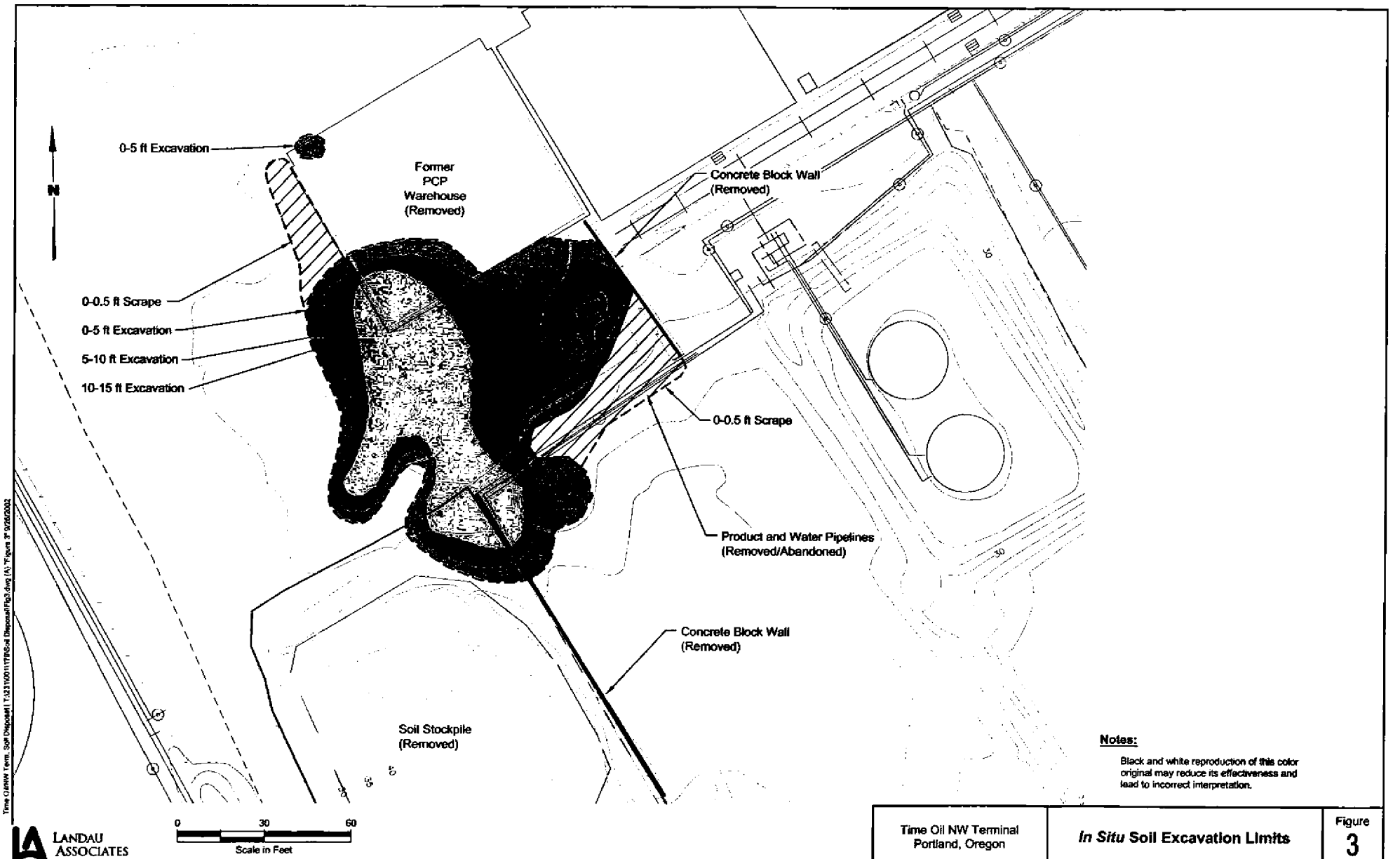

Notes:

Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Time Oil NW Terminal Portland, Oregon	*In Situ* Soil Excavation Limits	Figure 3

Time Oil NW Term. Soil Disposal\ T:\231\00111\TB\Soil Disposal\Fig3.dwg (A) "Figure 3" 9/26/2002

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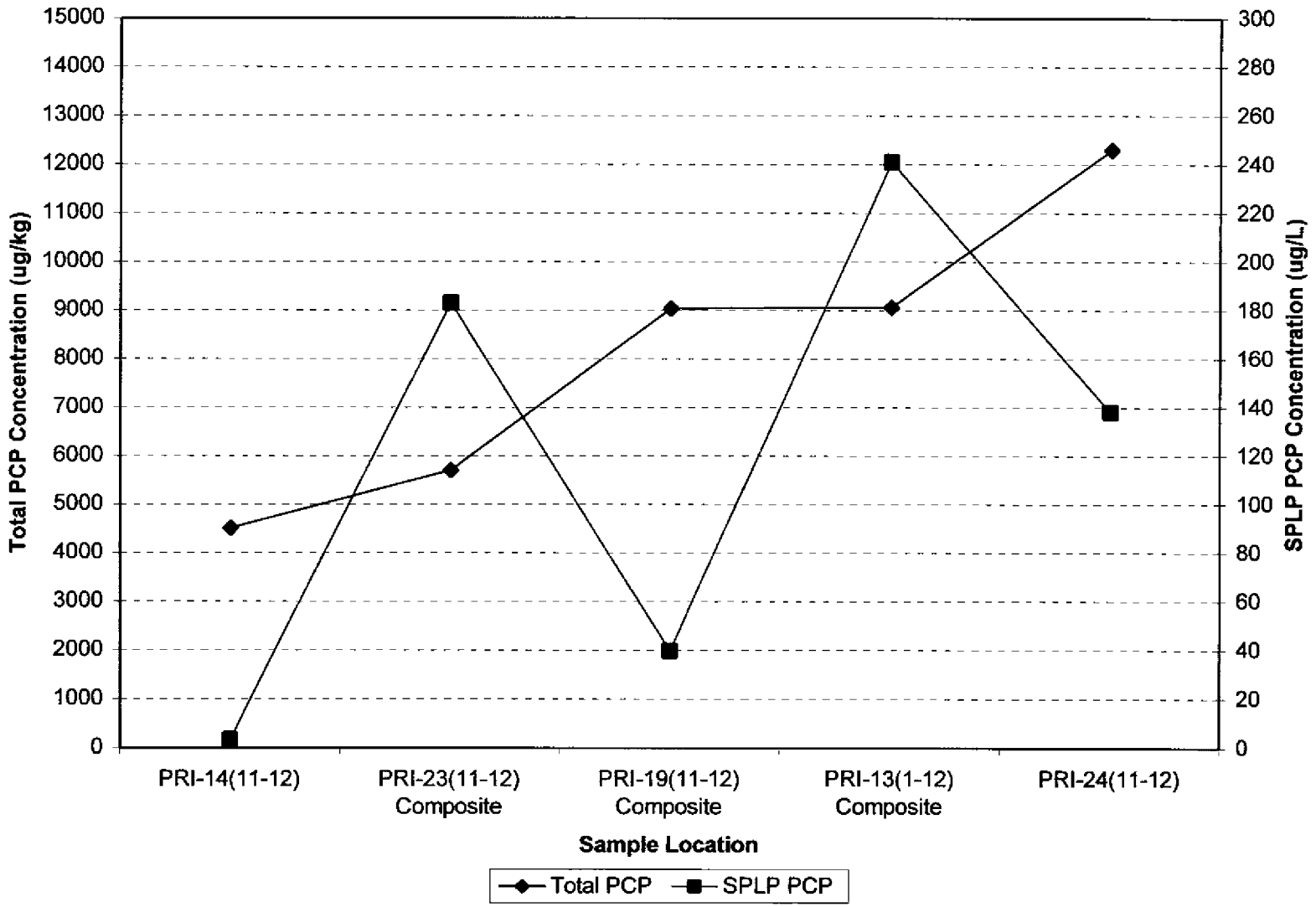

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Time Oil Northwest Terminal Portland, Oregon	**Total vs SPLP PCP Concentrations**	Figure 4

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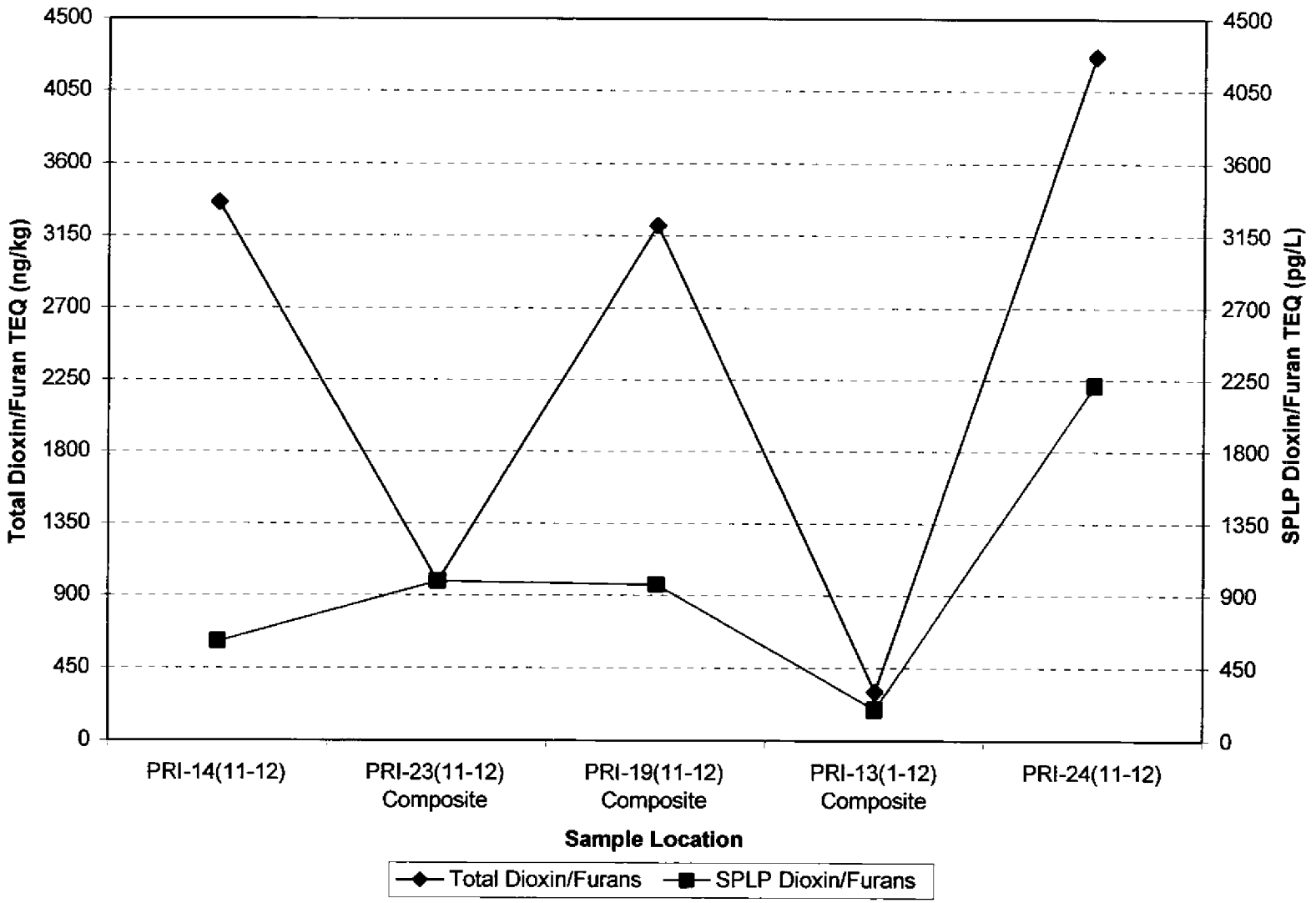

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Time Oil Northwest Terminal Portland, Oregon	**Total vs SPLP Dioxin/Furan TEQ Concentrations**	Figure 5

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TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location.	PRI-01	PRI-02	PRI-03	PRI-04	PRI-04	PRI-04	PRI-05	PRI-06	PRI-06
Depth	0-0.5	0-0.5	9-10	3-4	7-8	11-12	7-8	3-4	7-8
Lab ID:	0207076-14	0207076-13	0207077-01	0207076-10	0207076-11	0207076-12	0207058-01	0207060-01	0207060-02
Date Collected:	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
PCP, SPLP LEACHED (ug/L)									
Method SW1311/8270A	NA	NA	0.100 U	NA	NA	NA	0.100 U	NA	NA
PCP									
Method SW8270D (µg/kg)	25.0	43.3	105	25.7	625	15 0 U	79 3	30.0	27.7
PAHs (µg/kg)									
Method 8270									
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	6.67 U	6.67 U
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	6.67 U	10.0
Anthracene	NA	NA	NA	NA	NA	NA	NA	6 67 U	10 0
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	14 0	28 7
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	26 7	55 3
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	55 3	78 0
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	32.0	66.7
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	15 3	22 7
Chrysene	NA	NA	NA	NA	NA	NA	NA	24 0	45.3
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	6.67 U	10 0
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	35.3	84.0
Fluorene	NA	NA	NA	NA	NA	NA	NA	6 67 U	6.67 U
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	18 7	38.0
Naphthalene	NA	NA	NA	NA	NA	NA	NA	6.67 U	6 67 U
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	8 00	25.3
Pyrene	NA	NA		NA	NA	NA		52 0	120
NWTPH-HCID (mg/kg)									
Gasoline	NA	NA	NA	NA	NA	NA	NA	22 2 U	23.2 U
Mineral Spirits	NA	NA	NA	NA	NA	NA	NA	22 2 U	23.2 U
Kerosene	NA	NA	NA	NA	NA	NA	NA	55.5 U	58.1 U
Diesel	NA	NA	NA	NA	NA	NA	NA	55.5 U	58.1 U
Lube Oil	NA	NA	NA	NA	NA	NA	NA	111 U	116 U

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-01	PRI-02	PRI-03	PRI-04	PRI-04	PRI-04	PRI-05	PRI-06	PRI-06
Depth:	0-0 5	0-0 5	9-10	3-4	7-8	11-12	7-8	3-4	7-8
Lab ID:	0207076-14	0207076-13	0207077-01	0207076-10	0207076-11	0207076-12	0207058-01	0207060-01	0207060-02
Date Collected:	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
TOTAL DIOXINS AND FURANS (ng/kg)									
Method 8290									
2,3,7,8-TCDF	NA	NA	0.190 U	NA	NA	NA	1.40	NA	NA
Total TCDF	NA	NA	4.8	NA	NA	NA	15.00	NA	NA
2,3,7,8-TCDD	NA	NA	0.190 U	NA	NA	NA	0.82 J	NA	NA
Total TCDD	NA	NA	2.6	NA	NA	NA	4 90	NA	NA
1,2,3,7,8-PeCDF	NA	NA	3.8 U	NA	NA	NA	9 30	NA	NA
2,3,4,7,8-PeCDF	NA	NA	2.0 J	NA	NA	NA	17.00	NA	NA
Total PeCDF	NA	NA	24 0	NA	NA	NA	150.00	NA	NA
1,2,3,7,8-PeCDD	NA	NA	1.1 J	NA	NA	NA	13.00	NA	NA
Total PeCDD	NA	NA	6 5	NA	NA	NA	34 00	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	16.0	NA	NA	NA	51.00	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	280.0 U	NA	NA	NA	200 U	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	24 0	NA	NA	NA	67 00	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	4.5 J	NA	NA	NA	17.00	NA	NA
Total HxCDF	NA	NA	840.0	NA	NA	NA	1300.00	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	13.0	NA	NA	NA	44.00	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	130.0	NA	NA	NA	270.00	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	9 7	NA	NA	NA	74 00	NA	NA
Total HxCDD	NA	NA	320.0	NA	NA	NA	760.00	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	3500.0	NA	NA	NA	3000.00	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	53.0	NA	NA	NA	93.00	NA	NA
Total HpCDF	NA	NA	7600.0	NA	NA	NA	7200 00	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	4500.0	NA	NA	NA	6000 00	NA	NA
Total HpCDD	NA	NA	6500.0	NA	NA	NA	9000 00	NA	NA
OCDF	NA	NA	5200.0	NA	NA	NA	5500.00	NA	NA
OCDD	NA	NA	29000.0	NA	NA	NA	40000 00	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-01	PRI-02	PRI-03	PRI-04	PRI-04	PRI-04	PRI-05	PRI-06	PRI-06
Depth:	0-0.5	0-0.5	9-10	3-4	7-8	11-12	7-8	3-4	7-8
Lab ID:	0207076-14	0207076-13	0207077-01	0207076-10	0207076-11	0207076-12	0207058-01	0207060-01	0207060-02
Date Collected:	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
SPLP DIOXINS AND FURANS (pg/L)									
Method 8290									
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-06	PRI-07	PRI-07	PRI-07	PRI-08	PRI-09	PRI-09	PRI-09	PRI-10
Depth:	11-12	3-4	7-8	11-12	4-5	3-4	7-8	11-12	3-4
Lab ID:	0207060-03	0207060-04	0207060-05	0207060-06	0207077-02	0207060-07	0207060-08	0207060-09	0207076-07
Date Collected.	7/9/02	7/9/02	7/9/02	7/9/02	7/10/02	7/9/02	7/9/02	7/9/02	7/10/02
PCP, SPLP LEACHED (ug/L)									
Method SW1311/8270A	NA	NA	NA	NA	0.100 U	NA	NA	NA	NA
PCP									
Method SW8270D (µg/kg)	2350	360	15.7	1020	15 0 U	15.0 U	17 3 J2	990 J2	18 0
PAHs (µg/kg)									
Method 8270									
Acenaphthene	6.67 U	6.67 U	6 67 U	6.67 U	NA	6.67 U	6 67 U	6 67 U	NA
Acenaphthylene	6.67 U	6.67 U	7.33	6.67 U	NA	6 67 U	9.33	6 67 U	NA
Anthracene	6.67 U	6.67 U	6.67 U	6 67 U	NA	6.67 U	10 0	6 67 U	NA
Benzo(a)anthracene	8.67	10 7	19.3	13.3	NA	8 67	26.0	6.67 U	NA
Benzo(a)pyrene	14 7	22.0	34.0	21 3	NA	16.0	51 3	6 67 U	NA
Benzo(b)fluoranthene	22.7	32 7	51.3	34.0	NA	24 7	84.0	8.00	NA
Benzo(g,h,i)perylene	20.0	26.7	44.7	27.3	NA	20 7	58.7	7.33	NA
Benzo(k)fluoranthene	6.67 U	8.67	13.3	9.33	NA	6.67 U	18 7	6 67 U	NA
Chrysene	12.0	18.0	31.3	20.0	NA	15.3	40 7	6 67 U	NA
Dibenzo(a,h)anthracene	6.67 U	6.67 U	6 67 U	6.67 U	NA	6 67 U	9.33	6.67 U	NA
Fluoranthene	21 3	27.3	53.3	35.3	NA	23.3	65.3	10.0	NA
Fluorene	6.67 U	6.67 U	6.67 U	6.67 U	NA	6.67 U	6 67 U	6 67 U	NA
Indeno(1,2,3-cd)pyrene	12 0	15.3	25.3	15 3	NA	12.0	33.3	6.67 U	NA
Naphthalene	6 67 U	6 67 U	6.67 U	6.67 U	NA	6.67 U	6.67 U	6 67 U	NA
Phenanthrene	6.67 U	6.67 U	17 3	10.7	NA	6.67 U	19.3	6 67 U	NA
Pyrene	30 7	42.7	78.7	46.7	NA	36 7	94 7	14 7	NA
NWTPH-HCID (mg/kg)									
Gasoline	23.8 U	22.1 U	22 3 U	24.5 U	NA	21.9 U	22.7 U	24.5 U	NA
Mineral Spirits	23.8 U	22.1 U	22.3 U	24 5 U	NA	21 9 U	22.7 U	24 5 U	NA
Kerosene	59.5 U	55.3 U	55 8 U	61.3 U	NA	54 6 U	56.6 U	61.3 U	NA
Diesel	59.5 U	55.3 U	55.8 U	61.3 U	NA	54.6 U	56.6 U	61.3 U	NA
Lube Oil	119 U	111 U	112 U	123 U	NA	109 U	113 U	123 U	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-06	PRI-07	PRI-07	PRI-07	PRI-08	PRI-09	PRI-09	PRI-09	PRI-10
Depth:	11-12	3-4	7-8	11-12	4-5	3-4	7-8	11-12	3-4
Lab ID:	0207060-03	0207060-04	0207060-05	0207060-06	0207077-02	0207060-07	0207060-08	0207060-09	0207076-07
Date Collected:	7/9/02	7/9/02	7/9/02	7/9/02	7/10/02	7/9/02	7/9/02	7/9/02	7/10/02
TOTAL DIOXINS AND FURANS (ng/kg)									
Method 8290									
2,3,7,8-TCDF	NA	NA	NA	NA	0.39 J	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	4 40	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	0.43 J	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	2 50	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	1.80 J	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	3.50 J	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	38 00	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	4.30 J	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	14 00	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	8.90	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	24 U	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	15.00	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	5.90	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	210.00	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	12.00	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	50.00	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	21.00	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	180.00	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	120 00	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	12.00	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	470.00	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	810 00	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	1300.00	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	390.00	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	5200.00	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-06	PRI-07	PRI-07	PRI-07	PRI-08	PRI-09	PRI-09	PRI-09	PRI-10
Depth.	11-12	3-4	7-8	11-12	4-5	3-4	7-8	11-12	3-4
Lab ID:	0207060-03	0207060-04	0207060-05	0207060-06	0207077-02	0207060-07	0207060-08	0207060-09	0207076-07
Date Collected.	7/9/02	7/9/02	7/9/02	7/9/02	7/10/02	7/9/02	7/9/02	7/9/02	7/10/02
SPLP DIOXINS AND FURANS (pg/L)									
Method 8290									
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-10	PRI-10	PRI-11	PRI-11	PRI-11	PRI-12	PRI-13	PRI-13	PRI-13
Depth:	7-8	11-12	3-4	7-8	11-12	0-0.5	3-4	7-8	11-12
Lab ID	0207076-08	0207076-09	0207076-01	0207076-02	0207076-03	0207077-03	0207060-10	0207060-11	0207060-12
Date Collected	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
PCP, SPLP LEACHED (ug/L)									
Method SW1311/8270A	NA	NA	NA	NA	NA	0.100 U	NA	NA	NA
PCP									
Method SW8270D (µg/kg)	15 0 U	25 3	15.0 U	15.0 U	164	1330	30 0 U	30.0 U	118000
PAHs (µg/kg)									
Method 8270									
Acenaphthene	NA	NA	6.67 U	6 67 U	6.67 U	NA	NA	NA	NA
Acenaphthylene	NA	NA	6 67 U	8 00	6.67 U	NA	NA	NA	NA
Anthracene	NA	NA	6.67 U	8.00	6.67 U	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	10.0	21.3	6.67 U	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	20.7	38.7	8.00	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	38.0	58 0	12.0	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	25.3	48 7	10.0	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	9.33	16 7	6.67 U	NA	NA	NA	NA
Chrysene	NA	NA	19.3	35.3	8.00	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	6.67 U	7.33	6.67 U	NA	NA	NA	NA
Fluoranthene	NA	NA	25 3	54.7	12 7	NA	NA	NA	NA
Fluorene	NA	NA	6.67 U	6.67 U	6.67 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	14 7	27.3	6 67 U	NA	NA	NA	NA
Naphthalene	NA	NA	6.67 U	6.67 U	6 67 U	NA	NA	NA	NA
Phenanthrene	NA	NA	6.67 U	15.3	6.67 U	NA	NA	NA	NA
Pyrene	NA	NA	40.7	84.0	18 7	NA	NA	NA	NA
NWTPH-HCID (mg/kg)									
Gasoline	NA	NA	22.8 U	23 5 U	24.9 U	NA	NA	NA	NA
Mineral Spirits	NA	NA	22.8 U	23 5 U	24.9 U	NA	NA	NA	NA
Kerosene	NA	NA	56 9 U	58.8 U	62 3 U	NA	NA	NA	NA
Diesel	NA	NA	56.9 U	58.8 U	62.3 U	NA	NA	NA	NA
Lube Oil	NA	NA	114 U	118 U	125 U	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-10	PRI-10	PRI-11	PRI-11	PRI-11	PRI-12	PRI-13	PRI-13	PRI-13
Depth:	7-8	11-12	3-4	7-8	11-12	0-0 5	3-4	7-8	11-12
Lab ID:	0207076-08	0207076-09	0207076-01	0207076-02	0207076-03	0207077-03	0207060-10	0207060-11	0207060-12
Date Collected	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
TOTAL DIOXINS AND FURANS (ng/kg)									
Method 8290									
2,3,7,8-TCDF	NA	NA	NA	NA	NA	66	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	660	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	26	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	130	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	360	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	770	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	3900	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	660	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	1900	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	970	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	2500 U	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	2500	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	520	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	19000	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	1400	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	8200	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	2900	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	30000	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	1000	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	940	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	29000	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	84000	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	140000	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	11000	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	380000	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-10	PRI-10	PRI-11	PRI-11	PRI-11	PRI-12	PRI-13	PRI-13	PRI-13
Depth:	7-8	11-12	3-4	7-8	11-12	0-0 5	3-4	7-8	11-12
Lab ID.	0207076-08	0207076-09	0207076-01	0207076-02	0207076-03	0207077-03	0207060-10	0207060-11	0207060-12
Date Collected:	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/10/02	7/9/02	7/9/02	7/9/02
SPLP DIOXINS AND FURANS (pg/L)									
Method 8290									
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-13 (11-12)	PRI-14	PRI-14	PRI-14	PRI-15	PRI-16	PRI-17	PRI-18	PRI-19
Depth:	Composite	3-4	7-8	11-12	0-0.5	1-2	3-4	0-0.5	11-12
Lab ID:	0207153-02	0207076-04	0207076-05	0207076-06/0207	0207060-13	0207077-04	0207060-14	0207077-05	0207171-02
Date Collected:	7/9/02	7/10/02	7/10/02	7/10/02	7/9/02	7/10/02	7/9/02	7/10/02	7/30/02
PCP, SPLP LEACHED (ug/L)									
Method SW1311/8270A	241	NA	NA	3.31	NA	0 100 U	NA	0.100 U	NA
PCP									
Method SW8270D (µg/kg)	9060	181	3370	4510	313	2440	130	865	19200
PAHs (µg/kg)									
Method 8270									
Acenaphthene	NA	NA	NA	NA	NA	NA	6.67 U	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	10.7	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	18 0	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	35.3	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	68 0	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	138	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	50.7	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	28 0	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	46.7	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	14 7	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	65.3	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	6 67 U	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	38.0	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	6 67 U	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	48 7	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	90.7	NA	NA
NWTPH-HCID (mg/kg)									
Gasoline	NA	NA	NA	NA	NA	NA	22 2 U	NA	NA
Mineral Spirits	NA	NA	NA	NA	NA	NA	22.2 U	NA	NA
Kerosene	NA	NA	NA	NA	NA	NA	55.5 U	NA	NA
Diesel	NA	NA	NA	NA	NA	NA	55.5 U	NA	NA
Lube Oil	NA	NA	NA	NA	NA	NA	111 U	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-13 (11-12)	PRI-14	PRI-14	PRI-14	PRI-15	PRI-16	PRI-17	PRI-18	PRI-19
Depth:	Composite	3-4	7-8	11-12	0-0.5	1-2	3-4	0-0.5	11-12
Lab ID	0207153-02	0207076-04	0207076-05	0207076-06/0207	0207060-13	0207077-04	0207060-14	0207077-05	0207171-02
Date Collected:	7/9/02	7/10/02	7/10/02	7/10/02	7/9/02	7/10/02	7/9/02	7/10/02	7/30/02
TOTAL DIOXINS AND FURANS (ng/kg)									
Method 8290									
2,3,7,8-TCDF	3.790	NA	NA	37.564	NA	5.9	NA	NA	NA
Total TCDF	17.205	NA	NA	203.358	NA	88.0	NA	NA	NA
2,3,7,8-TCDD	0.435 U	NA	NA	2.171	NA	2.9	NA	NA	NA
Total TCDD	0.435 U	NA	NA	12.744	NA	31.0	NA	NA	NA
1,2,3,7,8-PeCDF	13.917	NA	NA	142.639	NA	29.0	NA	NA	NA
2,3,4,7,8-PeCDF	9.287 U	NA	NA	105.393	NA	83.0	NA	NA	NA
Total PeCDF	287.692	NA	NA	3170.411	NA	880.0	NA	NA	NA
1,2,3,7,8-PeCDD	5.853	NA	NA	29.668	NA	50.0	NA	NA	NA
Total PeCDD	15.232	NA	NA	96.841	NA	150.0	NA	NA	NA
1,2,3,4,7,8-HxCDF	62.198	NA	NA	650.202	NA	150.0	NA	NA	NA
1,2,3,6,7,8-HxCDF	36.157	NA	NA	297.633	NA	1200 U	NA	NA	NA
2,3,4,6,7,8-HxCDF	71.125	NA	NA	598.033	NA	430.0	NA	NA	NA
1,2,3,7,8,9-HxCDF	31.946	NA	NA	179.440	NA	81.0	NA	NA	NA
Total HxCDF	2616.237	NA	NA	28473.078	NA	6100.0	NA	NA	NA
1,2,3,4,7,8-HxCDD	11.251	NA	NA	96.329	NA	250.0	NA	NA	NA
1,2,3,6,7,8-HxCDD	413.333	NA	NA	4097.152	NA	1400.0	NA	NA	NA
1,2,3,7,8,9-HxCDD	40.443	NA	NA	284.983	NA	300.0	NA	NA	NA
Total HxCDD	991.331	NA	NA	9797.113	NA	3800.0	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	2136.619	NA	NA	25815.876	NA	4400.0	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	131.917	NA	NA	708.487	NA	660.0	NA	NA	NA
Total HpCDF	10807.705	NA	NA	139753.376	NA	31000.0	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	13149.827	NA	NA	144973.896	NA	31000.0	NA	NA	NA
Total HpCDD	20581.553	NA	NA	222067.830	NA	47000.0	NA	NA	NA
OCDF	9160.286	NA	NA	138096.234	NA	32000.0	NA	NA	NA
OCDD	69268.168	NA	NA	802995.553	NA	170000.0 J2	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-13 (11-12)	PRI-14	PRI-14	PRI-14	PRI-15	PRI-16	PRI-17	PRI-18	PRI-19
Depth:	Composite	3-4	7-8	11-12	0-0 5	1-2	3-4	0-0.5	11-12
Lab ID:	0207153-02	0207076-04	0207076-05	0207076-06/0207	0207060-13	0207077-04	0207060-14	0207077-05	0207171-02
Date Collected:	7/9/02	7/10/02	7/10/02	7/10/02	7/9/02	7/10/02	7/9/02	7/10/02	7/30/02
SPLP DIOXINS AND FURANS (pg/L)									
Method 8290									
2,3,7,8-TCDF	8.50	NA	NA	13.945	NA	0.0083 U	NA	NA	NA
Total TCDF	28.394	NA	NA	32 319	NA	0.023 J	NA	NA	NA
2,3,7,8-TCDD	1 586 U	NA	NA	2 095 U	NA	0 0083 U	NA	NA	NA
Total TCDD	1.586 U	NA	NA	2 095 U	NA	0.0083 U	NA	NA	NA
1,2,3,7,8-PeCDF	28.719 U	NA	NA	37 786	NA	0.0420 U	NA	NA	NA
2,3,4,7,8-PeCDF	23 799 J	NA	NA	27.557	NA	0.049 J	NA	NA	NA
Total PeCDF	557.963	NA	NA	681 245	NA	0.440	NA	NA	NA
1,2,3,7,8-PeCDD	7 414 U	NA	NA	9.657 U	NA	0 0420 U	NA	NA	NA
Total PeCDD	8 887	NA	NA	9.657	NA	0 0420 U	NA	NA	NA
1,2,3,4,7,8-HxCDF	125.801	NA	NA	152.873	NA	0 083 J	NA	NA	NA
1,2,3,6,7,8-HxCDF	67.205	NA	NA	71.997	NA	0 200 J	NA	NA	NA
2,3,4,6,7,8-HxCDF	144.040	NA	NA	149.712	NA	0 210	NA	NA	NA
1,2,3,7,8,9-HxCDF	72.757	NA	NA	83.453	NA	0 048 J	NA	NA	NA
Total HxCDF	5308 407	NA	NA	7584 192	NA	4.400	NA	NA	NA
1,2,3,4,7,8-HxCDD	12.951 J	NA	NA	24.013 J	NA	0 110 J	NA	NA	NA
1,2,3,6,7,8-HxCDD	856 621	NA	NA	1159 374	NA	0.630	NA	NA	NA
1,2,3,7,8,9-HxCDD	70.690	NA	NA	82.197	NA	0 120 J	NA	NA	NA
Total HxCDD	1948 426	NA	NA	2643.921	NA	1 900	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	631.144	NA	NA	3674.972	NA	3.100	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	170 831	NA	NA	305.529	NA	0.240	NA	NA	NA
Total HpCDF	3135.180	NA	NA	20189.957	NA	17.000	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	4169.806	NA	NA	22448.517	NA	14.000	NA	NA	NA
Total HpCDD	6426.439	NA	NA	34375.767	NA	21.000	NA	NA	NA
OCDF	1565.057	NA	NA	39685.098	NA	19.000	NA	NA	NA
OCDD	11853.935	NA	NA	1195351.83	NA	86.000	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-19 (11-12)	PRI-21	PRI-21	PRI-22	PRI-22	PRI-23	PRI-23 (11-12)	PRI-24	PRI-25
Depth:	Composite	7-8	10-11	3-4	7-8	11-12	Composite	11-12	3-4
Lab ID:	0208014-02	0207171-06	0207171-07	0207171-04	0207171-05	0207171-08	0208014-03	0207171-09/0208014-01	0207171-01
Date Collected:	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02
PCP, SPLP LEACHED (ug/L)									
Method SW1311/8270A	39.7	NA	NA	NA	NA	NA	183	138	NA
PCP									
Method SW8270D (µg/kg)	9040	ND	ND	ND	ND	62900	5700	12300	ND
PAHs (µg/kg)									
Method 8270									
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
NWTPH-HCID (mg/kg)									
Gasoline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mineral Spirits	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kerosene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lube Oil	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-19 (11-12)	PRI-21	PRI-21	PRI-22	PRI-22	PRI-23	PRI-23 (11-12)	PRI-24	PRI-25
Depth:	Composite	7-8	10-11	3-4	7-8	11-12	Composite	11-12	3-4
Lab ID:	0208014-02	0207171-06	0207171-07	0207171-04	0207171-05	0207171-08	0208014-03	0207171-09/0208014-01	0207171-01
Date Collected:	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02
TOTAL DIOXINS AND FURANS (ng/kg)									
Method 8290									
2,3,7,8-TCDF	42.813	NA	NA	NA	NA	NA	12.749	96.924	NA
Total TCDF	331.593	NA	NA	NA	NA	NA	94 683	291.074	NA
2,3,7,8-TCDD	7 594	NA	NA	NA	NA	NA	1 813	1.384	NA
Total TCDD	33.206	NA	NA	NA	NA	NA	5.682	12.960	NA
1,2,3,7,8-PeCDF	200.335	NA	NA	NA	NA	NA	56 066	363.629	NA
2,3,4,7,8-PeCDF	145 686	NA	NA	NA	NA	NA	38 122	319.940	NA
Total PeCDF	5215.547	NA	NA	NA	NA	NA	1416.630	6758.933	NA
1,2,3,7,8-PeCDD	139.505	NA	NA	NA	NA	NA	24 194	35 824	NA
Total PeCDD	421.571	NA	NA	NA	NA	NA	69.539	125.674	NA
1,2,3,4,7,8-HxCDF	724 547	NA	NA	NA	NA	NA	239.688	1450.177 J	NA
1,2,3,6,7,8-HxCDF	609.404	NA	NA	NA	NA	NA	202 711	450 336 U	NA
2,3,4,6,7,8-HxCDF	960 979 U	NA	NA	NA	NA	NA	368.657	1028 980 J	NA
1,2,3,7,8,9-HxCDF	346.474	NA	NA	NA	NA	NA	61.831	615 538 U	NA
Total HxCDF	27382 602	NA	NA	NA	NA	NA	4702.818	39813 602	NA
1,2,3,4,7,8-HxCDD	389.136	NA	NA	NA	NA	NA	64.481	138.141	NA
1,2,3,6,7,8-HxCDD	4601 799	NA	NA	NA	NA	NA	1305.505	5029.817	NA
1,2,3,7,8,9-HxCDD	700.143	NA	NA	NA	NA	NA	198 982	373 798 J	NA
Total HxCDD	14200 331	NA	NA	NA	NA	NA	3474.434	12276.063	NA
1,2,3,4,6,7,8-HpCDF	21763.016	NA	NA	NA	NA	NA	7148 890	28795 284	NA
1,2,3,4,7,8,9-HpCDF	1191 378	NA	NA	NA	NA	NA	315.059	1090.554 J	NA
Total HpCDF	94306 562	NA	NA	NA	NA	NA	31202.505	135304.475	NA
1,2,3,4,6,7,8-HpCDD	130519.583	NA	NA	NA	NA	NA	39774 294	180463 251	NA
Total HpCDD	206324.368	NA	NA	NA	NA	NA	62065.120	278762.589	NA
OCDF	76177.215	NA	NA	NA	NA	NA	26966 970	113332.293	NA
OCDD	702132.965	NA	NA	NA	NA	NA	205567 064	1036617.000	NA

TABLE 1
SOIL ANALYTICAL RESULTS
PRE REMOVAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location:	PRI-19 (11-12)	PRI-21	PRI-21	PRI-22	PRI-22	PRI-23	PRI-23 (11-12)	PRI-24	PRI-25
Depth:	Composite	7-8	10-11	3-4	7-8	11-12	Composite	11-12	3-4
Lab ID:	0208014-02	0207171-06	0207171-07	0207171-04	0207171-05	0207171-08	0208014-03	0207171-09/0208014-01	0207171-01
Date Collected:	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02	7/30/02
SPLP DIOXINS AND FURANS (pg/L)									
Method 8290									
2,3,7,8-TCDF	19.716	NA	NA	NA	NA	NA	32.594	45 990	NA
Total TCDF	85.582	NA	NA	NA	NA	NA	154 821	131 287	NA
2,3,7,8-TCDD	6.638 J	NA	NA	NA	NA	NA	1.325 U	2.138 U	NA
Total TCDD	11.834	NA	NA	NA	NA	NA	1 325 U	2 138 U	NA
1,2,3,7,8-PeCDF	95.965	NA	NA	NA	NA	NA	123.136	178.827	NA
2,3,4,7,8-PeCDF	63.437	NA	NA	NA	NA	NA	90.146	142.063	NA
Total PeCDF	2058.839	NA	NA	NA	NA	NA	2791.386	2668.165	NA
1,2,3,7,8-PeCDD	52 433	NA	NA	NA	NA	NA	39.546	14.039 U	NA
Total PeCDD	109 295	NA	NA	NA	NA	NA	107.292	17.103	NA
1,2,3,4,7,8-HxCDF	392.502	NA	NA	NA	NA	NA	460.227	654.995	NA
1,2,3,6,7,8-HxCDF	296 944	NA	NA	NA	NA	NA	314 325	282 517	NA
2,3,4,6,7,8-HxCDF	551.366	NA	NA	NA	NA	NA	654 843	513.766	NA
1,2,3,7,8,9-HxCDF	98.873	NA	NA	NA	NA	NA	225 133	45.576 U	NA
Total HxCDF	14655.384	NA	NA	NA	NA	NA	8408 151	7899.394	NA
1,2,3,4,7,8-HxCDD	119.563	NA	NA	NA	NA	NA	118 457	2 177 U	NA
1,2,3,6,7,8-HxCDD	2382.839	NA	NA	NA	NA	NA	3002 476	2594 520	NA
1,2,3,7,8,9-HxCDD	365.976	NA	NA	NA	NA	NA	320.392	222.991	NA
Total HxCDD	5937 265	NA	NA	NA	NA	NA	7381.462	5983 513	NA
1,2,3,4,6,7,8-HpCDF	4780.074	NA	NA	NA	NA	NA	3624.911	20609 798	NA
1,2,3,4,7,8,9-HpCDF	744 447	NA	NA	NA	NA	NA	869.604	751.748	NA
Total HpCDF	21077.915	NA	NA	NA	NA	NA	17083 626	106372.047	NA
1,2,3,4,6,7,8-HpCDD	31080 335	NA	NA	NA	NA	NA	23632.847	134016 013	NA
Total HpCDD	49676.562	NA	NA	NA	NA	NA	38484 926	206443.358	NA
OCDF	12412.613	NA	NA	NA	NA	NA	13016.223	84440.067	NA
OCDD	108926 407	NA	NA	NA	NA	NA	109744.816	659593 396	NA

NA = Not analyzed.
U = Not detected.
J = Concentration detected is below the calibration range.
J2 = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

TABLE 2
PRE-REMOVAL INVESTIGATION SAMPLE RESULTS
TIME OIL NORTHWEST TERMINAL

Sample No.	Total PCP (Total) µg/kg	SPLP PCP (SPLP) µg/L	Total Dioxin/Furans (Total TEQ) ng/kg	SPLP Dioxin/Furans (SPLP TEQ) pg/L
PRI-03 (9-10)	105	ND (0.1)	136	NA
PRI-05(7-8)	79.3	ND (0.1)	205	NA
PRI-08(4-5)	ND (15.0)	ND (0.1)	30.75	NA
PRI-12(0-0.5)	1330	ND (0.1)	3665	NA
PRI-14(11-12)	4510	3.31	3357	613
PRI-16(1-2)	2440	ND (0.1)	NA	NA
PRI-18(0-0.5)	865	ND (0.1)	NA	NA
PRI-24(11-12)	12300	138	4263	2809
PRI-13(1-12) Composite	9060	241	303	192
PRI-19(11-12) Composite	9040	39.7	3215	980
PRI-23(11-12)Composite	5700	183	986	988

NA = Not Analyzed.
ND = Not Detected.

LANDAU ASSOCIATES

January 9, 2003

RECEIVED JAN 1 3 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the December 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
11/8/02 S \WPROC\231\TRANSMIT FAX\Monthly Rpt_Ltr doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
December 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the November 2002 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 8.8 gpm. HRW-1 did not operate during December. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 2.6 gpm. A total of approximately 9.24 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 544,000 gallons treated in December 2002.
- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Continued preparation of the ISCO pilot study report.
- Continued preparation of as-built drawings for storm drain modifications and the groundwater intercept system.
- Received and began validation and evaluation of the 4th quarter 2002 groundwater data.
- Continued preparation of the 3rd quarter 2002 groundwater monitoring and groundwater interim action status report.
- Conducted data validation of the results for the soil confirmation samples from the *in situ* excavation within the former PCP mixing area, and the warehouse decontamination and wipe confirmation samples.
- Began preparation of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report.*
- Continued client review of the draft *East Property Remedial Action Completion Report*, including soil removal on the east property and within the former Crosby & Overton tank area.
- Prepared a work plan for well abandonment of shallow wells on the east property.
- Continued client review of the draft technical memorandum for interim subsurface investigations in the Phase III study area, including the CPT investigation.

RESULTS COLLECTED

- Soil confirmation results from the *in situ* excavation within the former PCP mixing area, warehouse decontamination confirmation samples, soil confirmation samples below the former soil stockpile area, concrete wall wipe confirmation sample, and metal interior wipe confirmation sample of tank 38009. The laboratory data and data validation reports will be provided with the *Soil Stockpile and In Situ Excavation Removal Action Completion Report.*

BZTO104(e)016976

- Third quarter 2002 groundwater results. The laboratory data and data validation report will be provided to DEQ with the *Third Quarter 2002 Groundwater Monitoring and Groundwater Interim Action Status Report*.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- None.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and of the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system. Re-route discharge from HRW-1 to "new" discharge pipe and attempt to remove biofouling from the screened section piping in HRW-1.
- Complete the draft 3rd quarter 2002 groundwater monitoring and interim action status report and submit to client.
- Conduct data validation of the soil confirmation samples below the former soil stockpile area.
- Complete data validation of 4th quarter 2002 groundwater data.
- Conduct internal reviews of the ISCO pilot study report.
- Continue preparation of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation.
- Complete client review of the *East Property Remedial Action Completion Report* and submit to DEQ.
- Complete well abandonment plan for the east property wells and submit to client for review.
- Complete client review of the Phase III CPT investigation technical memorandum and submit to DEQ.
- Complete preparation of the as-builts for the groundwater intercept system and provide to client for review.

BZTO104(e)016977

Second Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report Time Oil Northwest Terminal Portland, Oregon

October 13, 2003

Prepared for

Time Oil Co.
2737 W. Commodore Way
Seattle, Washington 98199

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

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1.0 INTRODUCTION

This report provides the results of the second quarter 2003 groundwater sampling event and the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon. The second quarter 2003 sampling event was conducted from May 7 to May 9, 2003, as part of the Phase II remedial investigation (RI) at the terminal. This report summarizes groundwater elevation and groundwater quality data, transmits analytical laboratory data packages and the associated data validation report, and presents an evaluation of the second quarter 2003 (April 1-June 30, 2003) data relative to compliance with performance criteria for ongoing implementation of the groundwater interim action systems in the upper and lower water-bearing zones.

The terminal is a former bulk petroleum storage and transfer facility owned by Time Oil Co. (Time Oil). Time Oil ceased operations at the terminal on October 31, 2001. The terminal is located in the industrialized Rivergate area of North Portland, Oregon (Figure 1). Quarterly groundwater monitoring has been conducted at the terminal since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The groundwater monitoring locations at the terminal are shown on Figure 2.

The chemical analyses conducted during this sampling event for each groundwater sampling location are summarized in Appendix A, Table A-1. Groundwater level measurements collected at the terminal for the second quarter 2003 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-2. Groundwater quality data for the second quarter 2003 event are provided in Tables A-3 and A-4 for the shallow and deep wells, respectively. Data validation qualifiers included in Tables A-3 and A-4 are defined in Table A-5. A summary of the second quarter 2003 groundwater interim action recovery data is provided in Appendix B. Procedures for collection of water level measurements and groundwater samples and methods for evaluation are provided in Appendix C. Modifications to the groundwater quality sampling and analysis requirements, as approved by the Oregon Department of Environmental Quality (DEQ), are documented and referenced in Appendix D. The data validation report for the second quarter 2003 data is provided in Appendix E. Laboratory data packages for these data are provided in Appendix F.

As requested by DEQ, a summary of the quarterly water quality data (detected constituents) since March 1997 for the shallow and deep wells is being provided to DEQ either electronically or on computer diskette. These tables will continue to be updated following each quarterly event.

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2.0 SECOND QUARTER 2003 GROUNDWATER SAMPLING EVENT

The second quarter 2003 groundwater sampling event was conducted from May 7 to May 9, 2003. The quarterly event included measurement of groundwater levels at existing monitoring wells and well points, recovery wells, and a river gauge established on the south side of the dock extending into the Willamette River (Figure 2); measurement of product thickness in wells, if observed; and collection of groundwater quality samples. The second quarter event included sampling of all monitoring wells routinely included in the quarterly sampling program; wells monitored as part of the groundwater interim action (LW-13S, -14D, -17D, and -18D); and selected monitoring wells associated with the *in situ* chemical oxidation (ISCO) pilot study (OX-1S, -2S, -3S, and -4S, LW-11S, and RW-1). A summary of the wells sampled for the second quarter 2003 event and the types of analyses conducted at each sample location are provided in Table A-1. This section presents a summary of the results for the groundwater level measurements and groundwater quality sampling, and provides an evaluation of groundwater flow and contaminant occurrence and trends. The performance and status of the groundwater interim action is discussed in Section 3.0.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the second quarter 2003 event on May 8, 2003. Each well was also checked for the presence of product. The measurement and evaluation results are provided in the following sections. The measurement and evaluation procedures are provided in Appendix C. The groundwater measurement locations are shown on Figure 2. Groundwater level measurements conducted for the quarterly groundwater sampling events since March 1997 are provided in Table A-2. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided in the Phase II RI report (Landau Associates 2000a).

2.1.1 PRODUCT MEASUREMENTS AND PRODUCT RECOVERY

During the second quarter 2003 event, measurable product was noted at site monitoring well Q with a product thickness measurement of 0.22 ft. A sheen was also observed at Well P. Since there was inadequate volume of product in these wells for product recovery, recovery efforts were not performed. Monitoring of these wells and all site monitoring wells for the presence of product will continue for all future quarterly monitoring events.

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2.1.2 UPPER WATER-BEARING ZONE

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper zone. Groundwater elevation contours for the upper zone are presented on Figure 3. The groundwater elevation contours indicate that groundwater flow in the upper zone across the terminal is generally to the west-southwest toward the Willamette River. A localized shift in groundwater flow to the south in an area southwest of the former pentachlorophenol (PCP) mixing area may be due to the influence of the east-west trending storm drain located about 170 ft north of the southern property boundary (Figure 2). The groundwater flow pattern observed in the upper zone does not vary significantly from the patterns seen over the previous years of monitoring. As discussed in Section 3.0, HRW-1 did not operate until the final four days of this quarter (June 27-30). Groundwater elevation decreases in the upper zone throughout the site since the first quarter of 2002 can be attributed to seasonal fluctuation of the groundwater table.

2.1.3 LOWER WATER-BEARING ZONE

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower zone. Groundwater elevation contours for the lower zone are presented on Figure 4. RW-2 pumped continuously during the second quarter 2003, except for periodic shutdowns for system maintenance. The contours indicate that pumping of recovery well RW-2 for the groundwater interim action has modified groundwater flow in the lower zone in proximity to the pumping well, such that hydraulic capture is achieved to the west near LW-18D and to the south near LW-10D. Groundwater flow outside the RW-2 capture zone is generally toward the west to the Willamette River. The groundwater flow observed during this quarterly event is consistent with the trend seen since the startup of RW-2 in October 2000.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the second quarter 2003 event from May 7 to May 9, 2003. The wells sampled consisted of 16 upper zone wells and 16 lower zone wells. Monitoring well LW-9S was dry and not sampled as part of this event. Except as shown in Table A-1, all groundwater samples were analyzed for the following constituents: semivolatile organic compounds [SVOCs; U.S. Environmental Protection Agency (EPA) Method 8270]; PCP (EPA Method 8270 SIM); volatile organic compounds (VOCs; EPA Method 8260); six priority pollutant metals (arsenic, chromium, copper, lead, nickel, and zinc; EPA Methods 6010/7000 series); chloride (EPA Method 325.2); total dissolved solids (TDS; EPA Method 160.1); and field parameters (pH, conductivity, dissolved oxygen,

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turbidity, and temperature). Additionally, groundwater from nine monitoring wells was analyzed for diesel-range total petroleum hydrocarbons (TPH; NWTPH-D). Samples from wells B1, LW-8S, LW-11S, RW-1, and RW-2 were also analyzed for TPH gasoline and motor oil ranges (NWTPH-G and NWTPH-Dx). Laboratory analyses were conducted by Analytical Resources, Inc. (ARI, Seattle, Washington).

Analytical results for the second quarter 2003 event are provided in Tables A-3a through A-3f for the upper zone wells and Tables A-4a through A-4f for the lower zone wells. A summary of the results is provided in the following sections. Data qualifier definitions are included in Table A-5.

2.2.1 UPPER WATER-BEARING ZONE

The analytical results from the upper zone wells (presented in Table A-3) indicate that samples from nine wells contained detectable concentrations of PCP during the second quarter 2003 event. The highest concentration was observed in the samples from wells OX-2S and OX-4S [6,700 and 8,300 micrograms per liter (µg/L), respectively], which are located downgradient of the former PCP mixing area. The detected concentrations of PCP at both these wells are greater than last quarter (5,400 and 880 µg/L, respectively). In addition, groundwater from downgradient monitoring wells OX-1S, OX-3S, LW-4S, and LW-11S, and downgradient recovery well RW-1, contained PCP concentrations ranging from 67 to 3,800 µg/L. Low-level PCP concentrations of less than 1 µg/L were detected at wells J1 and LW-10S. Groundwater analytical results for monitoring wells utilized in the ISCO pilot study are discussed in more detail in the field pilot test report (ISOTEC 2003) and the accompanying cover letter dated June 18, 2003 that was submitted to DEQ (Landau Associates 2003).

Other SVOCs were detected at lower concentrations, but most detections were less than 100 µg/L and none were greater than 150 µg/L [bis(2-ethylhexyl)phthalate at well D]. The highest concentrations of VOCs (ethylbenzene; isopropylbenzene; 1,2,4-trimethylbenzene; n-propylbenzene; and toluene) were detected in samples collected at wells B1, LW-4S, LW-8S, LW-11S, and RW-1. The highest detection of TPH was 9.5 milligrams per liter (mg/L) (TPH-G at well LW-8S). The highest concentrations of metals were detected in samples collected at wells B1, LW-7S, LW-8S, and RW-1.

2.2.2 LOWER WATER-BEARING ZONE

During this quarter, PCP was detected at the following lower zone wells: RW-2 (12 µg/L), LW-6D (0.47 µg/L) and LW-10D (0.36 µg/L). Low-level concentrations have been detected occasionally in wells LW-6D and LW-10D and may reflect intermittent migration outside the capture zone of recovery well RW-2. None of the other SVOCs detected were at concentrations greater than 13 µg/L

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(2-methylnapthalene at RW-2). The highest concentrations of VOCs detected were in the samples collected from wells G1A, LW-11D and RW-2; however, none of the detected concentrations were greater than 140 µg/L (acetone at LW-11D). The highest detected concentration of TPH was 3.3 mg/L (diesel-range TPH at G1A). The highest concentrations of metals (arsenic and zinc) were detected in samples collected from wells B2 and LW-3D at concentrations of 0.048 and 1.1 mg/L, respectively.

2.2.3 WATER LEVEL AND CONTAMINANT TRENDS

Potential trends between water levels and detected concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the period covered by the Phase II RI quarterly sampling events (April 1997 through the current quarterly event). Plots of PCP concentrations (maximum concentrations of EPA Methods 8270 and 8040 for events prior to the second quarter 2001 event) versus time for selected upper zone wells (LW-4S, -11S, -13S, and RW-1); selected lower zone wells (LW-4D, -11D, and RW-2); and clustered wells (LW-4S and -4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-4S and LW-11S are shown on Figures 8 and 9. Figure 10 shows groundwater elevations and PCP concentrations at lower zone well LW-4D plotted with the Willamette River stage.

As shown on Figure 5, PCP concentrations in the selected upper zone wells show variable concentration trends over time (note the logarithmic scale). The PCP concentration at RW-1 (1,600 µg/L) has continued the decreasing trend started last quarter with concentrations similar to those observed in August 2002. The PCP concentration at LW-11S was slightly greater this quarter (3,800 µg/L) than last quarter (2,000 µg/L) ending the decreasing trend of last year from 4,700 µg/L to 2,000 µg/L. These concentrations are greater than the historic low concentration detected at this well in the fourth quarter of 2001 (560 µg/L); however, since May 2000, PCP concentrations in LW-11S are considerably lower than the maximum detection observed to date (24,000 µg/L in May 1999). The decreases are likely a result, in part, of the *in situ* chemical oxidation (ISCO) injections conducted for the ISCO pilot study test in September 2002. The increase in PCP concentration at well LW-11S likely reflects a response to seasonal groundwater fluctuations and possible rebound from the ISCO injections. The PCP concentration at LW-13S increased to about 10 µg/L between May 2000 and July 2001, but has been reported at or near the detection limit since the fourth quarter 2001 event. The PCP concentration at well LW-4S (1,400 µg/L) was considerably greater this quarter and disrupted the decreasing trend seen from the second quarter 2002 event (2,200 µg/L) through the last quarter event (below detection limit 0.26 µg/L). Results from well LW-4S, located slightly south of the east-west trending storm drain, have also shown increases in the PCP concentration in November 1998 (4,200 µg/L), August 2000 (9,400 µg/L), and June 2002 (2,200 µg/L). Initially, as reported in previous quarterly reports, these increases in PCP concentration appeared anomalous, but, after

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ongoing review, they appear to be related to seasonal changes in groundwater elevation and consequent changes in PCP concentrations at locations upgradient and within the source areas, and subsequent downgradient migration of PCP (Figure 8). The PCP concentration detected at well J1 was greater than during the first quarter of 2003 (0.73 µg/L) and contrary to the decreasing trend seen in the previous four quarters.

As shown on Figure 6 (note the logarithmic scale), PCP concentrations in the lower zone have generally decreased over time, except at RW-2 where concentrations decreased from 630 to 0.68 µg/L between September 2000 and June 2001, but increased to 76 µg/L between June 2001 and June 2002. Since the third quarter 2002 sampling event, PCP concentrations at RW-2 have remained relatively stable with a decrease this quarter (12 µg/L) from last quarter (33 µg/L).

As in previous quarters, PCP concentrations detected this quarter at selected lower zone well locations where PCP has historically been detected are generally lower than the concentrations in the upper zone wells at the same location or similar locations. The PCP concentration trends for clustered wells LW-4S and -4D (Figure 7) indicate that contamination observed in the lower zone at this location does not appear to be related to the upper zone at the same location, except possibly between December 1999 to November 2001. Overall, PCP concentrations at lower zone well LW-4D have decreased over time, with concentrations below the detection limit mainly observed since groundwater recovery began at nearby well RW-2 in October 2000. However, at adjacent upper zone well LW-4S, intermittent increases in PCP concentration have been observed, as discussed earlier.

Fluctuations in groundwater elevations in the upper zone reflect typical seasonal variability with seasonal lows during the fall months (October-November) and seasonal highs during the winter and early spring months (January-March) since monitoring began in March 1997. The groundwater levels during the past year are similar to those observed during 1998 and 2000. Groundwater levels this quarter appear to have recovered to more seasonally representative levels from the lowest upper zone groundwater elevations measured to date at the terminal in November 2002. Trends in PCP concentrations can be correlated with groundwater elevations at some locations. Figure 9 shows that the PCP concentration in the upper zone at well LW-11S generally follows the water level trends in that zone over time. Figure 8 also shows that there appears to be a direct correlation between the water levels and PCP concentrations in the upper zone at well LW-4S. As discussed earlier, the increases in PCP concentration at LW-4S appear to be related to seasonal migration of PCP from upgradient locations. In the lower zone, groundwater levels show similar trends with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at LW-4D with river stage on Figure 10. However, there appears to be no correlation between PCP concentrations and groundwater/river stage elevations at LW-4D.

Contaminant and groundwater level trends will continue to be evaluated and discussed for future quarterly events.

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3.0 GROUNDWATER INTERIM ACTION

This section presents a summary of the performance and status of the groundwater interim action system at the terminal for the second quarter of 2003 (April 1 through June 30, 2003). System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000b) to determine compliance with performance criteria for the upper zone and the lower zone at the terminal. Specific performance criteria include: 1) groundwater recovery from an upper zone recovery well (HRW-1) when the pump is operating or when sufficient groundwater is present in the upper zone; 2) continuous pumping from a lower zone recovery well (RW-2), except for brief periods of system maintenance (or as described below); 3) groundwater flow toward HRW-1 and RW-2 from the downgradient and upgradient directions; 4) reversal of the lower zone groundwater flow direction at the leading edge of the PCP plume; 5) chemical confirmation that continued migration of PCP in groundwater downgradient of RW-2 and HRW-1 is not occurring; and 6) compliance with the requirements of the existing discharge permit. In addition to the six criteria listed above, information is also presented in this section regarding the operation of an upper zone groundwater intercept system implemented in a storm drain (SDM-1) at the site.

Specific operational information for the second quarter 2003 as it relates to the criteria identified above as follows:

1) During the second quarter 2003, groundwater extraction resumed at HRW-1 beginning June 27. As stated in the previous quarterly reports, the pump in HRW-1 was pulled on August 2, 2002 and observations indicated that there was likely biofouling on the pump and in the well. It appears that the well was "plugged" and not allowing water in the upper zone to enter the horizontal well at a rate sufficient to maintain pumping. The horizontal well was redeveloped on April 29 and 30, 2003 using a sodium hypochlorite solution as a biocide, a sewer jetting tool to clean the well screen, fire hydrant water to flush the well, and surface-mounted pumps to remove the water from the well. The well redevelopment procedure was verbally approved by Tom Roick of DEQ prior to initiation of the activities. Prior to the redevelopment of the well, the submersible pump in HRW-1 was removed and appeared to be inoperable. The pump was replaced by the manufacturer and the new pump was installed and extraction was reinitiated on June 27, 2003. The groundwater extraction rate from HRW-1 during the period from June 27 to 30, 2003 was approximately 1 gallon per minute (gpm) and the total groundwater recovered was 4,175 gallons. A summary of historical groundwater recovery for HRW-1 is included in Appendix B, Table B-1.

2) As discussed in Section 2.1, groundwater elevation data were collected from the upper zone monitoring wells on May 8, 2003. The groundwater elevation data are summarized in Table A-2 and presented on Figure 3. Because the pump in HRW-1 was not operating at the time the groundwater elevation data were collected, an assessment of the impact of upper zone water elevations from pumping of HRW-1 was not possible during this quarter.

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3) With the exception of periodic shutdowns for system maintenance or brief controller shutdowns due to excessive heat in the system control trailer, groundwater was extracted continuously from the lower zone during the period from April 1 to June 30, 2003 by operating the groundwater recovery pump in RW-2. A total of approximately 1,286,927 gallons of groundwater were recovered from RW-2 during the second quarter of 2003 at an estimated average rate of 9.7 gpm. The recovery pump in RW-2 operated for approximately 2,012 hours and discharged water to Tank 16804 for temporary storage until treated by the wastewater treatment system located at the terminal. A summary of the groundwater recovery for RW-2 is included in Appendix B, Table B-1.

4) As discussed in Section 2.1, groundwater elevation data were collected from the lower zone wells on May 8, 2003. The groundwater elevation data are summarized in Table A-2 and presented on Figure 4. Based on the groundwater elevation data collected, the groundwater flow direction was reversed locally downgradient of the leading edge of the PCP plume in the lower zone when RW-2 was in operation during this quarter.

5) As previously discussed in Section 2.2, groundwater samples were collected at the site on May 7 through 9, 2003. Historically, the extent of groundwater impact has been estimated based on the extent of dissolved-phase PCP. The extent of PCP in the upper and lower zones is depicted on Figures 11 and 12, respectively, based on data collected during the May 2003 groundwater sampling event. The extent of PCP in the upper zone is consistent with previous quarterly events; however, within the plume, the area of highest PCP concentrations appears to have increased. The second quarter lower zone analytical data indicate that monitoring well LW-10D, located approximately 100 ft downgradient from RW-2, had a detectable concentration (0.36 µg/L) of PCP. PCP was also detected at LW-17D (0.33 µg/L), located between the PCP plume and the river, for the first time since February 2002.

6) Between April 1 and June 30, 2003, approximately 144,280 gallons of groundwater was recorded as pumped by the groundwater intercept system at storm drain manhole SDM-1 to Tank 16804 for treatment. The pump at SDM-1 was found to have likely been inoperable from approximately April 11 to June 18, and on June 18, the pump was removed and a replacement pump was installed. Pumping at SDM-1 resumed in late June and groundwater extraction continued through the end of the quarter (June 30). During operation, the pump extracted water from SDM-1 at a rate of approximately 4.2 gpm. Groundwater collected from the discharge point of the intercept system into 16804 contained a PCP concentration of 0.93 µg/L on May 7, 2003.

   The industrial wastewater discharge permit (City of Portland Permit No. 400.121) for discharge of the extracted groundwater following treatment at the terminal's wastewater treatment plant includes the following discharge limitations:

Parameter	Permitted Limit
PCP	40 µg/L
Benzene	50 µg/L
BTEX (benzene, toluene, ethylbenzene, and xylenes)	750 µg/L
pH	5 to 11.5

Samples of the treated groundwater discharged were collected on April 9, 2003 for laboratory analyses of the listed parameters. None of the permitted limits were exceeded. The analytical results for PCP are provided in Appendix B, Table B-1.

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4.0 FUTURE GROUNDWATER TASKS

The third quarter 2003 groundwater sampling event was conducted August 27 through 29, 2003. The groundwater monitoring and analytical program for the third quarter 2003 event included the following: 1) monitoring at routine quarterly well locations, including monitoring wells OX-1S, -2S, -3S, -4S; and 2) monitoring of wells LW-13S, LW-14D, LW-17D, and LW-18D for evaluation of the groundwater interim action at RW-2. The results for the third quarter 2003 groundwater monitoring event and the third quarter groundwater interim action status will be provided in the *Third Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report*

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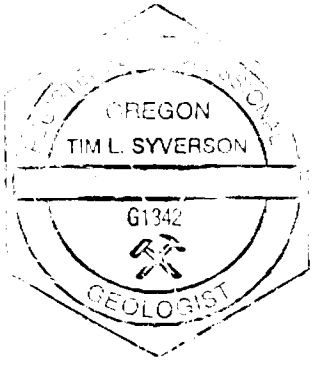
5.0 USE OF THIS REPORT

This quarterly groundwater report has been prepared by Landau Associates for the exclusive use of Time Oil Co. for specific application to the Northwest Terminal. Services for this project were conducted in accordance with the Environmental Services Contract between Time Oil Co. and Landau Associates, Inc. Landau Associates has performed our services in accordance with generally accepted engineering and consulting standards for environmental work in effect at the time and locality services were performed. The reuse of information, conclusions, and recommendations provided herein by Time Oil Co. or others in connection with any site other than the Northwest Terminal without Landau Associates' written permission shall be at the sole risk of Time Oil Co. and without liability to Landau Associates.

This document was prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.



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APPENDIX A

Groundwater Level Measurements And Quality Data

TABLE A-1
GROUNDWATER MONITORING POINTS AND ANALYTICAL METHODS
SECOND QUARTER EVENT, MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	SVOC (8270)	VOC (8260)	PCP (8270 SIM)	TPH-D	TPH-DX	TPH-G	PP Metals (a) (6010/7000)	TDS (160.1)	Chloride (325.2)	Major Ions
B1	X	X	X		X	X	X	X	X	
B2	X	X	X				X	X	X	
D	X	X	X				X	X	X	
G1A	X	X	X	X			X	X	X	
J1	X	X	X				X	X	X	
J2	X	X	X				X	X	X	
K							X			
O	X	X								
R	X	X								
LW001S	X	X	X				X	X	X	
LW001D	X	X	X				X	X	X	
LW003D	X	X	X				X	X	X	
LW004S	X	X		X			X	X	X	
LW004D	X	X	X	X			X	X	X	
LW006D	X	X	X	X			X	X	X	
LW007S	X	X	X	X			X	X	X	
LW008S	X	X	X		X	X	X	X	X	
LW009S (b)										
LW009D	X	X	X	X			X	X	X	
LW010S	X	X	X	X			X	X	X	
LW010D	X	X	X	X			X	X	X	
LW011S	X	X			X	X	X	X	X	
LW011D	X	X	X	X			X	X	X	
LW013S			X							
LW014D			X							
LW017D			X							
LW018D			X							
RW1	X	X			X	X	X	X	X	
RW2	X	X			X	X	X	X	X	
OX001S			X							
OX002S			X							
OX003S			X							
OX004S			X							

(a) Metals analyzed include: arsenic, chromium, copper, nickel, lead, and zinc.
(b) Well dry and not sampled.

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TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
Shallow Wells:							
B *	03/25/97	----	29.04	NM	----	NM	Couldn't remove cap
B *	03/31/97	----	29.04	NM	----	NM	Couldn't remove cap
B *	07/16/97	08:30	29.04	11.02	18.02	----	
B *	10/21/97	16:35	29.04	13.39	15.65	----	
B *	01/27/98	12:15	29.04	11.53	17.51	----	
B *	05/18/98	17:56	29.04	12.51	16.53	----	
B *	08/17/98	11:02	29.04	14.40	14.64	----	
B *	11/13/98	10:24	29.04	14.38	14.66	----	
B *	02/16/99	13:36	29.04	9.69	19.35	----	
B *	05/18/99	15:52	29.04	11.72	17.32	----	
B *	09/21/99	12:21	29.04	15.18	13.86	----	
B *	12/06/99	14:37	29.04	13.00	16.04	----	
B *	02/16/00	10:57	29.04	11.84	17.20	----	
B *	05/23/00	17:31	29.04	13.22	15.82	----	
B *	08/29/00	14:23	29.04	15.32	13.72	----	
B *	11/09/00	13:31	29.04	15.29	13.75	----	
B *	02/12/01	15:25	29.04	13.68	15.36	----	
B *	06/04/01	12:49	29.04	14.18	14.86	----	
B *	08/16/01	11:54	29.04	15.80	13.24	----	
B *	11/28/01	12:44	29.04	13.80	15.24	----	
B *	02/27/02	14:33	29.04	12.27	16.77	----	
B *	06/27/02	15:05	29.04	13.38	15.66	----	
B *	08/26/02	16:59	29.04	14.02	15.02	----	
B *	11/13/02	09:01	29.04	13.90	15.14	----	
B *	02/11/03	10:13	29.04	12.85	16.19	----	
B *	05/08/03	08:11	29.04	12.27	16.77	----	
B1	03/25/97	10:48	29.74	----	----	----	Couldn't remove cap
B1	03/31/97	----	29.74	----	----	----	Couldn't remove cap
B1	07/16/97	07:49	29.74	11.01	18.73	----	
B1	10/21/97	16:33	29.74	13.56	16.18	----	
B1	01/27/98	12:10	29.74	11.68	18.06	----	
B1	05/18/98	17:55	29.74	12.76	16.98	----	
B1	08/17/98	11:04	29.74	14.15	15.59	----	
B1	11/13/98	10:21	29.74	15.05	14.69	----	
B1	02/16/99	13:33	29.74	9.59	20.15	----	
B1	05/18/99	15:51	29.74	11.79	17.95	----	
B1	09/21/99	12:19	29.74	14.63	15.11	----	
B1	12/06/99	14:38	29.74	14.25	15.49	----	
B1	02/16/00	10:55	29.74	12.20	17.54	----	
B1	05/23/00	17:32	29.74	13.25	16.49	----	
B1	08/29/00	14:22	29.74	14.93	14.81	----	
B1	11/09/00	13:30	29.74	15.56	14.18	----	
B1	02/12/01	15:26	29.74	15.19	14.55	----	
B1	06/04/01	12:50	29.74	15.06	14.68	----	
B1	08/16/01	11:55	29.74	15.72	14.02	----	
B1	11/28/01	12:45	29.74	15.47	14.27	----	
B1	02/27/02	14:34	29.74	12.15	17.59	----	
B1	03/05/02	11:06	29.74	12.28	17.46	----	
B1	04/05/02	08:42	29.74	12.40	17.34	----	
B1	05/29/02	00:00	29.74	13.20	16.54	----	
B1	06/27/02	15:06	29.74	13.77	15.97	----	
B1	08/26/02	17:00	29.74	14.79	14.95	----	
B1	11/13/02	09:02	29.74	16.00	13.74	----	
B1	02/11/03	10:15	29.74	12.86	16.88	----	
B1	05/08/03	08:12	29.74	12.25	17.49	----	
C *	03/25/97	12:32	28.89	5.56	23.33	----	
C *	03/31/97	11:38	28.89	6.16	22.73	----	
C *	07/16/97	08:47	28.89	8.28	20.61	----	
C *	10/21/97	15:15	28.89	10.00	18.89	----	
C *	01/27/98	13:41	28.89	7.98	20.91	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
C *	05/18/98	18:08	28.89	9.54	19.35	----	
C *	08/17/98	11:11	28.89	dry	----	----	
C *	11/13/98	10:36	28.89	10.36	18.53	----	
C *	02/16/99	13:58	28.89	5.91	22.98	----	
C *	05/18/99	16:04	28.89	7.90	20.99	----	
C *	09/21/99	12:44	28.89	dry	----	----	
C *	12/06/99	14:50	28.89	9.82	----	----	Water in endcap
C *	02/16/00	09:51	28.89	8.78	20.11	----	
C *	05/23/00	17:55	28.89	dry	----	----	
C *	08/29/00	14:33	28.89	dry	----	----	
C *	11/09/00	13:47	28.89	9.94	18.95	----	Dry?
C *	02/12/01	15:08	28.89	dry	----	----	
C *	06/04/01	13:25	28.89	dry	----	----	
C *	08/16/01	12:11	28.89	dry	----	----	
C *	11/28/01	13:03	28.89	dry	----	----	
C *	02/27/02	14:44	28.89	8.94	19.95	----	
C *	06/27/02	15:36	28.89	dry	----	----	
C *	08/26/02	17:31	28.89	dry	----	----	
C *	11/13/02	09:25	28.89	dry	----	----	
C *	02/11/03	10:46	28.89	dry	----	----	1" water
C *	05/08/03	08:35	28.89	8.53	20.36	----	
D	03/25/97	12:25	30.04	8.32	21.72	----	
D	03/31/97	11:31	30.04	8.66	21.38	----	
D	07/16/97	08:35	30.04	10.45	19.59	----	
D	10/21/97	17:10	30.04	13.27	16.77	----	
D	01/27/98	13:31	30.04	10.72	19.32	----	
D	05/18/98	17:36	30.04	12.23	17.81	----	
D	08/17/98	10:57	30.04	13.83	16.21	----	
D	11/13/98	09:05	30.04	15.01	15.03	----	
D	02/16/99	13:45	30.04	8.50	21.54	----	
D	05/18/99	15:59	30.04	11.00	19.04	----	
D	09/21/99	12:37	30.04	14.41	15.63	----	
D	12/06/99	14:46	30.04	14.04	16.00	----	
D	02/16/00	09:55	30.04	11.50	18.54	----	
D	05/23/00	12:56	30.04	12.74	17.30	----	
D	08/29/00	14:35	30.04	14.70	15.34	----	
D	11/09/00	13:43	30.04	15.49	14.55	----	
D	02/12/01	15:12	30.04	14.99	15.05	----	
D	06/04/01	12:35	30.04	14.95	15.09	----	
D	08/16/01	11:46	30.04	15.64	14.40	----	
D	11/28/01	12:43	30.04	15.45	14.59	----	
D	02/27/02	14:21	30.04	11.37	18.67	----	
D	03/05/02	11:00	30.04	11.51	18.53	----	
D	04/05/02	08:45	30.04	11.65	18.39	----	
D	05/29/02	00:00	30.04	12.73	17.31	----	
D	06/27/02	15:00	30.04	13.43	16.61	----	
D	08/26/02	17:04	30.04	14.68	15.36	----	
D	11/13/02	09:19	30.04	15.96	14.08	----	
D	02/11/03	10:41	30.04	12.10	17.94	----	
D	05/08/03	08:30	30.04	11.48	18.56	----	
F*	08/18/98	08:10	NA	14.77	NA		
F *							Abandoned August 2003
G *	03/25/97	11:57	30.24	14.49	15.75	----	
G *	03/31/97	09:13	30.24	14.01	16.23	----	
G *	07/16/97	07:37	30.24	14.30	15.94	----	
G *	10/21/97	16:20	30.24	dry	----	----	
G *	01/27/98	11:49	30.24	dry	----	----	
G *	05/18/98	17:30	30.24	dry	----	----	
G *	08/17/98	11:06	30.24	dry	----	----	
G *	11/13/98	09:53	30.24	dry	----	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
G *	02/16/99	13:14	30.24	dry	----	----	
G *	05/18/99	14:50	30.24	dry	----	----	
G *	09/21/99	11:30	30.24	dry	----	----	
G *	12/06/99	14:07	30.24	dry	----	----	
G *	02/16/00	10:19	30.24	dry	----	----	
G *	05/23/00	16:33	30.24	dry	----	----	
G *	08/29/00	13:18	30.24	dry	----	----	
G *	11/09/00	12:30	30.24	dry	----	----	
G *	02/12/01	16:02	30.24	dry	----	----	
G *	06/04/01	11:41	30.24	dry	----	----	
G *	08/16/01	10:50	30.24	dry	----	----	
G *	11/28/01	11:33	30.24	dry	----	----	
G *	02/27/02	13:38	30.24	dry	----	----	
G *	06/27/02	14:13	30.24	dry	----	----	
G *	08/26/02	16:05	30.24	dry	----	----	
G *	11/13/02	07:37	30.24	dry	----	----	
G *	02/11/03	08:58	30.24	dry	----	----	
G *	05/08/03	06:57	30.24	dry	----	----	
H	03/31/97	11:51	27.08	5.42	21.66	----	
H	07/16/97	08:44	27.08	7.29	19.79	----	
H	10/21/97	17:45	27.08	10.08	17.00	----	
H	01/27/98	13:45	27.08	7.56	19.52	----	
H	05/18/98	17:50	27.08	9.06	18.02	----	
H	08/17/98	09:15	27.08	10.68	16.40	----	
H	11/13/98	10:54	27.08	11.84	15.24	----	
H	02/16/99	13:50	27.08	5.35	21.73	----	
H	05/18/99	15:41	27.08	7.78	19.30	----	
H	09/21/99	12:15	27.08	11.23	15.85	----	
H	12/06/99	15:13	27.08	10.91	16.17	----	
H	02/16/00	10:52	27.08	8.28	18.80	----	
H	05/23/00	17:20	27.08	9.48	17.60	----	
H	08/29/00	14:06	27.08	11.55	15.53	----	
H	11/09/00	13:23	27.08	12.34	14.74	----	
H	02/12/01	15:36	27.08	11.88	15.20	----	
H	06/04/01	12:27	27.08	11.81	15.27	----	
H	08/16/01	11:41	27.08	12.57	14.51	----	
H	11/28/01	12:34	27.08	12.39	14.69	----	
H	02/27/02	14:18	27.08	8.14	18.94	----	
H	03/05/02	10:58	27.08	8.28	18.80	----	
H	04/05/02	09:10	27.08	8.45	18.63	----	
H	05/29/02	00:00	27.08	9.38	17.70	----	
H	06/27/02	14:51	27.08	10.25	16.83	----	
H	08/26/02	17:00	27.08	11.54	15.54	----	
H	11/13/02	09:12	27.08	12.83	14.25	----	
H	02/11/03	10:33	27.08	8.96	18.12	----	
H	05/08/03	08:24	27.08	8.24	18.84	----	
J1	03/25/97	12:15	29.70	8.78	20.92	----	Orange/brown algae
J1	03/31/97	11:19	29.70	9.02	20.68	----	
J1	07/16/97	08:22	29.70	10.49	19.21	----	
J1	10/21/97	16:58	29.70	13.10	16.60	----	
J1	01/27/98	13:15	29.70	11.03	18.67	----	
J1	05/18/98	18:01	29.70	12.27	17.43	----	
J1	08/17/98	11:00	29.70	13.78	15.92	----	
J1	11/13/98	10:30	29.70	14.77	14.93	----	
J1	02/16/99	13:37	29.70	8.91	20.79	----	
J1	05/18/99	15:46	29.70	11.19	18.51	----	
J1	09/21/99	12:28	29.70	14.36	15.34	----	
J1	12/06/99	15:07	29.70	13.95	15.75	----	
J1	02/16/00	11:05	29.70	11.67	18.03	----	
J1	05/23/00	17:27	29.70	12.78	16.92	----	
J1	08/29/00	14:14	29.70	14.58	15.12	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
J1	11/09/00	13:25	29.70	15.30	14.40	----	
J1	02/12/01	15:22	29.70	14.87	14.83	----	
J1	06/04/01	12:39	29.70	14.83	14.87	----	
J1	08/16/01	11:52	29.70	15.48	14.22	----	
J1	11/28/01	12:35	29.70	15.23	14.47	----	
J1	02/27/02	14:30	29.70	11.62	18.08	----	
J1	03/05/02	11:04	29.70	11.76	17.94	----	
J1	04/05/02	08:40	29.70	11.87	17.83	----	
J1	05/29/02	00:00	29.70	12.77	16.93	----	
J1	06/27/02	15:02	29.70	13.40	16.30	----	
J1	08/26/02	16:54	29.70	14.51	15.19	----	
J1	11/13/02	09:00	29.70	15.71	13.99	----	
J1	02/11/03	10:18	29.70	12.33	17.37	----	
J1	05/08/03	08:14	29.70	11.65	18.05	----	
K	03/25/97	12:08	29.42	8.20	21.22	----	
K	03/31/97	09:32	29.42	8.46	20.96	----	
K	07/16/97	08:00	29.42	10.03	19.39	----	
K	10/21/97	16:45	29.42	12.71	16.71	----	
K	01/27/98	12:37	29.42	10.46	18.96	----	
K	05/18/98	17:52	29.42	11.77	17.65	----	
K	08/17/98	10:50	29.42	13.34	16.08	----	
K	11/13/98	10:14	29.42	14.30	15.12	----	
K	02/16/99	13:55	29.42	8.41	21.01	----	
K	05/18/99	15:30	29.42	10.68	18.74	----	
K	09/21/99	12:08	29.42	13.91	15.51	----	
K	12/06/99	14:32	29.42	13.44	15.98	----	
K	02/16/00	10:48	29.42	11.15	18.27	----	
K	05/23/00	17:12	29.42	12.25	17.17	----	
K	08/29/00	13:56	29.42	14.16	15.26	----	
K	11/09/00	13:16	29.42	14.84	14.58	----	
K	02/12/01	15:41	29.42	14.35	15.07	----	
K	06/04/01	12:20	29.42	14.22	15.20	----	
K	08/16/01	11:35	29.42	15.12	14.30	----	
K	11/28/01	12:26	29.42	14.68	14.74	----	
K	02/27/02	14:17	29.42	11.05	18.37	----	
K	03/05/02	10:55	29.42	11.25	18.17	----	
K	04/05/02	08:55	29.42	11.30	18.12	----	
K	05/29/02	00:00	29.42	12.22	17.20	----	
K	06/27/02	14:47	29.42	12.92	16.50	----	
K	08/26/02	17:17	29.42	14.12	15.30	----	
K	11/13/02	09:11	29.42	15.18	14.24	----	
K	02/11/03	10:29	29.42	11.80	17.62	----	
K	05/08/03	08:21	29.42	11.14	18.28	----	
L	03/25/97	12:35	28.10	4.98	23.12	----	
L	03/31/97	11:40	28.10	5.24	22.86	----	
L	07/16/97	08:49	28.10	7.50	20.60	----	
L	10/21/97	15:18	28.10	9.55	18.55	----	
L	01/27/98	13:39	28.10	6.45	21.65	----	
L	05/18/98	18:07	28.10	9.21	18.89	----	
L	08/17/98	11:10	28.10	11.59	16.51	----	
L	11/13/98	10:35	28.10	13.02	15.08	----	
L	02/16/99	13:57	28.10	4.78	23.32	----	
L	05/18/99	16:03	28.10	7.62	20.48	----	
L	09/21/99	12:43	28.10	12.30	15.80	----	
L	12/06/99	14:49	28.10	9.51	18.59	----	
L	02/16/00	09:49	28.10	7.13	20.97	----	
L	05/23/00	17:54	28.10	9.11	18.99	----	
L	08/29/00	14:32	28.10	12.66	15.44	----	
L	11/09/00	13:46	28.10	13.56	14.54	----	
L	02/12/01	15:07	28.10	13.04	15.06	----	
L	06/04/01	13:24	28.10	12.78	15.32	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
L	08/16/01	12:10	28.10	13.66	14.44	----	
L	11/28/01	13:02	28.10	12.34	15.76	----	
L	02/27/02	14:42	28.10	7.16	20.94	----	
L	03/05/02	11:12	28.10	7.39	20.71	----	
L	04/05/02	08:39	28.10	7.63	20.47	----	
L	05/29/02	00:00	28.10	9.09	19.01	----	
L	06/27/02	10:38	28.10	10.11	17.99	----	
L	08/26/02	17:30	28.10	12.56	15.54	----	
L	11/13/02	09:26	28.10	14.00	14.10	----	
L	02/11/03	10:47	28.10	7.17	20.93	----	
L	05/08/03	08:34	28.10	7.01	21.09	----	
N	03/25/97	11:48	31.40	14.05	17.35	----	
N	03/31/97	08:59	31.40	14.26	17.14	----	Hydrocarbon odor, product
N	07/16/97	07:20	31.40	16.03	16.33	1.20	Light brown color; thick coating on probe
N	10/21/97	16:09	31.40	16.46	14.94	----	No product - strong petroleum odor
N	10/23/97	17:20	31.40	16.48	14.92	----	No product - strong petroleum odor
N	01/27/98	11:13	31.40	15.01	16.41	0.02	
N	05/18/98	17:20	31.40	16.39	15.06	0.06	
N	08/17/98	10:40	31.40	17.16	14.26	0.02	Thin coat of thick product
N	11/13/98	09:48	31.40	17.83	13.58	0.01	
N	02/16/99	12:55	31.40	14.09	17.53	0.27	Strong petroleum odor
N	05/18/99	14:47	31.40	15.79	15.64	0.04	
N	09/21/99	11:23	31.40	17.39	14.02	0.01	
N	12/06/99	14:00	31.40	16.57	14.83	----	
N	02/16/00	10:10	31.40	15.69	15.71	----	
N	05/23/00	16:24	31.40	16.42	14.98	----	Strong petroleum odor, no product
N	08/29/00	13:07	31.40	17.61	13.79	----	
N	11/09/00	12:26	31.40	18.23	13.19	0.03	
N	02/12/01	15:49	31.40	17.64	13.76	----	
N	06/04/01	11:31	31.40	17.58	13.82	----	
N	08/16/01	10:29	31.40	18.08	13.32	----	Trace product
N	11/28/01	11:27	31.40	18.06	13.34	----	Trace product
N	02/27/02	13:25	31.40	15.76	15.64	----	
N	04/05/02	08:09	31.40	15.88	15.52	----	
N	05/29/02	00:00	31.40	16.42	14.98	----	
N	06/27/02	14:12	31.40	16.80	14.60	----	
N	08/26/02	15:56	31.40	17.51	13.89	----	
N	11/13/02	07:27	31.40	18.44	12.98	0.03	Product present
N	02/11/03	08:49	31.40	15.33	16.07	----	
N	05/08/03	06:51	31.40	15.71	15.69	----	
P	03/25/97	11:45	29.96	12.88	17.08	----	
P	03/31/97	08:55	29.96	12.94	17.02	----	Hydrocarbon odor, product
P	07/16/97	07:15	29.96	14.02	16.08	0.17	Light coating on probe; light brown color
P	10/21/97	16:05	29.96	15.23	14.73	----	No product - strong petroleum odor
P	10/23/97	17:25	29.96	15.21	14.75	----	No product - strong petroleum odor
P	01/27/98	11:09	29.96	13.87	16.09	----	
P	05/18/98	17:18	29.96	13.08	16.88	----	Trace of product on probe
P	08/17/98	10:37	29.96	15.82	14.15	0.01	Sheen on probe, strong petroleum odor
P	11/13/98	09:46	29.96	16.63	13.37	0.05	Strong gasoline odor
P	02/16/99	12:52	29.96	12.91	17.10	0.06	Strong petroleum odor
P	05/18/99	14:43	29.96	14.68	15.38	0.13	
P	09/21/99	11:20	29.96	16.08	13.89	0.01	
P	12/06/99	13:55	29.96	15.41	14.55	----	
P	02/16/00	10:08	29.96	14.51	15.45	----	
P	05/23/00	16:21	29.96	15.15	14.81	----	Trace of product on surface
P	08/29/00	13:04	29.96	16.26	13.71	0.01	
P	11/09/00	12:24	29.96	16.98	13.00	0.03	
P	02/12/01	15:46	29.96	16.31	13.65	----	
P	06/04/01	11:27	29.96	16.26	13.70	----	Trace product
P	08/16/01	10:28	29.96	16.75	13.21	----	
P	11/28/01	11:24	29.96	17.01	12.95	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
P	02/27/02	13:22	29.96	14.60	15.44	0.10	Strong ethanol-like odor
P	04/05/02	08:07	29.96	14.70	15.34	0.10	
P	05/29/02	00:00	29.96	15.00	14.96	----	Trace product
P	06/27/02	14:11	29.96	15.49	14.47	----	
P	08/26/02	15:54	29.96	16.15	13.81	----	
P	11/13/02	07:25	29.96	16.99	13.00	0.04	Product present
P	02/11/03	08:44	29.96	14.13	15.84	0.01	Product present
P	05/08/03	06:47	29.96	15.53	14.44	0.01	Product barely present
Q	03/25/97	11:42	30.36	13.55	16.81	----	
Q	03/31/97	08:52	30.36	13.54	16.82	----	Hydrocarbon odor
Q	07/16/97	07:10	30.36	14.55	15.83	0.02	Light coating on probe; light brown color
Q	10/21/97	16:04	30.36	15.70	14.66	----	No product - strong petroleum odor
Q	10/23/97	17:29	30.36	15.69	14.67	----	No product - strong petroleum odor
Q	01/27/98	11:05	30.36	14.48	15.88	----	
Q	05/18/98	17:16	30.36	15.58	14.78	----	
Q	08/17/98	10:35	30.36	16.27	14.09	----	Slight sheen on probe; no product, strong petroleum odor
Q	11/13/98	09:44	30.36	17.01	13.36	0.01	Strong gasoline odor
Q	02/16/99	12:49	30.36	13.61	16.76	0.01	Strong petroleum odor
Q	05/18/99	14:40	30.36	15.13	15.23	----	Strong odor when cap removed
Q	09/21/99	11:17	30.36	16.51	13.85	----	
Q	12/06/99	13:53	30.36	15.88	14.48	----	
Q	02/16/00	10:06	30.36	15.02	15.34	----	Film of product
Q	05/23/00	16:19	30.36	15.64	14.72	----	Strong petroleum odor, no product
Q	08/29/00	13:01	30.36	16.69	13.67	----	
Q	11/09/00	12:23	30.36	17.50	12.86	----	Trace of product
Q	02/12/01	15:45	30.36	16.71	13.65	----	
Q	06/04/01	11:25	30.36	16.66	13.70	----	
Q	08/16/01	10:26	30.36	17.15	13.21	----	Trace product
Q	11/28/01	11:21	30.36	17.76	12.94	0.42	
Q	02/27/02	13:20	30.36	15.07	15.29	----	Strong petroleum odor, no product
Q	04/05/02	08:05	30.36	15.23	15.13	----	Trace product
Q	05/29/02	00:00	30.36	15.53	14.83	----	Trace product
Q	06/27/02	14:10	30.36	15.95	14.41	----	Trace product
Q	08/26/02	15:52	30.36	16.60	13.76	----	
Q	11/13/02	07:30	30.36	17.50	12.87	0.01	Product present
Q	02/11/03	08:47	30.36	14.67	15.69	----	
Q	05/08/03	06:48	30.36	15.00	15.54	0.22	
LW001S	03/31/97	11:12	27.96	6.65	21.31		
LW001S	07/16/97	08:15	27.96	8.34	19.62	----	
LW001S	10/21/97	16:53	27.96	11.02	16.94	----	
LW001S	01/27/98	13:00	27.96	8.75	19.21	----	
LW001S	05/18/98	17:40	27.96	9.15	18.81	----	
LW001S	08/17/98	10:54	27.96	11.67	16.29	----	
LW001S	11/13/98	10:02	27.96	12.76	15.20	----	
LW001S	02/16/99	13:24	27.96	6.60	21.36	----	
LW001S	05/18/99	15:38	27.96	8.92	19.04	----	
LW001S	09/21/99	12:10	27.96	12.20	15.76	----	
LW001S	12/06/99	14:33	27.96	11.86	16.10	----	
LW001S	02/16/00	10:50	27.96	9.42	18.54	----	
LW001S	05/23/00	17:18	27.96	10.52	17.44	----	
LW001S	08/29/00	13:58	27.96	12.51	15.45	----	
LW001S	11/09/00	13:17	27.96	13.26	14.70	----	
LW001S	02/12/01	15:33	27.96	12.82	15.14	----	
LW001S	06/04/01	12:24	27.96	12.77	15.19	----	
LW001S	08/16/01	11:37	27.96	13.45	14.51	----	
LW001S	11/28/01	12:28	27.96	13.25	14.71	----	
LW001S	02/27/02	14:19	27.96	9.31	18.65	----	
LW001S	03/05/02	10:56	27.96	9.45	18.51	----	
LW001S	04/05/02	09:08	27.96	9.60	18.36	----	
LW001S	05/29/02	00:00	27.96	10.49	17.47	----	
LW001S	06/27/02	14:50	27.96	11.26	16.70	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW001S	08/26/02	17:11	27.96	12.47	15.49	----	
LW001S	11/13/02	09:07	27.96	13.72	14.24	----	
LW001S	02/11/03	10:25	27.96	10.11	17.85	----	
LW001S	05/08/03	08:20	27.96	9.41	18.55	----	
LW002S	03/25/97	12:22	29.56	8.06	21.50	----	
LW002S	03/31/97	11:27	29.56	8.34	21.22	----	
LW002S	07/16/97	08:33	29.56	10.05	19.51	----	
LW002S	10/21/97	17:04	29.56	12.77	16.79	----	
LW002S	01/27/98	13:25	29.56	10.39	19.17	----	
LW002S	05/18/98	18:02	29.56	11.78	17.78	----	
LW002S	08/17/98	10:56	29.56	13.38	16.18	----	
LW002S	11/13/98	10:32	29.56	14.47	15.09	----	
LW002S	02/16/99	13:42	29.56	8.27	21.29	----	
LW002S	05/18/99	15:45	29.56	10.63	18.93	----	
LW002S	09/21/99	12:34	29.56	13.95	15.61	----	
LW002S	12/06/99	15:11	29.56	13.54	16.02	----	
LW002S	02/16/00	10:38	29.56	11.08	18.48	----	
LW002S	05/23/00	17:24	29.56	12.29	17.27	----	
LW002S	08/29/00	14:12	29.56	14.23	15.33	----	
LW002S	11/09/00	13:04	29.56	15.00	14.56	----	
LW002S	02/12/01	15:30	29.56	14.52	15.04	----	
LW002S	06/04/01	12:34	29.56	14.46	15.10	----	
LW002S	08/16/01	11:45	29.56	15.16	14.40	----	
LW002S	11/28/01	12:41	29.56	14.90	14.66	----	
LW002S	02/27/02	14:19	29.56	11.02	18.54	----	
LW002S	03/05/02	10:59	29.56	11.17	18.39	----	
LW002S	04/05/02	08:47	29.56	11.33	18.23	----	
LW002S	05/29/02	00:00	29.56	12.22	17.34	----	
LW002S	06/27/02	14:56	29.56	13.00	16.56	----	
LW002S							Abandoned August 2003
LW004S	03/31/97	09:20	30.26	12.77	17.49	----	
LW004S	07/16/97	07:40	30.26	14.66	15.60	----	
LW004S	10/21/97	16:25	30.26	16.88	13.38	----	
LW004S	01/27/98	12:00	30.26	15.13	15.13	----	
LW004S	05/18/98	17:32	30.26	16.08	14.18	----	
LW004S	08/17/98	11:07	30.26	17.30	12.96	----	
LW004S	11/13/98	09:56	30.26	17.96	12.30	----	
LW004S	02/16/99	13:16	30.26	13.10	17.16	----	
LW004S	05/18/99	15:03	30.26	15.43	14.83	----	
LW004S	09/21/99	11:44	30.26	17.61	12.65	----	
LW004S	12/06/99	14:19	30.26	17.08	13.18	----	
LW004S	02/16/00	10:31	30.26	15.84	14.42	----	
LW004S	05/23/00	16:55	30.26	16.71	13.55	----	
LW004S	08/29/00	13:39	30.26	17.78	12.48	----	
LW004S	11/09/00	12:53	30.26	18.17	12.09	----	
LW004S	02/12/01	16:38	30.26	17.08	13.18	----	
LW004S	06/04/01	12:08	30.26	17.81	12.45	----	
LW004S	08/16/01	11:14	30.26	18.39	11.87	----	
LW004S	11/28/01	12:05	30.26	17.84	12.42	----	
LW004S	02/27/02	14:01	30.26	15.82	14.44	----	
LW004S	03/05/02	11:35	30.26	15.95	14.31	----	
LW004S	04/05/02	08:20	30.26	16.02	14.24	----	
LW004S	05/29/02	00:00	30.26	16.74	13.52	----	
LW004S	06/27/02	14:39	30.26	16.89	13.37	----	
LW004S	08/26/02	16:31	30.26	17.68	12.58	----	
LW004S	11/13/02	08:22	30.26	19.04	11.22	----	
LW004S	02/11/03	09:31	30.26	16.03	14.23	----	
LW004S	05/08/03	07:43	30.26	15.75	14.51	----	
LW005S	03/25/97	12:29	30.79	10.57	20.22	----	
LW005S	03/31/97	11:35	30.79	10.84	19.95	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW005S	07/16/97	08:53	30.79	12.29	18.50	----	
LW005S	10/21/97	15:16	30.79	15.00	15.79	----	
LW005S	01/27/98	13:36	30.79	12.90	17.89	----	
LW005S	05/18/98	18:05	30.79	14.19	16.60	----	
LW005S	08/17/98	11:09	30.79	15.54	15.25	----	
LW005S	11/13/98	10:38	30.79	16.55	14.24	----	
LW005S	02/16/99	13:16	30.79	10.59	20.20	----	
LW005S	05/18/99	16:01	30.79	13.12	17.67	----	
LW005S	09/21/99	12:40	30.79	16.00	14.79	----	
LW005S	12/06/99	14:47	30.79	15.64	15.15	----	
LW005S	02/16/00	09:56	30.79	13.54	17.25	----	
LW005S	05/23/00	17:51	30.79	14.80	15.99	----	
LW005S	08/29/00	14:37	30.79	16.35	14.44	----	
LW005S	11/09/00	13:45	30.79	16.98	13.81	----	
LW005S	02/12/01	15:13	30.79	16.51	14.28	----	
LW005S	06/04/01	13:23	30.79	16.43	14.36	----	
LW005S	08/16/01	12:07	30.79	17.03	13.76	----	
LW005S	11/28/01	13:01	30.79	16.94	13.85	----	
LW005S	02/27/02	14:39	30.79	13.48	17.31	----	
LW005S	03/05/02	11:13	30.79	13.62	17.17	----	
LW005S	04/05/02	08:38	30.79	13.60	17.19	----	
LW005S	05/29/02	00:00	30.79	14.81	15.98	----	
LW005S	06/27/02	10:43	30.79	15.15	15.64	----	
LW005S	08/26/02	17:08	30.79	16.12	14.67	----	
LW005S	11/13/02	09:22	30.79	17.39	13.40	----	
LW005S	02/11/03	10:43	30.79	13.95	16.84	----	
LW005S	05/08/03	08:32	30.79	13.58	17.21	----	
LW007S	03/31/97	11:05	28.10	6.75	21.35	----	
LW007S	07/16/97	08:05	28.10	8.62	19.48	----	
LW007S	10/21/97	16:45	28.10	11.26	16.84	----	
LW007S	01/27/98	12:47	28.10	8.85	19.25	----	
LW007S	05/18/98	17:48	28.10	10.34	17.76	----	
LW007S	08/17/98	10:48	28.10	11.85	16.25	----	
LW007S	11/13/98	10:12	28.10	12.90	15.20	----	Strong gasoline odor
LW007S	02/16/99	13:53	28.10	6.81	21.29	----	
LW007S	05/18/99	15:23	28.10	9.14	18.96	----	
LW007S	09/21/99	12:03	28.10	12.37	15.73	----	
LW007S	12/06/99	14:27	28.10	12.00	16.10	----	
LW007S	02/16/00	10:46	28.10	9.60	18.50	----	
LW007S	05/23/00	17:09	28.10	10.70	17.40	----	
LW007S	08/29/00	13:53	28.10	12.64	15.46	----	
LW007S	11/09/00	13:14	28.10	13.36	14.74	----	
LW007S	02/12/01	15:39	28.10	12.94	15.16	----	
LW007S	06/04/01	12:17	28.10	12.87	15.23	----	
LW007S	08/16/01	11:33	28.10	13.58	14.52	----	
LW007S	11/28/01	12:22	28.10	13.34	14.76	----	
LW007S	02/27/02	14:15	28.10	9.47	18.63	----	
LW007S	03/05/02	10:52	28.10	9.62	18.48	----	
LW007S	04/05/02	08:57	28.10	9.73	18.37	----	
LW007S	05/29/02	00:00	28.10	10.63	17.47	----	
LW007S	06/27/02	14:45	28.10	11.36	16.74	----	
LW007S	08/26/02	17:18	28.10	12.69	15.41	----	
LW007S	11/13/02	09:16	28.10	13.82	14.28	----	
LW007S	02/11/03	10:37	28.10	10.18	17.92	----	
LW007S	05/08/03	08:27	28.10	9.54	18.56	----	
LW008S	05/18/99	14:55	31.28	14.84	16.44	----	
LW008S	09/21/99	12:24	31.28	16.94	14.34	----	
LW008S	12/06/99	14:40	31.28	16.63	14.65	----	
LW008S	02/16/00	10:16	31.28	15.18	16.10	----	
LW008S	05/23/00	17:42	31.28	15.88	15.40	----	
LW008S	08/29/00	14:26	31.28	17.06	14.22	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW008S	11/09/00	13:32	31.28	17.55	13.73	----	
LW008S	02/12/01	15:58	31.28	17.24	14.04	----	
LW008S	06/04/01	13:05	31.28	17.14	14.14	----	
LW008S	08/16/01	12:00	31.28	17.70	13.58	----	
LW008S	11/28/01	12:57	31.28	17.63	13.65	0.04	
LW008S	02/27/02	14:37	31.28	15.12	16.16	----	
LW008S	03/05/02	11:09	31.28	15.26	16.02	----	
LW008S	04/05/02	08:17	31.28	15.34	15.94	----	
LW008S	05/29/02	00:00	31.28	15.91	15.37	----	
LW008S	06/27/02	15:21	31.28	16.21	15.07	----	
LW008S	08/26/02	16:38	31.28	16.95	14.33	----	
LW008S	11/13/02	08:50	31.28	17.88	13.40	----	
LW008S	02/11/03	09:48	31.28	15.57	15.71	----	
LW008S	05/08/03	08:00	31.28	15.11	16.17	----	
LW009S	05/18/99	14:57	31.04	19.58	11.46	----	Water level appears to be more representative of lower zone
LW009S	09/21/99	11:36	31.04	dry	----	----	
LW009S	12/06/99	14:13	31.04	19.64	----	----	Water in endcap
LW009S	02/16/00	10:24	31.04	19.59	----	----	Water in endcap
LW009S	05/23/00	16:39	31.04	dry	----	----	
LW009S	08/29/00	13:28	31.04	dry	----	----	
LW009S	11/09/00	12:42	31.04	dry	----	----	
LW009S	02/12/01	16:12	31.04	dry	----	----	
LW009S	06/04/01	11:50	31.04	dry	----	----	
LW009S	08/16/01	11:01	31.04	dry	----	----	
LW009S	11/28/01	11:52	31.04	dry	----	----	
LW009S	02/27/02	13:48	31.04	dry	----	----	
LW009S	03/05/02	11:15	31.04	dry	----	----	
LW009S	04/05/02	08:26	31.04	dry	----	----	
LW009S	05/29/02	00:00	31.04	dry	----	----	
LW009S	06/27/02	14:24	31.04	dry	----	----	
LW009S	08/26/02	16:09	31.04	dry	----	----	
LW009S	11/13/02	07:49	31.04	dry	----	----	
LW009S	02/11/03	09:06	31.04	dry	----	----	Recorded DTW of 19.58; well most likely dry
LW009S	05/08/03	07:11	31.04	dry	----	----	
LW010S	05/18/99	14:59	30.75	17.24	13.51	----	
LW010S	09/21/99	11:38	30.75	19.13	11.62	----	
LW010S	12/06/99	14:14	30.75	18.54	12.21	----	
LW010S	02/16/00	10:26	30.75	17.62	13.13	----	
LW010S	05/23/00	16:41	30.75	18.25	12.50	----	
LW010S	08/29/00	13:30	30.75	dry	----	----	
LW010S	11/09/00	12:45	30.75	dry	----	----	
LW010S	02/12/01	16:14	30.75	dry	----	----	
LW010S	06/04/01	11:53	30.75	dry	----	----	
LW010S	08/16/01	11:03	30.75	dry	----	----	
LW010S	11/28/01	11:54	30.75	dry	----	----	
LW010S	02/27/02	13:50	30.75	17.77	12.98	----	
LW010S	03/05/02	11:32	30.75	17.84	12.91	----	
LW010S	04/05/02	08:24	30.75	17.82	12.93	----	
LW010S	05/29/02	00:00	30.75	18.22	12.53	----	
LW010S	06/27/02	14:28	30.75	18.27	12.48	----	
LW010S	08/26/02	16:15	30.75	dry	----	----	
LW010S	11/13/02	08:00	30.75	dry	----	----	
LW010S	02/11/03	09:20	30.75	17.50	13.25	----	
LW010S	05/08/03	07:32	30.75	17.68	13.07	----	
LW011S	05/18/99	15:10	29.10	11.47	17.63	----	
LW011S	09/21/99	11:51	29.10	14.23	14.87	----	
LW011S	12/06/99	15:05	29.10	14.00	15.10	----	
LW011S	02/16/00	11:01	29.10	11.94	17.16	----	
LW011S	05/23/00	11:01	29.10	13.01	16.09	----	
LW011S	08/29/00	14:55	29.10	14.51	14.59	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW011S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well
LW011S	02/12/01	15:18	29.10	14.62	14.48	----	
LW011S	06/04/01	13:12	29.10	14.65	14.45	----	
LW011S	08/16/01	11:24	29.10	15.46	13.86	0.28	
LW011S	11/28/01	12:51	29.10	15.10	14.00	----	Trace product
LW011S	02/27/02	14:59	29.10	11.86	17.24	----	
LW011S	03/05/02	11:40	29.10	11.96	17.14	----	
LW011S	04/05/02	08:34	29.10	12.07	17.03	----	
LW011S	05/29/02	00:00	29.10	13.00	16.10	----	
LW011S	06/27/02	15:09	29.10	13.40	15.70	----	
LW011S	08/26/02	16:48	29.10	14.37	14.73	----	
LW011S	11/13/02	08:54	29.10	15.53	13.57	----	
LW011S	02/11/03	10:03	29.10	12.46	16.64	----	
LW011S	05/08/03	08:07	29.10	11.91	17.19	----	
LW013S	05/23/00	16:51	30.17	17.23	12.94	----	
LW013S	08/29/00	13:37	30.17	18.27	11.90	----	
LW013S	11/09/00	12:51	30.17	18.75	11.42	----	
LW013S	02/12/01	16:30	30.17	18.26	11.91	----	
LW013S	06/04/01	12:06	30.17	18.30	11.87	----	
LW013S	08/16/01	11:13	30.17	18.81	11.36	----	
LW013S	11/28/01	12:03	30.17	18.37	11.80	----	
LW013S	02/27/02	13:58	30.17	16.60	13.57	----	
LW013S	03/05/02	11:33	30.17	16.68	13.49	----	
LW013S	04/05/02	08:22	30.17	16.73	13.44	----	
LW013S	05/29/02	00:00	30.17	17.30	12.87	----	
LW013S	06/27/02	14:37	30.17	17.38	12.79	----	
LW013S	08/26/02	16:30	30.17	18.11	12.06	----	
LW013S	11/13/02	08:14	30.17	19.04	11.13	----	
LW013S	02/11/03	09:30	30.17	16.57	13.60	----	
LW013S	05/08/03	07:41	30.17	16.53	13.64	----	
LW101S	03/31/97	09:54	29.41	4.51	24.90	----	
LW101S	07/16/97	09:01	29.41	6.81	22.60	----	
LW101S	10/21/97	18:01	29.41	7.28	22.13	----	
LW101S	01/27/98	14:15	29.41	4.10	25.31	----	
LW101S	05/18/98	18:18	29.41	6.68	22.73	----	
LW101S	08/17/98	11:21	29.41	8.14	21.27	----	
LW101S	11/13/98	10:48	29.41	8.61	20.80	----	
LW101S	02/16/99	14:11	29.41	3.21	26.20	----	
LW101S	05/18/99	16:17	29.41	6.00	23.41	----	
LW101S	09/21/99	12:54	29.41	8.60	20.81	----	
LW101S	12/06/99	14:58	29.41	6.98	22.43	----	
LW101S	02/16/00	09:44	29.41	4.96	24.45	----	
LW101S	05/23/00	18:06	29.41	6.83	22.58	----	
LW101S	08/29/00	14:47	29.41	8.67	20.74	----	
LW101S	11/09/00	13:56	29.41	9.39	20.02	----	
LW101S	02/12/01	15:02	29.41	8.02	21.39	----	
LW101S	06/04/01	13:35	29.41	8.40	21.01	----	
LW101S	08/16/01	12:20	29.41	9.44	19.97	----	
LW101S	11/28/01	13:12	29.41	8.58	20.83	----	
LW101S	02/27/02	14:52	29.41	5.70	23.71	----	
LW101S	06/27/02	15:32	29.41	7.80	21.61	----	
LW101S	08/26/02	17:34	29.41	8.85	20.56	----	
LW101S	11/13/02	09:35	29.41	9.92	19.49	----	
LW101S	02/11/03	10:59	29.41	5.27	24.14	----	
LW101S	05/08/03	08:43	29.41	5.40	24.01	----	
LW102S	03/31/97	10:01	25.77	1.86	23.91	----	
LW102S	07/16/97	09:09	25.77	3.91	21.86	----	
LW102S	10/21/97	17:59	25.77	4.03	21.74	----	
LW102S	01/27/98	14:07	25.77	1.26	24.51	----	
LW102S	05/18/98	18:15	25.77	3.57	22.20	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW102S	08/17/98	11:18	25.77	4.88	20.89	----	
LW102S	11/13/98	10:45	25.77	5.14	20.63	----	
LW102S	02/16/99	14:08	25.77	0.45	25.32	----	
LW102S	05/18/99	16:12	25.77	3.24	22.53	----	
LW102S	09/21/99	12:52	25.77	5.33	20.44	----	
LW102S	12/06/99	14:56	25.77	3.67	22.10	----	
LW102S	02/16/00	09:41	25.77	1.91	23.86	----	
LW102S	05/23/00	18:03	25.77	3.72	22.05	----	
LW102S	08/29/00	14:45	25.77	5.40	20.37	----	
LW102S	11/09/00	13:53	25.77	5.94	19.83	----	
LW102S	02/12/01	15:00	25.77	4.52	21.25	----	
LW102S	06/04/01	13:32	25.77	4.93	20.84	----	
LW102S	08/16/01	12:17	25.77	5.96	19.81	----	
LW102S	11/28/01	13:10	25.77	5.15	20.62	----	
LW102S	02/27/02	14:48	25.77	2.14	23.63	----	
LW102S	06/27/02	15:30	25.77	4.50	21.27	----	
LW102S	08/26/02	17:39	25.77	5.48	20.29	----	
LW102S	11/13/02	09:32	25.77	6.50	19.27	----	
LW102S	02/11/03	10:55	25.77	1.88	23.89	----	
LW102S	05/08/03	08:40	25.77	2.22	23.55	----	
LW103S	03/31/97	09:50	29.07	5.50	23.57	----	
LW103S	07/16/97	08:59	29.07	6.93	22.14	----	
LW103S	10/21/97	18:03	29.07	7.08	21.99	----	
LW103S	01/27/98	14:20	29.07	5.11	23.96	----	
LW103S	05/18/98	18:21	29.07	6.57	22.50	----	
LW103S	08/17/98	11:24	29.07	7.80	21.27	----	
LW103S	11/13/98	10:51	29.07	7.91	21.16	----	
LW103S	02/16/99	14:14	29.07	4.54	24.53	----	
LW103S	05/18/99	16:20	29.07	6.20	22.87	----	
LW103S	09/21/99	12:57	29.07	8.30	20.77	----	
LW103S	12/06/99	15:00	29.07	6.60	22.47	----	
LW103S	02/16/00	09:46	29.07	5.50	23.57	----	
LW103S	05/23/00	18:10	29.07	6.64	22.43	----	
LW103S	08/29/00	14:50	29.07	8.41	20.66	----	
LW103S	11/09/00	13:58	29.07	8.78	20.29	----	
LW103S	02/12/01	15:04	29.07	7.39	21.68	----	
LW103S	06/04/01	13:37	29.07	7.83	21.24	----	
LW103S	08/16/01	12:23	29.07	9.07	20.00	----	
LW103S	11/28/01	13:16	29.07	8.02	21.05	----	
LW103S	02/27/02	14:50	29.07	5.26	23.81	----	
LW103S	06/27/02	15:34	29.07	7.42	21.65	----	
LW103S	08/26/02	17:36	29.07	8.57	20.50	----	
LW103S	11/13/02	09:37	29.07	9.48	19.59	----	
LW103S	02/11/03	11:03	29.07	5.65	23.42	----	
LW103S	05/08/03	08:46	29.07	5.86	23.21	----	
LW104S	03/31/97	10:06	26.57	3.55	23.02	----	
LW104S	07/16/97	08:54	26.57	5.71	20.86	----	
LW104S	10/21/97	16:22	26.57	5.71	20.86	----	
LW104S	01/27/98	14:00	26.57	2.84	23.73	----	
LW104S	05/18/98	18:11	26.57	5.17	21.40	----	
LW104S	08/17/98	11:15	26.57	6.64	19.93	----	
LW104S	11/13/98	10:41	26.57	6.72	19.85	----	
LW104S	02/16/99	14:03	26.57	2.11	24.46	----	
LW104S	05/18/99	16:08	26.57	4.97	21.60	----	
LW104S	09/21/99	12:48	26.57	7.18	19.39	----	
LW104S	12/06/99	14:54	26.57	5.00	21.57	----	
LW104S	02/16/00	09:39	26.57	3.61	22.96	----	
LW104S	05/23/00	17:59	26.57	5.61	20.96	----	
LW104S	08/29/00	14:43	26.57	7.08	19.49	----	
LW104S	11/09/00	13:51	26.57	7.49	19.08	----	
LW104S	02/12/01	14:57	26.57	6.28	20.29	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW104S	06/04/01	13:30	26.57	6.64	19.93	----	
LW104S	08/16/01	12:15	26.57	7.56	19.01	----	
LW104S	11/28/01	13:06	26.57	6.30	20.27	----	
LW104S	02/27/02	14:46	26.57	4.07	22.50	----	
LW104S	06/27/02	15:27	26.57	6.28	20.29	----	
LW104S	08/26/02	17:41	26.57	7.13	19.44	----	
LW104S	11/13/02	09:30	26.57	7.85	18.72	----	
LW104S	02/11/03	10:51	26.57	3.72	22.85	----	
LW104S	05/08/03	08:38	26.57	4.94	21.63	----	
RW1	05/18/99	15:06	31.46	15.70	15.76	----	
RW1	09/21/99	11:46	31.46	18.02	13.44	----	
RW1	12/06/99	14:43	31.46	17.73	13.73	----	
RW1	02/16/00	10:33	31.46	16.14	15.32	----	
RW1	05/23/00	17:46	31.46	17.09	14.37	----	
RW1	08/29/00	14:28	31.46	18.29	13.17	----	
RW1	11/09/00	12:57	31.46	18.67	12.79	----	
RW1	02/12/01	16:44	31.46	18.30	13.16	----	
RW1	06/04/01	13:17	31.46	18.22	13.24	----	
RW1	08/16/01	10:55	31.46		----	----	Vapor/water recovery system test running - not measured
RW1	11/28/01	12:02	31.46	18.55	12.91	----	
RW1	02/27/02	14:03	31.46	16.12	15.34	----	
RW1	03/05/02	11:38	31.46	16.33	15.13	----	
RW1	04/05/02	08:27	31.46	16.28	15.18	----	
RW1	05/29/02	00:00	31.46	17.00	14.46	----	
RW1	06/27/02	15:16	31.46	17.33	14.13	----	
RW1	08/26/02	16:40	31.46	18.00	13.46	----	
RW1	11/13/02	08:26	31.46	18.85	12.61	----	
RW1	02/11/03	09:34	31.46	16.50	14.96	----	
RW1	05/08/03	07:46	31.46	16.23	15.23	----	
RW3	12/06/99	15:24	29.96	14.20	15.76	----	
RW3	02/16/00	10:37	29.96	11.88	18.08	----	
RW3	05/23/00	17:26	29.96	13.02	16.94	----	
RW3	08/29/00	13:42	29.96	14.88	15.08	----	
RW3	11/09/00	13:03	29.96	15.58	14.38	----	
RW3	02/12/01	15:28	29.96	15.13	14.83	----	
RW3	06/04/01	12:30	29.96	15.09	14.87	----	
RW3	08/16/01	11:44	29.96	15.74	14.22	----	
RW3	11/28/01	12:40	29.96	15.52	14.44	----	
RW3	02/27/02	14:26	29.96	11.80	18.16	----	
RW3	03/05/02	11:02	29.96	11.94	18.02	----	
RW3	04/05/02	08:44	29.96	12.06	17.90	----	
RW3	05/29/02	00:00	29.96	13.00	16.96	----	
RW3	06/27/02	14:59	29.96	13.64	16.32	----	
RW3							Abandoned August 2003
PZ1	05/23/00	17:47	28.04	14.21	13.83	----	
PZ1	08/29/00	14:30	28.04	15.33	12.71	----	
PZ1	11/09/00	12:55	28.04	15.68	12.36	----	
PZ1	02/12/01	16:42	28.04	15.30	12.74	----	
PZ1	06/04/01	13:20	28.04	15.29	12.75	----	
PZ1	08/16/01	11:17	28.04	15.94	12.10	----	
PZ1	11/28/01	12:09	28.04	15.48	12.56	----	
PZ1	02/27/02	14:02	28.04	13.28	14.76	----	
PZ1	03/05/02	11:34	28.04	13.40	14.64	----	
PZ1	04/05/02	08:32	28.04	13.44	14.60	----	
PZ1	05/29/02	00:00	28.04	14.16	13.88	----	
PZ1	06/27/02	15:17	28.04	14.50	13.54	----	
PZ1	08/26/02	16:33	28.04	15.17	12.87	----	
PZ1	11/13/02	08:42	28.04	15.83	12.21	----	
PZ1	02/11/03	09:36	28.04	13.58	14.46	----	
PZ1	05/08/03	07:58	28.04	13.25	14.79	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
PZ2	06/27/02	15:18	31.97	18.31	13.66	----	
PZ2	08/26/02	16:34	31.97	18.88	13.09	----	
PZ2	11/13/02	08:25	31.97	19.40	12.57	----	
PZ2	02/11/03	09:44	31.97	17.46	14.51	----	
PZ2	05/08/03	07:45	31.97	17.15	14.82	----	
PZ3	06/27/02	15:19	31.12	19.35	11.77	----	
PZ3	08/26/02	16:35	31.12	19.74	11.38	----	
PZ3	11/13/02	08:45	31.12	16.87	----	----	
PZ3	02/11/03	09:40	31.12	19.05	12.07	----	
PZ3	05/08/03	07:53	31.12	18.95	12.17	----	
PZ4	06/27/02	15:20	28.47	dry	----	----	
PZ4	08/26/02	16:36	28.47	dry	----	----	
PZ4	11/13/02	08:48	28.47	16.87	11.60	----	
PZ4	02/11/03	09:41	28.47	dry	----	----	
PZ4	05/08/03	07:52	28.47	17.78	10.69	----	
OX001S	06/27/02	15:13	33.38	17.85	15.53	----	
OX001S	08/26/02	16:45	33.38	18.75	14.63	----	
OX001S	11/13/02	08:30	33.38	19.92	13.46	----	
OX001S	02/11/03	09:59	33.38	16.96	16.42	----	
OX001S	05/08/03	08:04	33.38	16.48	16.90	----	
OX002S	06/27/02	15:12	28.69	13.22	15.47	----	
OX002S	08/26/02	16:44	28.69	14.26	14.43	----	
OX002S	11/13/02	08:33	28.81	15.39	13.42	----	New reference elevation September 2002
OX002S	02/11/03	10:06	28.81	12.39	16.42	----	
OX002S	05/08/03	08:09	28.81	11.90	16.91	----	
OX003S	06/27/02	15:14	30.01	14.65	15.36	----	
OX003S	08/26/02	16:42	30.01	15.50	14.51	----	
OX003S	11/13/02	08:31	30.01	16.65	13.36	----	
OX003S	02/11/03	09:58	30.01	13.78	16.23	----	
OX003S	05/08/03	08:03	30.01	13.30	16.71	----	
OX004S	06/27/02	15:15	33.42	19.07	14.35	----	
OX004S	08/26/02	16:39	33.42	19.74	13.68	----	
OX004S	11/13/02	08:24	33.54	20.73	12.81	----	New reference elevation September 2002
OX004S	02/11/03	09:38	33.54	18.39	15.15	----	
OX004S	05/08/03	07:47	33.54	19.07	14.47	----	
Deep Wells:							
B2	08/11/93	10:02	30.31	25.44	4.87	----	Slight sheen, slight to mod solvent-like odor
B2	10/26/93	13:32	30.31	25.25	5.06	----	
B2	11/17/93	13:32	30.31	25.23	5.08	----	
B2	12/17/93	12:59	30.31	23.88	6.43	----	
B2	01/17/94	13:12	30.31	23.99	6.32	----	
B2	02/18/94	14:20	30.31	23.73	6.58	----	
B2	03/18/94	12:59	30.31	23.15	7.16	----	
B2	04/18/94	14:42	30.31	24.35	5.96	----	
B2	05/18/94	15:22	30.31	23.12	7.19	----	
B2	06/17/94	14:54	30.31	22.90	7.41	----	
B2	07/19/94	09:20	30.31	24.38	5.93	----	
B2	08/17/94	07:35	30.31	25.22	5.09	----	
B2	09/16/94	07:27	30.31	25.89	4.42	----	
B2	10/17/94	09:03	30.31	25.43	4.88	----	
B2	11/21/94	11:51	30.31	24.56	5.75	----	
B2	12/19/94	11:10	30.31	21.82	8.49	----	
B2	01/18/95	11:18	30.31	18.93	11.38	----	
B2	02/21/95	13:23	30.31	17.12	13.19	----	
B2	03/21/95	13:05	30.31	20.37	9.94	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
B2	04/19/95	12:48	30.31	21.21	9.10	----	
B2	05/19/95	13:38	30.31	19.30	11.01	----	
B2	07/17/95	13:55	30.31	22.72	7.59	----	
B2	08/22/95	07:53	30.31	24.42	5.89	----	
B2	09/22/95	08:28	30.31	25.28	5.03	----	
B2	11/20/95	07:57	30.31	22.02	8.29	----	
B2	12/01/95	08:29	30.31	13.63	16.68	----	
B2	12/19/95	07:26	30.31	15.57	14.74	----	
B2	01/19/96	08:38	30.31	16.48	13.83	----	
B2	02/20/96	10:42	30.31	10.63	19.68	----	
B2	03/19/96	09:23	30.31	16.61	13.70	----	
B2	04/19/96	11:53	30.31	16.20	14.11	----	
B2	07/22/96	14:24	30.31	22.29	8.02	----	
B2	08/20/96	14:20	30.31	23.43	6.88	----	
B2	09/24/96	08:11	30.31	24.30	6.01	----	
B2	10/28/96	11:09	30.31	23.76	6.55	----	
B2	12/13/96	10:47	30.31	16.70	13.61	----	
B2	03/25/97	12:02	30.31	15.85	14.46	----	
B2	03/31/97	09:27	30.31	14.91	15.40	----	
B2	07/16/97	07:45	30.31	19.91	10.40	----	
B2	10/21/97	16:30	30.31	23.56	6.75	----	
B2	01/27/98	12:06	30.31	19.32	10.99	----	
B2	05/18/98	17:54	30.31	18.80	11.51	----	
B2	08/17/98	10:23	30.31	24.38	5.93	----	
B2	11/13/98	10:17	30.31	25.33	4.98	----	
B2	02/16/99	13:34	30.31	19.64	10.67	----	
B2	05/18/99	15:50	30.31	19.04	11.27	----	
B2	09/21/99	12:18	30.31	25.34	4.97	----	
B2	12/06/99	14:39	30.31	20.25	10.06	----	
B2	02/16/00	10:56	30.31	20.57	9.74	----	
B2	05/23/00	17:33	30.31	20.99	9.32	----	
B2	08/29/00	14:20	30.31	25.38	4.93	----	
B2	11/09/00	13:29	30.31	25.31	5.00	----	
B2	02/12/01	15:27	30.31	24.62	5.69	----	
B2	06/04/01	13:04	30.31	24.84	5.47	----	
B2	08/16/01	11:58	30.31	26.75	3.56	----	
B2	11/28/01	12:46	30.31	24.14	6.17	----	
B2	02/27/02	14:35	30.31	22.90	7.41	----	
B2	06/27/02	15:07	30.31	20.16	10.15	----	
B2	08/26/02	17:01	30.31	25.32	4.99	----	
B2	11/13/02	09:03	30.31	25.28	5.03	----	
B2	02/11/03	10:14	30.31	23.58	6.73	----	
B2	05/08/03	08:13	30.31	21.33	8.98	----	
G1A	03/25/97	11:55	29.72	14.84	14.88	----	
G1A	03/31/97	09:11	29.72	14.28	15.44	----	
G1A	07/16/97	07:33	29.72	18.94	10.78	----	
G1A	10/21/97	16:18	29.72	22.44	7.28	----	
G1A	01/27/98	11:46	29.72	18.42	11.30	----	
G1A	05/18/98	17:31	29.72	18.05	11.67	----	
G1A	08/17/98	10:07	29.72	23.35	6.37	----	
G1A	11/13/98	09:54	29.72	24.59	5.13	----	
G1A	02/16/99	13:14	29.72	18.28	11.44	----	
G1A	05/18/99	14:51	29.72	18.42	11.30	----	
G1A	09/21/99	11:29	29.72	24.32	5.40	----	
G1A	12/06/99	14:05	29.72	19.82	9.90	----	
G1A	02/16/00	10:18	29.72	19.81	9.91	----	
G1A	05/23/00	16:31	29.72	20.08	9.64	----	Replaced lock and tubing
G1A	08/29/00	13:13	29.72	24.36	5.36	----	
G1A	11/09/00	12:32	29.72	24.85	4.87	----	
G1A	02/12/01	16:01	29.72	24.08	5.64	----	
G1A	06/04/01	11:40	29.72	24.10	5.62	----	
G1A	08/16/01	10:52	29.72	25.51	4.21	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
G1A	11/28/01	11:32	29.72	23.84	5.88	----	
G1A	02/27/02	13:39	29.72	21.96	7.76	----	
G1A	06/27/02	14:17	29.72	19.48	10.24	----	
G1A	08/26/02	16:06	29.72	24.36	5.36	----	
G1A	11/13/02	07:35	29.72	24.60	5.12	----	
G1A	02/11/03	08:59	29.72	22.32	7.40	----	
G1A	05/08/03	06:58	29.72	20.51	9.21	----	
J2	03/25/97	12:18	29.65	15.22	14.43	----	
J2	03/31/97	11:21	29.65	14.38	15.27	----	
J2	07/16/97	08:24	29.65	19.28	10.37	----	
J2	10/21/97	17:00	29.65	23.02	6.63	----	
J2	01/27/98	13:19	29.65	18.69	10.96	----	
J2	05/18/98	18:00	29.65	18.14	11.51	----	
J2	08/17/98	10:21	29.65	23.70	5.95	----	
J2	11/13/98	10:28	29.65	24.64	5.01	----	
J2	02/16/99	13:40	29.65	19.00	10.65	----	
J2	05/18/99	15:46	29.65	18.40	11.25	----	
J2	09/21/99	12:30	29.65	24.73	4.92	----	
J2	12/06/99	15:08	29.65	19.53	10.12	----	
J2	02/16/00	11:07	29.65	19.89	9.76	----	
J2	05/23/00	17:28	29.65	20.33	9.32	----	
J2	08/29/00	14:15	29.65	24.67	4.98	----	
J2	11/09/00	13:26	29.65	24.66	4.99	----	
J2	02/12/01	15:23	29.65	23.92	5.73	----	
J2	06/04/01	13:02	29.65	24.17	5.48	----	
J2	08/16/01	11:51	29.65	25.57	4.08	----	
J2	11/28/01	12:36	29.65	23.45	6.20	----	
J2	02/27/02	14:31	29.65	22.21	7.44	----	
J2	06/27/02	15:03	29.65	19.48	10.17	----	
J2	08/26/02	16:56	29.65	24.67	4.98	----	
J2	11/13/02	08:59	29.65	24.60	5.05	----	
J2	02/11/03	10:19	29.65	22.95	6.70	----	
J2	05/08/03	08:16	29.65	20.65	9.00	----	
J3	03/25/97	12:20	29.58	14.70	14.88	----	
J3	03/31/97	11:25	29.58	14.03	15.55	----	
J3	07/16/97	08:25	29.58	18.91	10.67	----	
J3	10/21/97	17:02	29.58	22.37	7.21	----	
J3	01/27/98	13:21	29.58	18.28	11.30	----	
J3	05/18/98	17:58	29.58	17.84	11.74	----	
J3	08/17/98	10:22	29.58	23.12	6.46	----	
J3	11/13/98	10:26	29.58	24.14	5.44	----	
J3	02/16/99	13:41	29.58	18.32	11.26	----	
J3	05/18/99	15:48	29.58	18.01	11.57	----	
J3	09/21/99	12:31	29.58	24.12	5.46	----	
J3	12/06/99	15:09	29.58	19.31	10.27	----	
J3	02/16/00	10:07	29.58	19.50	10.08	----	
J3	05/23/00	17:29	29.58	19.86	9.72	----	
J3	08/29/00	14:17	29.58	24.05	5.53	----	
J3	11/09/00	13:27	29.58	24.24	5.34	----	
J3	02/12/01	15:24	29.58	23.45	6.13	----	
J3	06/04/01	12:44	29.58	23.62	5.96	----	
J3	08/16/01	11:50	29.58	24.98	4.60	----	
J3	11/28/01	12:37	29.58	22.98	6.60	----	
J3	02/27/02	14:32	29.58	21.52	8.06	----	
J3	06/27/02	15:04	29.58	19.14	10.44	----	
J3	08/26/02	16:57	29.58	23.99	5.59	----	
J3	11/13/02	08:58	29.58	24.10	5.48	----	
J3	02/11/03	10:20	29.58	22.28	7.30	----	
J3	05/08/03	08:17	29.58	20.16	9.42	----	
O	03/25/97	11:40	32.03	17.01	15.02	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
O	03/31/97	08:48	32.03	16.39	15.64	----	
O	07/16/97	07:05	32.03	21.93	10.10	----	
O	10/21/97	16:01	32.03	22.23	9.80	----	
O	01/27/98	11:03	32.03	20.51	11.52	----	
O	05/18/98	17:14	32.03	20.25	11.78	----	
O	08/17/98	10:13	32.03	25.42	6.61	----	
O	11/13/98	09:31	32.03	26.49	5.54	----	
O	02/16/99	12:45	32.03	20.25	11.78	----	
O	05/18/99	14:36	32.03	21.23	10.80	----	
O	09/21/99	11:09	32.03	26.22	5.81	----	
O	12/06/99	13:48	32.03	21.90	10.13	----	
O	02/16/00	10:04	32.03	22.21	9.82	----	
O	05/23/00	16:15	32.03	22.18	9.85	----	
O	08/29/00	12:56	32.03	26.49	5.54	----	
O	11/09/00	12:18	32.03	27.01	5.02	----	
O	02/12/01	15:52	32.03	26.12	5.91	----	
O	06/04/01	11:22	32.03	26.08	5.95	----	
O	08/16/01	10:22	32.03	27.58	4.45	----	
O	11/28/01	11:18	32.03	26.15	5.88	----	
O	02/27/02	13:15	32.03	24.08	7.95	----	
O	06/27/02	14:09	32.03	21.29	10.74	----	
O	08/26/02	15:47	32.03	25.91	6.12	----	
O	11/13/02	07:21	32.03	26.56	5.47	----	
O	02/11/03	08:38	32.03	22.81	9.22	----	
O	05/08/03	06:44	32.03	22.70	9.33	----	
R	03/25/97	11:36	30.47	15.56	14.91	----	
R	03/31/97	08:43	30.47	14.85	15.62	----	
R	07/16/97	07:00	30.47	20.37	10.10	----	
R	10/21/97	15:56	30.47	22.54	7.93	----	
R	01/27/98	10:57	30.47	18.98	11.49	----	
R	05/18/98	17:15	30.47	18.73	11.74	----	
R	08/17/98	10:12	30.47	23.93	6.54	----	
R	11/13/98	09:35	30.47	25.17	5.30	----	
R	02/16/99	13:05	30.47	18.79	11.68	----	
R	05/18/99	14:37	30.47	19.64	10.83	----	
R	09/21/99	11:15	30.47	24.53	5.94	----	
R	12/06/99	13:46	30.47	20.33	10.14	----	
R	02/16/00	10:12	30.47	20.65	9.82	----	
R	05/23/00	16:17	30.47	20.64	9.83	----	
R	08/29/00	12:58	30.47	24.97	5.50	----	
R	11/09/00	12:20	30.47	25.47	5.00	----	
R	02/12/01	15:54	30.47	24.46	6.01	----	
R	06/04/01	11:36	30.47	24.53	5.94	----	
R	08/16/01	10:35	30.47	26.02	4.45	----	
R	11/28/01	11:19	30.47	24.57	5.90	----	
R	02/27/02	13:17	30.47	22.50	7.97	----	
R	06/27/02	14:08	30.47	19.75	10.72	----	
R	08/26/02	15:58	30.47	24.38	6.09	----	
R	11/13/02	07:22	30.47	25.04	5.43	----	
R	02/11/03	08:41	30.47	21.22	9.25	----	
R	05/08/03	06:46	30.47	21.14	9.33	----	
LW001D	03/31/97	11:11	28.31	12.71	15.60	----	
LW001D	07/16/97	08:12	28.31	17.65	10.66	----	
LW001D	10/21/97	16:55	28.31	21.29	7.02	----	
LW001D	01/27/98	13:07	28.31	17.06	11.25	----	
LW001D	05/18/98	17:39	28.31	16.53	11.78	----	
LW001D	08/17/98	10:30	28.31	21.82	6.49	----	
LW001D	11/13/98	10:01	28.31	22.77	5.54	----	
LW001D	02/16/99	13:21	28.31	17.30	11.01	----	
LW001D	05/18/99	15:36	28.31	16.76	11.55	----	
LW001D	09/21/99	12:12	28.31	22.91	5.40	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW001D	12/06/99	14:34	28.31	18.00	10.31	----	
LW001D	02/16/00	10:49	28.31	18.16	10.15	----	
LW001D	05/23/00	17:19	28.31	18.62	9.69	----	
LW001D	08/29/00	13:59	28.31	22.81	5.50	----	
LW001D	11/09/00	13:20	28.31	22.98	5.33	----	
LW001D	02/12/01	15:35	28.31	22.23	6.08	----	
LW001D	06/04/01	12:23	28.31	22.36	5.95	----	
LW001D	08/16/01	11:38	28.31	23.73	4.58	----	
LW001D	11/28/01	12:29	28.31	21.73	6.58	----	
LW001D	02/27/02	14:17	28.31	20.31	8.00	----	
LW001D	06/27/02	14:49	28.31	17.81	10.50	----	
LW001D	08/26/02	17:12	28.31	22.85	5.46	----	
LW001D	11/13/02	09:08	28.31	22.91	5.40	----	
LW001D	02/11/03	10:27	28.31	21.11	7.20	----	
LW001D	05/08/03	08:19	28.31	18.91	9.40	----	
LW003D	03/31/97	11:45	30.80	19.38	11.42	----	Time estimated
LW003D	07/16/97	08:38	30.80	28.09	2.71	----	
LW003D	10/21/97	17:07	30.80	23.36	7.44	----	
LW003D	01/27/98	13:30	30.80	21.66	9.14	----	
LW003D	05/18/98	17:35	30.80	19.21	11.59	----	
LW003D	08/17/98	10:24	30.80	24.62	6.18	----	
LW003D	11/13/98	09:03	30.80	25.56	5.24	----	
LW003D	02/16/99	13:44	30.80	20.00	10.80	----	
LW003D	05/18/99	15:58	30.80	19.42	11.38	----	Purged dry at 11:00
LW003D	09/21/99	10:40	30.80	25.76	5.04	----	
LW003D	12/06/99	14:45	30.80	20.69	10.11	----	
LW003D	02/16/00	09:54	30.80	20.98	9.82	----	
LW003D	05/23/00	14:40	30.80	21.16	9.64	----	Purged dry at 13:10
LW003D	08/29/00	14:36	30.80	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW003D	11/09/00		30.80	----	----	----	Well sampled 11/8/00 - water level not representative
LW003D	02/12/01	15:11	30.80	24.85	5.95	----	
LW003D	06/04/01	12:35	30.80	25.09	5.71	----	
LW003D	08/16/01	11:47	30.80	26.43	4.37	----	
LW003D	11/28/01	12:42	30.80	24.48	6.32	----	
LW003D	02/27/02	14:20	30.80	23.13	7.67	----	
LW003D	06/27/02	14:59	30.80	20.55	10.25	----	
LW003D	08/26/02	17:03	30.80	25.63	5.17	----	
LW003D	11/13/02	09:20	30.80	25.57	5.23	----	
LW003D	02/11/03	10:40	30.80	24.03	6.77	----	
LW003D	05/08/03	08:29	30.80	21.68	9.12	----	
LW004D	03/31/97	09:18	30.17	14.73	15.44	----	
LW004D	07/16/97	07:42	30.17	19.43	10.74	----	
LW004D	10/21/97	16:27	30.17	23.02	7.15	----	
LW004D	01/27/98	11:56	30.17	18.84	11.33	----	
LW004D	05/18/98	17:33	30.17	18.54	11.63	----	
LW004D	08/17/98	10:18	30.17	23.81	6.36	----	
LW004D	11/13/98	09:57	30.17	24.99	5.18	----	
LW004D	02/16/99	13:17	30.17	18.79	11.38	----	
LW004D	05/18/99	15:04	30.17	18.77	11.40	----	Completed sampling at 13:40
LW004D	09/21/99	11:41	30.17	24.78	5.39	----	
LW004D	12/06/99	14:18	30.17	20.21	9.96	----	
LW004D	02/16/00	10:30	30.17	20.23	9.94	----	
LW004D	05/23/00	16:54	30.17	20.55	9.62	----	
LW004D	08/29/00	13:38	30.17	24.78	5.39	----	
LW004D	11/09/00	12:52	30.17	25.19	4.98	----	
LW004D	02/12/01	16:39	30.17	24.71	5.46	----	
LW004D	06/04/01	12:07	30.17	24.66	5.51	----	
LW004D	08/16/01	11:15	30.17	26.27	3.90	----	
LW004D	11/28/01	12:04	30.17	24.41	5.76	----	
LW004D	02/27/02	14:00	30.17	22.65	7.52	----	
LW004D	03/05/02	11:36	30.17	22.94	7.23	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW004D	04/05/02	08:19	30.17	23.75	6.42	----	
LW004D	05/29/02	00:00	30.17	20.48	9.69	----	
LW004D	06/27/02	14:41	30.17	20.15	10.02	----	
LW004D	08/26/02	16:32	30.17	25.02	5.15	----	
LW004D	11/13/02	08:23	30.17	25.26	4.91	----	
LW004D	02/11/03	09:32	30.17	23.08	7.09	----	
LW004D	05/08/03	07:44	30.17	21.21	8.96	----	
LW006D	03/25/97	11:52	30.84	16.51	14.33	----	
LW006D	03/31/97	09:05	30.84	15.53	15.31	----	Faint odor
LW006D	07/16/97	07:30	30.84	20.74	10.10	----	
LW006D	10/21/97	16:16	30.84	24.05	6.79	----	
LW006D	01/27/98	11:38	30.84	19.94	10.90	----	
LW006D	05/18/98	17:28	30.84	19.36	11.48	----	
LW006D	08/17/98	10:05	30.84	24.92	5.92	----	
LW006D	11/13/98	09:50	30.84	25.94	4.90	----	
LW006D	02/16/99	13:11	30.84	20.40	10.44	----	
LW006D	05/18/99	14:53	30.84	19.81	11.03	----	
LW006D	09/21/99	11:32	30.84	25.92	4.92	----	
LW006D	12/06/99	14:09	30.84	20.86	9.98	----	
LW006D	02/16/00	10:20	30.84	21.27	9.57	----	
LW006D	05/23/00	16:35	30.84	21.64	9.20	----	
LW006D	08/29/00	13:20	30.84	25.93	4.91	----	
LW006D	11/09/00	12:35	30.84	26.21	4.63	----	
LW006D	02/12/01	16:03	30.84	25.37	5.47	----	
LW006D	06/04/01	11:42	30.84	25.30	5.54	----	
LW006D	08/16/01	10:54	30.84	26.72	4.12	----	
LW006D	11/28/01	11:46	30.84	24.92	5.92	----	
LW006D	02/27/02	13:35	30.84	23.62	7.22	----	
LW006D	06/27/02	14:19	30.84	20.68	10.16	----	
LW006D	08/26/02	16:04	30.84	25.79	5.05	----	
LW006D	11/13/02	07:42	30.84	25.82	5.02	----	
LW006D	02/11/03	09:01	30.84	24.08	6.76	----	
LW006D	05/08/03	07:01	30.84	21.97	8.87	----	
LW009D	05/18/99	14:56	30.98	20.02	10.96	----	
LW009D	09/21/99	11:34	30.98	25.23	5.75	----	
LW009D	12/06/99	14:11	30.98	21.04	9.94	----	
LW009D	02/16/00	10:23	30.98	21.17	9.81	----	
LW009D	05/23/00	16:39	30.98	21.15	9.83	----	
LW009D	08/29/00	13:27	30.98	25.36	5.62	----	
LW009D	11/09/00	12:43	30.98	25.96	5.02	----	
LW009D	02/12/01	16:11	30.98	25.13	5.85	----	
LW009D	06/04/01	11:49	30.98	25.15	5.83	----	
LW009D	08/16/01	11:02	30.98	26.57	4.41	----	
LW009D	11/28/01	11:53	30.98	25.40	5.58	----	
LW009D	02/27/02	13:47	30.98	22.97	8.01	----	
LW009D	06/27/02	14:25	30.98	20.38	10.60	----	
LW009D	08/26/02	16:11	30.98	24.90	6.08	----	
LW009D	11/13/02	07:48	30.98	25.73	5.25	----	
LW009D	02/11/03	09:07	30.98	22.03	8.95	----	
LW009D	05/08/03	07:12	30.98	21.65	9.33	----	
LW010D	05/18/99	15:00	31.12	19.82	11.30	----	
LW010D	09/21/99	11:37	31.12	25.81	5.31	----	
LW010D	12/06/99	14:15	31.12	21.18	9.94	----	
LW010D	02/16/00	10:27	31.12	21.20	9.92	----	
LW010D	05/23/00	16:42	31.12	21.51	9.61	----	
LW010D	08/29/00	13:29	31.12	25.86	5.26	----	
LW010D	11/09/00	12:46	31.12	26.26	4.86	----	
LW010D	02/12/01	16:15	31.12	25.63	5.49	----	
LW010D	06/04/01	11:52	31.12	25.62	5.50	----	
LW010D	08/16/01	11:04	31.12	27.16	3.96	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW010D	11/28/01	11:55	31.12	25.46	5.66	----	
LW010D	02/27/02	13:49	31.12	23.58	7.54	----	
LW010D	06/27/02	14:29	31.12	21.03	10.09	----	
LW010D	08/26/02	16:17	31.12	25.91	5.21	----	
LW010D	11/13/02	08:01	31.12	26.17	4.95	----	
LW010D	02/11/03	09:21	31.12	23.83	7.29	----	
LW010D	05/08/03	07:33	31.12	22.10	9.02	----	
LW011D	05/18/99	15:09	29.04	18.59	10.45	----	
LW011D	09/21/99	11:50	29.04	20.76	8.28	----	
LW011D	12/06/99	15:06	29.04	21.81	7.23	----	
LW011D	02/16/00	11:02	29.04	20.35	8.69	----	
LW011D	05/23/00	17:37	29.04	19.50	9.54	----	
LW011D	08/29/00	14:54	29.04	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW011D	11/09/00		29.04	----	----	----	Well sampled 11/8/00 - water level not representative
LW011D	02/12/01	15:16	29.04	23.14	5.90	----	
LW011D	06/04/01	13:11	29.04	23.35	5.69	----	
LW011D	08/16/01	11:25	29.04	26.94	2.10	----	
LW011D	11/28/01	12:53	29.04	24.54	4.50	----	
LW011D	02/27/02	14:57	29.04	21.80	7.24	----	
LW011D	06/27/02	15:11	29.04	18.84	10.20	----	
LW011D	08/26/02	16:47	29.04	22.71	6.33	----	
LW011D	11/13/02	08:55	29.04	23.87	5.17	----	
LW011D	02/11/03	10:04	29.04	21.79	7.25	----	
LW011D	05/08/03	08:08	29.04	19.28	9.76	----	
LW012D1	05/18/99	15:13	30.02	18.45	11.57	----	
LW012D1	09/21/99	11:54	30.02	24.44	5.58	----	
LW012D1	12/06/99	14:21	30.02	19.72	10.30	----	
LW012D1	02/16/00	10:35	30.02	19.89	10.13	----	
LW012D1	05/23/00	17:00	30.02	20.23	9.79	----	
LW012D1	08/29/00	13:45	30.02	24.38	5.64	----	
LW012D1	11/09/00	13:00	30.02	24.66	5.36	----	
LW012D1	02/12/01	15:57	30.02	23.92	6.10	----	
LW012D1	06/04/01	12:32	30.02	23.99	6.03	----	
LW012D1	08/16/01	11:42	30.02	25.39	4.63	----	
LW012D1	11/28/01	12:38	30.02	23.33	6.69	----	
LW012D1	02/27/02	14:28	30.02	21.88	8.14	----	
LW012D1	06/27/02	14:57	30.02	19.58	10.44	----	
LW012D1							Abandoned August 2003
LW012D2	05/18/99	15:14	29.24	18.23	11.01	----	
LW012D2	09/21/99	11:53	29.24	24.69	4.55	----	
LW012D2	12/06/99	14:22	29.24	19.40	9.84	----	
LW012D2	02/16/00	10:36	29.24	19.90	9.34	----	
LW012D2	05/23/00	16:59	29.24	20.38	8.86	----	
LW012D2	08/29/00	13:44	29.24	24.68	4.56	----	
LW012D2	11/09/00	13:01	29.24	24.56	4.68	----	
LW012D2	02/12/01	15:56	29.24	23.88	5.36	----	
LW012D2	06/04/01	12:31	29.24	24.10	5.14	----	
LW012D2	08/16/01	11:43	29.24	25.43	3.81	----	
LW012D2	11/28/01	12:39	29.24	23.17	6.07	----	
LW012D2	02/27/02	14:29	29.24	22.38	6.86	----	
LW012D2	06/27/02	14:58	29.24	19.44	9.80	----	
LW012D2							Abandoned August 2003
LW014D	05/23/00	16:50	30.54	21.26	9.28	----	
LW014D	08/29/00	13:35	30.54	25.68	4.86	----	
LW014D	11/09/00	12:49	30.54	25.90	4.64	----	
LW014D	02/12/01	16:20	30.54	25.33	5.21	----	
LW014D	06/04/01	12:00	30.54	25.37	5.17	----	
LW014D	08/16/01	11:08	30.54	27.00	3.54	----	
LW014D	11/28/01	11:56	30.54	25.03	5.51	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW014D	02/27/02	13:55	30.54	23.57	6.97	----	
LW014D	06/27/02	14:33	30.54	20.70	9.84	----	
LW014D	08/26/02	16:26	30.54	25.90	4.64	----	
LW014D	11/13/02	08:07	30.54	25.76	4.78	----	
LW014D	02/11/03	09:27	30.54	24.33	6.21	----	
LW014D	05/08/03	07:38	30.54	21.92	8.62	----	
LW015D	05/23/00	16:49	30.85	21.26	9.59	----	
LW015D	08/29/00	13:34	30.85	25.54	5.31	----	
LW015D	11/09/00	12:48	30.85	25.98	4.87	----	
LW015D	02/12/01	16:18	30.85	25.43	5.42	----	
LW015D	06/04/01	11:59	30.85	25.41	5.44	----	
LW015D	08/16/01	11:07	30.85	27.05	3.80	----	
LW015D	11/28/01	11:55	30.85	25.29	5.56	----	
LW015D	02/27/02	13:52	30.85	23.42	7.43	----	
LW015D	06/27/02	14:32	30.85	20.91	9.94	----	
LW015D	08/26/02	16:25	30.85	25.77	5.08	----	
LW015D	11/13/02	08:05	30.85	26.04	4.81	----	
LW015D	02/11/03	09:23	30.85	23.65	7.20	----	
LW015D	05/08/03	07:37	30.85	21.95	8.90	----	
LW016D	05/23/00	16:48	28.40	18.79	9.61	----	
LW016D	08/29/00	13:32	28.40	23.07	5.33	----	
LW016D	11/09/00	12:47	28.40	23.59	4.81	----	
LW016D	02/12/01	16:17	28.40	22.94	5.46	----	
LW016D	06/04/01	11:57	28.40	23.00	5.40	----	
LW016D	08/16/01	11:05	28.40	24.43	3.97	----	
LW016D	11/28/01	11:57	28.40	22.87	5.53	----	
LW016D	02/27/02	13:54	28.40	20.94	7.46	----	
LW016D	06/27/02	14:31	28.40	18.46	9.94	----	
LW016D	08/26/02	16:23	28.40	23.24	5.16	----	
LW016D	11/13/02	08:08	28.40	23.45	4.95	----	
LW016D	02/11/03	09:25	28.40	21.14	7.26	----	
LW016D	05/08/03	07:36	28.40	19.65	8.75	----	
LW017D	08/29/00	13:21	27.82	22.96	4.86	----	
LW017D	11/09/00	12:36	27.82	23.17	4.65	----	
LW017D	02/12/01	16:04	27.82	22.44	5.38	----	
LW017D	06/04/01	11:44	27.82	22.42	5.40	----	
LW017D	08/16/01	10:55	27.82	23.80	4.02	----	
LW017D	11/28/01	11:50	27.82	22.00	5.82	----	
LW017D	02/27/02	13:37	27.82	19.82	8.00	----	
LW017D	03/05/02	11:30	27.82	20.46	7.36	----	
LW017D	04/05/02	08:15	27.82	21.34	6.48	----	
LW017D	05/29/02	00:00	27.82	17.90	9.92	----	
LW017D	06/27/02	14:20	27.82	17.64	10.18	----	
LW017D	08/26/02	16:07	27.82	22.67	5.15	----	
LW017D	11/13/02	07:45	27.82	22.80	5.02	----	
LW017D	02/11/03	09:03	27.82	20.79	7.03	----	
LW017D	05/08/03	07:05	27.82	18.82	9.00	----	
LW018D	08/29/00	13:25	27.82	22.79	5.03	----	
LW018D	11/09/00	12:40	27.82	22.91	4.91	----	
LW018D	02/12/01	16:10	27.82	22.56	5.26	----	
LW018D	06/04/01	11:47	27.82	22.28	5.54	----	
LW018D	08/16/01	11:00	27.82	23.81	4.01	----	
LW018D	11/28/01	11:51	27.82	22.00	5.82	----	
LW018D	02/27/02	13:43	27.82	20.44	7.38	----	
LW018D	06/27/02	14:23	27.82	17.72	10.10	----	
LW018D	08/26/02	16:13	27.82	21.90	5.92	----	
LW018D	11/13/02	07:51	27.82	22.71	5.11	----	
LW018D	02/11/03	09:05	27.82	20.95	6.87	----	
LW018D	05/08/03	07:10	27.82	18.75	9.07	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
RW2	05/18/99	15:02	30.68	19.50	11.18	----	
RW2	09/21/99	11:40	30.68	25.75	4.93	----	
RW2	12/06/99	14:17	30.68	20.77	9.91	----	
RW2	02/16/00	10:29	30.68	20.99	9.69	----	
RW2	05/23/00	16:52	30.68	21.37	9.31	----	
RW2	08/29/00	13:36	30.68	25.36	5.32	----	
RW2	11/09/00	12:50	30.68	25.83	4.85	----	Groundwater interim action pumping began 10/5/00 in the lower zone at this well. Pump not running at time of measurement.
RW2	02/12/01	16:37	30.68	26.40	4.28	----	
RW2	06/04/01	12:05	30.68	26.26	4.42	----	
RW2	08/16/01	11:11	30.68	28.98	1.70	----	
RW2	11/28/01	12:02	30.68	26.86	3.82	----	
RW2	02/27/02	13:57	30.68	26.02	4.66	----	
RW2	06/27/02	14:35	30.68	23.68	7.00	----	
RW2	08/26/02	16:29	30.68	28.26	2.42	----	
RW2	11/13/02	08:20	30.68	28.50	2.18	----	
RW2	02/11/03	09:29	30.68	26.96	3.72	----	
RW2	05/07/03	17:30	30.68	24.80	5.88	----	Date of measurement is groundwater sampling date
RIVER_GAUGE	08/11/93	12:57	28.13	24.90	3.23	----	
RIVER_GAUGE	10/26/93	13:17	28.13	25.27	2.86	----	
RIVER_GAUGE	11/17/93	13:21	28.13	24.18	3.95	----	
RIVER_GAUGE	12/17/93	12:46	28.13	22.48	5.65	----	
RIVER_GAUGE	01/17/94	12:58	28.13	22.90	5.23	----	
RIVER_GAUGE	02/18/94	14:10	28.13	22.30	5.83	----	
RIVER_GAUGE	03/18/94	12:48	28.13	21.70	6.43	----	
RIVER_GAUGE	04/18/94	14:34	28.13	23.50	4.63	----	
RIVER_GAUGE	05/18/94	15:14	28.13	21.80	6.33	----	
RIVER_GAUGE	06/17/94	14:45	28.13	21.32	6.81	----	
RIVER_GAUGE	07/19/94	09:10	28.13	23.25	4.88	----	
RIVER_GAUGE	08/17/94	07:26	28.13	24.00	4.13	----	
RIVER_GAUGE	09/16/94	07:30	28.13	24.66	3.47	----	
RIVER_GAUGE	10/17/94	08:58	28.13	24.10	4.03	----	
RIVER_GAUGE	11/21/94	11:43	28.13	23.20	4.93	----	
RIVER_GAUGE	12/19/94	10:58	28.13	19.95	8.18	----	
RIVER_GAUGE	01/18/95	11:04	28.13	16.70	11.43	----	
RIVER_GAUGE	02/21/95	13:14	28.13	14.65	13.48	----	
RIVER_GAUGE	03/21/95	12:58	28.13	18.90	9.23	----	
RIVER_GAUGE	04/19/95	12:37	28.13	19.80	8.33	----	
RIVER_GAUGE	05/19/95	13:22	28.13	17.40	10.73	----	
RIVER_GAUGE	07/17/95	13:48	28.13	22.00	6.13	----	
RIVER_GAUGE	08/22/95	07:45	28.13	23.24	4.89	----	
RIVER_GAUGE	09/22/95	08:19	28.13	24.26	3.87	----	
RIVER_GAUGE	11/20/95	07:50	28.13	20.20	7.93	----	
RIVER_GAUGE	12/01/95	08:23	28.13	8.45	19.68	----	
RIVER_GAUGE	12/19/95	07:11	28.13	14.10	14.03	----	
RIVER_GAUGE	01/19/96	08:29	28.13	14.06	14.07	----	
RIVER_GAUGE	02/20/96	10:36	28.13	8.00	20.13	----	
RIVER_GAUGE	03/19/96	09:15	28.13	15.95	12.18	----	
RIVER_GAUGE	04/19/96	11:45	28.13	13.95	14.18	----	
RIVER_GAUGE	07/22/96	14:18	28.13	22.00	6.13	----	
RIVER_GAUGE	07/22/96	15:05	28.13	22.20	5.93	----	
RIVER_GAUGE	08/20/96	14:09	28.13	22.80	5.33	----	
RIVER_GAUGE	08/20/96	15:10	28.13	23.00	5.13	----	
RIVER_GAUGE	09/24/96	07:55	28.13	23.41	4.72	----	
RIVER_GAUGE	09/24/96	10:15	28.13	24.25	3.88	----	
RIVER_GAUGE	10/28/96	10:53	28.13	22.95	5.18	----	
RIVER_GAUGE	10/28/96	12:12	28.13	23.21	4.92	----	
RIVER_GAUGE	12/13/96	12:09	28.13	14.50	13.63	----	
RIVER_GAUGE	03/25/97	11:33	28.13	14.60	13.53	----	
RIVER_GAUGE	03/31/97		28.13	----	----	----	Locked

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
RIVER_GAUGE	07/16/97	06:55	28.13	18.73	9.40	----	
RIVER_GAUGE	07/16/97	07:55	28.13	18.84	9.29	----	
RIVER_GAUGE	07/16/97	09:14	28.13	18.92	9.21	----	
RIVER_GAUGE	10/21/97	15:52	28.13	23.38	4.75	----	
RIVER_GAUGE	10/21/97	16:11	28.13	23.44	4.69	----	
RIVER_GAUGE	10/21/97	17:55	28.13	23.59	4.54	----	
RIVER_GAUGE	01/27/98	10:46	28.13	18.20	9.93	----	
RIVER_GAUGE	01/27/98	12:25	28.13	18.31	9.82	----	
RIVER_GAUGE	01/27/98	13:56	28.13	17.89	10.24	----	
RIVER_GAUGE	05/18/98	17:12	28.13	16.97	11.16	----	
RIVER_GAUGE	05/18/98	17:45	28.13	17.15	10.98	----	
RIVER_GAUGE	08/17/98	09:58	28.13	23.98	4.15	----	
RIVER_GAUGE	08/17/98	10:34	28.13	24.15	3.98	----	
RIVER_GAUGE	11/13/98	09:30	28.13	24.64	3.49	----	
RIVER_GAUGE	11/13/98	10:05	28.13	24.45	3.68	----	
RIVER_GAUGE	02/16/99	12:40	28.13	19.36	8.77	----	
RIVER_GAUGE	02/16/99	13:27	28.13	19.43	8.70	----	
RIVER_GAUGE	05/18/99	14:33	28.13	17.24	10.89	----	
RIVER_GAUGE	05/18/99	15:19	28.13	17.30	10.83	----	
RIVER_GAUGE	09/21/99	11:10	28.13	24.94	3.19	----	
RIVER_GAUGE	09/21/99	11:59	28.13	25.03	3.10	----	
RIVER_GAUGE	12/06/99	13:43	28.13	18.24	9.89	----	
RIVER_GAUGE	12/06/99	14:25	28.13	18.06	10.07	----	
RIVER_GAUGE	02/16/00	10:03	28.13	19.18	8.95	----	
RIVER_GAUGE	02/16/00	10:41	28.13	19.07	9.06	----	
RIVER_GAUGE	05/23/00	16:12	28.13	19.80	8.33	----	
RIVER_GAUGE	05/23/00	17:04	28.13	19.94	8.19	----	
RIVER_GAUGE	08/29/00	12:54	28.13	24.63	3.50	----	
RIVER_GAUGE	08/29/00	13:49	28.13	24.91	3.22	----	
RIVER_GAUGE	11/09/00	12:19	28.13	24.26	3.87	----	
RIVER_GAUGE	11/09/00	13:10	28.13	23.67	4.46	----	
RIVER_GAUGE	02/12/01	15:45	28.13	23.75	4.38	----	
RIVER_GAUGE	02/12/01	16:43	28.13	24.00	4.13	----	
RIVER_GAUGE	06/04/01	11:20	28.13	23.62	4.51	----	
RIVER_GAUGE	06/04/01	12:15	28.13	23.79	4.34	----	
RIVER_GAUGE	08/16/01	10:20	28.13	24.83	3.30	----	
RIVER_GAUGE	08/16/01	11:29	28.13	25.23	2.90	----	
RIVER_GAUGE	11/28/01	11:16	28.13	22.50	5.63	----	
RIVER_GAUGE	11/28/01	12:18	28.13	23.13	5.00	----	
RIVER_GAUGE	02/27/02	13:11	28.13	22.24	5.89	----	
RIVER_GAUGE	02/27/02	14:12	28.13	22.27	5.86	----	
RIVER_GAUGE	03/05/02	11:25	28.13	21.42	6.71	----	
RIVER_GAUGE	04/05/02	08:00	28.13	23.10	5.03	----	
RIVER_GAUGE	05/29/02	14:07	28.13	17.31	10.82	----	
RIVER_GAUGE	06/27/02	14:07	28.13	18.31	9.82	----	
RIVER_GAUGE	06/27/02	14:43	28.13	18.36	9.77	----	
RIVER_GAUGE	08/26/02	15:45	28.13	24.83	3.30	----	
RIVER_GAUGE	08/26/02	16:13	28.13	24.85	3.28	----	
RIVER_GAUGE	11/13/02	07:19	28.13	24.10	4.03	----	
RIVER_GAUGE	11/13/02	07:54	28.13	24.21	3.92	----	
RIVER_GAUGE	02/11/03	08:34	28.13	23.70	4.43	----	
RIVER_GAUGE	02/11/03	09:14	28.13	23.43	4.70	----	
RIVER_GAUGE	05/08/03	06:40	28.13	20.02	8.11	----	
RIVER_GAUGE	05/08/03	07:17	28.13	20.00	8.13	----	

TABLE A-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - MAY 2003
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES

Notes:
NM = Not measured.
NA = Not available.
-- No measurable product or odor observed.
* Well Point
(a) Reference Elevation (Ref. Elev) is the north side of the top of the 1.25-, 2- or 4-inch well casing, reference elevation surveys were conducted by Zarosinski-Tatone Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.
(b) Depth to water (DTW) measured from surveyed reference elevation [see note (a)].
(c) Where LNAPL thickness measured, groundwater elevation adjusted to account for the presence of LNAPL in the well using the method in "Estimation of Free Hydrocarbon Volume from Fluid Levels in Monitoring Wells" [Lenhard and Parker 1990; *Groundwater* 28(1):57-67].

APPENDIX B

Groundwater Interim Action Recovery Summary

TABLE B-1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
UPPER AND LOWER WATER-BEARING ZONES
TIME OIL NORTHWEST TERMINAL

	RW-2 Discharge				HRW-1 Discharge				SDM-1 Discharge				Treatment System Discharge			
Monitoring Period	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	Comments
Fourth Quarter 2000																
October 2000	439,003			0.35									0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/9/2000	95	0.24									467,478	11/7/2000	ND (a)	
December 2000	348,720	12/20/2000	39	0.11									497,656	12/6/2000 12/20/2000	5.89 9.73	
Quarterly Totals	*1,093,324*			*0.70*									*965,134*			
First Quarter 2001																
January 2001	416,140	1/18/2001	38.8	0.13									239,207	1/18/2001	14.3	
February 2001	335,008	2/13/2001	30	0.08									184,192			
March 2001	332,963	3/7/2001	ND (b)	0.03									517,332	3/7/2001	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*									*940,731*			
Second Quarter 2001																
April 2001	377,931			0.04									275,519			
May 2001	344,252	5/22/2001	12.3	0.04									195,522	5/22/2001	5.29	
June 2001	361,846	6/4/2001	0.68	0.04									563,853			
Quarterly Totals	*1,084,029*			*0.11*									*1,034,894*			
Third Quarter 2001																
July 2001	351,509			0.01									559,015			
August 2001	486,123	8/13/2001	5	0.02									66,876			
Quarterly Totals	*837,632*			*0.03*									*625,891*			
Fourth Quarter 2001																
October 2001	393,168	10/11/2001	ND (a)	0.01									484,158	10/11/2001	ND (a)	
November 2001	319,798			0.01									118,786	11/1 & 11/15/01	ND (a)	
December 2001	361,058	12/6/2001	ND (c)	0.01									717,769	12/6/2001	ND (c)	
Quarterly Totals	*680,856*			*0.02*									*836,555*			
First Quarter 2002																
January 2002	331,224			0.02	1,812			0.01					340,688			Recovered groundwater from HRW-1 from January 22-29. Re-initiated groundwater recovery from HRW-1 on February 28.
February 2002	282,480	2/27/2002	8.6	0.02	58			0.00					437,943			HRW-1 mass removal estimates for January and February are based on the March 12 sampling event.
March 2002	280,814			0.02	40,294	3/12/2002	786	0.26					234,816			RW-2 mass removal estimates for January and March are based on February 27 sampling event.
Quarterly Totals	*894,518*			*0.06*	*42,164*			*0.28*					*1,013,447*			
Second Quarter 2002																
April 2002	292,099			0.19	74,996	4/5/2002	94	0.06					391,263	4/5/02 4/22/02	34.4 9.33	RW-2 mass removal estimates for April and May are based on June 27 sampling event.
May 2002	310,584			0.20	23,427	5/29/2002	452	0.09					247,440			
June 2002	272,393	6/27/2002	76	0.17	25,484	6/25/2002	410	0.09					307,810			
Quarterly Totals	*875,076*			*0.56*	*123,907*			*0.23*					*946,513*			
Third Quarter 2002																
July 2002	272,771			0.08	51,111			0.18					188,300	7/24/2002	2.09	
August 2002	270,746	8/27/2002	36	0.08	7								301,613	8/20/2002	9.15	HRW-1 shut down on July 24 due to dry pumping conditions and potential biofouling of the well. HRW-1 mass removal rate estimate based on June 2002 data.
September 2002	143,662			0.04	0				110,000	9/23/2002	47.0		369,469	9/23/2002	11.8	RW-2 temporarily shut down on September 25. Water being intercepted from SDM-1 and pumped to treatment system beginning on September 16.
Quarterly Totals	*687,179*				*51,118*								*859,382*			RW-2 mass removal rates based on August 27 sampling event. Total Volume pumped from SDM-1 estimated based on throughout of WWTP and volume recovered from RW-2; Flowmeter to be installed for SDM-1 in October 2002.

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TABLE B-1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
UPPER AND LOWER WATER-BEARING ZONES
TIME OIL NORTHWEST TERMINAL

	RW-2 Discharge				HRW-1 Discharge				SDM-1 Discharge				Treatment System Discharge			
Monitoring Period	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	Comments
Fourth Quarter 2002																
October 2002	177,937			0.06	0				Not metered				112,129	10/3/2002	8.84	
November 2002	275,033	11/13/2002	37	0.09	0				95,157				399,747			The storage tank gauge was moved to groundwater sump SDM-1 on November 1.
December 2002	418,846			0.13	0				124,894				507,766			
Quarterly Totals	*871,816*				*0*								*1,019,642*			RW-2 mass removal rates based on November 13 sampling event.
First Quarter 2003																
January 2003	417,646			0.12	0				166,663			0.05	574,451	1/15/2003	11.6	
February 2003	398,299	2/11/2003	33	0.11	0				192,395	2/13/2003	290.00	0.06	483,579			
March 2003	458,160			0.13	0				210,400			0.06	624,807			SDM-1 mass removal rates based on February 13 sampling event.
Quarterly Totals	*1,140,149*				*51,118*				*95,157*				*1,371,258*			RW-2 mass removal rates based on February 11 sampling event.
Second Quarter 2003																
April 2003	445,275			0.04	0				55,037				481,816	4/9/2003	22.2	
May 2003	455,994	5/7/2003	12	0.05	0	Not Analyzed			0	5/7/2003	0.93		469,079			
June 2003	385,658			0.04	4,175				89,243				446,127			RW-2 mass removal rates based on April 8, 2003 sampling event.
Quarterly Totals	*1,286,927*				*4,175*				*144,280*				*1,397,022*			

ND = Not Detected.

(a) PCP not detected above the detection limit of 5 µg/L; concentration-dependent calculations based on half the detection limit.
(b) PCP not detected above the detection limit of 25 µg/L; concentration-dependent calculations based on half the detection limit.
(c) PCP not detected above the detection limit of 5.25 µg/L; concentration-dependent calculations based on half the detection limit.

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APPENDIX C

Measurement and Evaluation Procedures

APPENDIX C
MEASUREMENT AND EVALUATION PROCEDURES

This appendix discusses the procedures for conducting groundwater level and product (where observed) measurements during the quarterly groundwater events and the method used to evaluate the groundwater elevations.

MEASUREMENT PROCEDURES

Groundwater level measurements and the check for the presence of product were conducted using an electronic oil-water interface probe. Measurements were taken from the top of the PVC well casing at a marked survey point or at the north side of the casing, and recorded to the nearest 0.01 ft. Measurements in the Willamette River were taken from a surveyed PK nail with washer located on the south side of the dock. Surveyed reference elevations for each water level measurement location, obtained by a licensed land surveyor (ZTec Engineers, Inc., Portland, Oregon), are shown in Table A-2 of this report.

Water level measurements for the quarterly event were obtained over about a 2.5-hour period beginning at about 2.5 hours after a predicted mean river stage, based on predictions for the St. Johns station on the Willamette River. The timing for water level measurements was scheduled to estimate a mean water level elevation or elevation minimally influenced by river stage, and to reduce the time-dependent variation between wells screened in the same water-bearing zone. The timing of the water level measurements was based on average time lag calculations presented in the additional groundwater investigation technical memorandum (Landau Associates 1998), aquifer test report (Landau Associates 1999), and previous quarterly measurements.

GROUNDWATER LEVEL EVALUATION METHODS

For evaluation purposes, the groundwater level measurements were converted from depth-to-water readings to groundwater elevations using the survey information for each location. At locations where product was observed, the groundwater elevations were adjusted to account for the presence of product using the method defined by Lenhard and Parker (1990). Groundwater elevations for the upper and lower zones were contoured using GIS/Key or manually in conjunction with the evaluations conducted to evaluate the capture zone of the groundwater interim action for the upper and lower zones.

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GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected from the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, with the following exceptions: the sample from RW-2 was collected from the in-line sampling port on the groundwater interim action system, and the sample from the groundwater intercept system at SDM-1 was collected from the discharge line at the output into Tank 16804. Wells were purged using a peristaltic pump or a centrifugal purge pump. Purging continued until at least 3 casing volumes of water had been removed and specific conductance and temperature had stabilized or until the well purged dry. Four replicate measurements of field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing of volatile organic compounds during sampling, the pumping rate was maintained below about 100 milliliters per minute. All sampling was conducted in accordance with the Phase I/II RI/FS work plan (Landau Associates 1996) and appropriate provisions of the revised quality assurance project plan and project health and safety plan (Landau Associates 2001). A more detailed description of groundwater sampling procedures is provided in the Phase II RI report (Landau Associates 2000).

REFERENCES

Landau Associates. 2001. *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon.* June 18.

Landau Associates. 2000. Report: *Phase II Remedial Investigation, Time Oil Co. Northwest Terminal.* Prepared for: Time Oil Co., Seattle, Washington. April 6.

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Landau Associates. 1998. Technical Memorandum: *Additional Groundwater Investigation, January-February 1998, Time Oil Northwest Terminal, Portland, Oregon.* Prepared for: Oregon Department of Environmental Quality, Portland, Oregon. July 28.

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Lenhard and Parker. 1990. "Estimation of Free Hydrocarbon Volume from Fluid Levels in Monitoring Wells. *Groundwater.* 28(1):57-57.

APPENDIX D

Summary of Modifications to Quarterly Groundwater Analysis Program

APPENDIX D
SUMMARY OF MODIFICATIONS TO QUARTERLY GROUNDWATER ANALYSIS PROGRAM

A summary of modifications to the quarterly groundwater monitoring program for the Time Oil Northwest Terminal in Portland, Oregon is presented below by the date of first implementation. A reference list for the modifications is attached.

- ***Second Quarter 1998*** (Landau Associates 1998; DEQ 1998):
  - Annual sampling of east property wells LW-101S, LW-102S, LW-103S, and LW-104S
  - Elimination of 2-chloroethylvinylether from the volatile analyte list
  - Reduction of the suite of metals analyses to include only arsenic, chromium, copper, lead, nickel, and zinc
  - Quarterly analysis of only metals in well K and only chlorinated phenols and metals in well H
  - Elimination of PCB analysis
  - Annual analysis for major ions; quarterly analysis for chloride and dissolved oxygen.
- ***First Quarter 1999*** (Landau Associates 1999; Urbanowicz, K., 12 February 1999, personal communication):
  - Analysis of polycyclic aromatic hydrocarbons (PAHs) using analytical techniques that provide lower detection limits at upper zone wells LW-2S, LW-7S and LW-101S and at lower zone wells G1A, O, and LW-4D for the first quarter 1999 event only
  - Elimination of sampling at well J3.
- ***Second Quarter 2000*** (Landau Associates 2000a; DEQ 2000):
  - Elimination of dioxin/furan analyses.
- ***Third Quarter 2000*** (Landau Associates 2000b; Roick 2000):
  - Reduction of sampling frequency of wells H, L, and LW-5S from quarterly to annually.
- ***Second Quarter 2001*** (Landau Associates 2001a, 2001b; Roick 2001):
  - Reduction of the list of chlorinated phenols being analyzed by EPA Method 8040 to pentachlorophenol (PCP) only using EPA Method 8270 SIM
  - Reduction of the frequency of total petroleum hydrocarbon (TPH) analysis from quarterly to annually at upper zone wells J1 and LW-1S; lower zone wells B2, J2, LW-1D; and deep sand unit well LW-12D2. In addition, TPH analysis was eliminated for the following wells: upper zone wells D, L, LW-5S, LW-101S through -104S, and lower zone well LW-3D.

BZTO104(e)017024

REFERENCES
(Modifications to Quarterly Groundwater Analysis Program)

DEQ. 2000. Letter: *Dioxin/Furans Groundwater Analysis, Time Oil Northwest Terminal*. From Thomas E. Roick, Oregon Department of Environmental Quality, to Kevin Murphy, Time Oil Co. May 18.

DEQ. 1998. Letter: *Groundwater Quality Sampling, Time Oil Co. Northwest Terminal*. From Karla Urbanowicz, Oregon Department of Environmental Quality, to Kevin Murphy, Time Oil Co. May 15.

Landau Associates. 2001a. Letter: *Recommendation for Reduction of Analyses, Time Oil Northwest Terminal, Portland, Oregon*. To Tom Roick, Oregon Department of Environmental Quality. January 30.

Landau Associates. 2001b. Letter: *Recommendation for Reduction of TPH Analyses, Time Oil Northwest Terminal, Portland, Oregon*. To Tom Roick, Oregon Department of Environmental Quality. May 17.

Landau Associates. 2000a. Letter: *Discontinuing Dioxin/Furan Analyses, Time Oil Northwest Terminal, Portland, Oregon.* To Tom Roick, Oregon Department of Environmental Quality. May 16.

Landau Associates. 2000b. Letter: *Recommended Reduction of Wells for Quarterly Monitoring, Time Oil Northwest Terminal, Portland, Oregon*. To Tom Roick, Oregon Department of Environmental Quality. August 9.

Landau Associates. 1999. Letter: *Time Oil Northwest Terminal, Portland, Oregon.* To Karla Urbanowicz, Oregon Department of Environmental Quality. January 21.

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Roick, T.E. 2001. E-mail message from Thomas E. Roick, Oregon Department of Environmental Quality, to Rebekah Brooks, Landau Associates. Re: *Reduction of Total Petroleum Hydrocarbon Analysis, Time Oil Co. Northwest Terminal*. May 30.

Roick, T.E. 2000. E-mail message from Thomas E. Roick, Oregon Department of Environmental Quality, to Rebekah Brooks, Landau Associates. Re: *Time Oil Groundwater Monitoring*. August 15.

Urbanowicz, K. 12 February 1999. Personal communication (telephone conversation with Rebekah Brooks, Landau Associates, Edmonds, Washington). Re: *Approval of Additional Modification to Groundwater Sampling and Analysis Program, Time Oil Northwest Terminal, Portland, Oregon*. Karla Urbanowicz, Oregon Department of Environmental Quality, Portland, Oregon.

APPENDIX E

Data Validation Report

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager

cc: Tom Roick, Oregon Department of Environmental Quality (DEQ)
Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

FROM: Shannon Dunn

DATE: June 25, 2003

RE: SECOND QUARTER 2003 GROUNDWATER MONITORING LABORATORY DATA QUALITY EVALUATION TIME OIL NORTHWEST TERMINAL

This technical memorandum provides the results of a data quality evaluation for 33 groundwater samples, 1 groundwater interim action influent sample, and 3 trip blanks collected at the Time Oil Northwest Terminal on May 7 through 9, 2003 for the Phase II remedial investigation (RI) second quarter 2003 groundwater monitoring event. A data quality evaluation was performed for analyses of total petroleum hydrocarbons (TPH; DEQ TPH-D, TPH-D extended, and TPH-G); volatile organic compounds [VOCs; U.S. Environmental Protection Agency (EPA) Method 8260B]; pentachlorophenol [PCP; EPA Method 8270 with selected ion monitoring (SIM)]; semivolatile organic compounds (SVOCs; EPA Method 8270C); selected priority pollutant metals (EPA Method 6010/7000 series); chloride (EPA Method 325.2); and total dissolved solids (TDS; EPA Method 160.1). All of the analyses were performed by Analytical Resources, Inc. (ARI), located in Seattle, Washington. This data quality evaluation covers ARI data packages FL41, FL58, and FL66. The data quality evaluation was performed in accordance with the revised quality assurance project plan (QAPP) contained in Appendix C of the *Phase III Remedial Investigation* work plan (Landau Associates 2001), and with applicable portions of the EPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* and *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994a,b).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Surrogate spike recoveries
- Matrix spike and matrix spike duplicate (MS/MSD) results
- Laboratory control sample (LCS) results
- Method blank results

- Duplicate (laboratory and field) results
- Reporting limits
- Overall data quality and completeness.

Data validation qualifiers are added to sample results based on the evaluation of data quality. The absence of a data qualifier indicates that the datum is acceptable without qualification. Applicable data validation qualifiers are summarized in Table 1. The data quality evaluation is summarized below.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package. The laboratory received all samples in good condition and all analyses requested were performed.

HOLDING TIMES

For all analyses and all samples, the time between sample collection, extraction, and analysis was determined to be within EPA and project-specified holding times except as indicated in Table 1 and as discussed below:

- **Data Package FL58 – SVOC analyses.** During the initial analysis of SVOCs, sample LW008S had surrogate recoveries below the control limits. Sample LW008S was re-extracted 7 days past the holding time and re-analyzed. The results of the re-analysis of sample LW008S are reported and qualified as estimates (J/UJ).

- **Data Package FL66 – SVOC analyses.** The base/neutral surrogate recoveries for sample LW011D were below the control limits during the initial SVOC analysis. Sample LW011D was re-extracted 6 days past the holding time and re-analyzed. No qualification of the data was necessary as a result of the exceeded holding time because the re-analysis results were not reported. The results of the initial analysis of sample LW011D are reported.

SURROGATE SPIKE RECOVERIES

All of the surrogate spike recoveries were within the laboratory control limits except as indicated in Table 1 and as discussed below:

- **Data Package FL41 – SVOC analyses.** Recoveries of some of the surrogates were diluted out in the diluted SVOC analyses. No qualifiers were assigned because surrogate recoveries in the original sample analyses were within laboratory control limits.
- **Data Package FL58 – VOC analyses.** Surrogates were diluted out in the diluted VOC analyses of samples LW4S and LW11S. Because surrogate recoveries during the initial (nondiluted) analysis of this sample were within the laboratory control limits, no qualifiers were assigned.
- **Data Package FL58 - PCP analyses.** Recoveries of the surrogates were diluted out in the diluted PCP analysis for sample OX-002S. No qualifiers were assigned because surrogate recoveries in the original sample analysis were within laboratory control limits.

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- **Data Package FL58 – SVOC analyses.** Surrogates were diluted out in the diluted SVOC analyses of samples LW004S, LW0011S, and D. The 2-fluorobiphenyl surrogate recoveries in the initial (nondiluted) analyses of samples LW004S and LW0011S were slightly below laboratory control limits. No qualifiers were assigned to samples LW004S and LW0011S because only one base/neutral surrogate recovery, in each sample for the initial analyses, was below laboratory control limits. No qualifiers were assigned to the SVOC results for sample D because surrogate recoveries in the initial analysis were within laboratory control limits. The surrogate recovery for 2-fluorobiphenyl was slightly below laboratory control limits in sample J2. No qualifiers were assigned the remaining SVOC surrogate recoveries were within the laboratory control limits. The 2-fluorobiphenyl and d4-1,2-dichlorobenzene surrogate recoveries were below laboratory control limits in the initial analysis of sample LW008S. The laboratory re-extracted and re-analyzed sample LW008S and surrogate recoveries were within laboratory control limits for the re-analysis. No qualifiers were assigned as the initial analysis results for sample LW008S were not reported.
- **Data Package FL66 – SVOC analyses.** The recovery of one acid or base/neutral surrogate for each of the following samples GIP, R, LW006D, and LW009D were slightly below laboratory control limits. No qualifiers were assigned to samples GIP, R, LW006D, and LW009D because the remaining surrogate recoveries were within laboratory control limits. Surrogate recoveries of d4-1,2-dichlorobenzene and 2-fluorobiphenyl were below laboratory control limits in the initial analysis of sample LW011D. Base/neutral SVOC results for the initial analysis of sample LW011D were qualified as estimates (J/UJ).

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

A minimum of one MS/MSD pair per 20 samples (or per laboratory batch if fewer than 20 samples were obtained) was performed for VOC, SVOC, and PCP analyses and a minimum of one MS per 20 samples (or per laboratory batch if fewer than 20 samples were obtained) was performed for total metals and chloride analyses. One MS/MSD was performed for TPH-G analyses. For all analyses, each MS/MSD was performed using a project sample. Recoveries and relative percent differences (RPDs) for the MS/MSDs were within the laboratory control limits, except as indicated in Table 1 and as discussed below:

- **Data Package FL58 – TPH-G analyses.** Recoveries of gasoline in the MS/MSD associated with sample LW011S were above laboratory control limits, indicating a potential high bias. The MS/MSD RPD was also above laboratory control limits. Detected concentrations of gasoline in samples LW008S and LW011S were qualified as estimates (J).

LABORATORY CONTROL SAMPLE (LCS) RESULTS

Except for the analysis of TDS, at least one LCS/blank spike was analyzed with each batch of samples. LCS duplicates were also performed with some of the analyses. Recoveries and RPDs for the LCSs and associated duplicates were within laboratory control limits. No qualification of the data was necessary.

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METHOD BLANK RESULTS

Method blanks were analyzed with each batch of samples for each analysis. No contamination was detected in the method blanks. No qualification of the data was necessary.

FIELD BLANK RESULTS

In accordance with the QAPP, field equipment rinsate blanks were not collected (all sampling equipment was dedicated and/or disposable, which eliminated the potential for cross contamination). Trip blanks were submitted for analysis of VOCs. No VOCs were detected in the trip blanks. No qualification of the data was necessary.

LABORATORY DUPLICATE RESULTS

At least one laboratory duplicate sample was analyzed for metals, chloride, and TDS. All RPDs were within the laboratory control limits. No qualification of the data was necessary.

FIELD DUPLICATE RESULTS

Two blind field duplicate pairs (RW2/W and RW1/X) were collected during this sampling event. The project-specified criterion of at least one blind field duplicate sample per 20 samples was met. A project-specified control limit of 20 percent was used to evaluate the RPDs between the duplicate samples except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for both duplicate sample pairs submitted for analysis were within the project-specified control limits, except as indicated in Table 1 and as discussed below:

- The RPD between field duplicate results for a number of VOCs, bis(2-ethylhexyl)phthalate, gasoline, and zinc in sample RW1 and duplicate sample X exceeded project control limits. Detected results of these compounds were qualified as estimates (J) in all samples.

REPORTING LIMITS

Method and/or project-specified quantitation limits were met except as discussed below:

- The reporting limits for VOCs in sample LW008S were raised slightly due to dilution.
- The reporting limits for SVOCs in sample RW-1 were raised slightly due to dilution.

No qualifiers were signed as a result of elevated reporting limits.

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OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory duplicates, field duplicates, matrix spike duplicates, and laboratory control samples duplicates. Data accuracy was evaluated through surrogate spikes, matrix spikes, and laboratory control samples. Based on this data quality evaluation, all of the data were determined to be acceptable and no data were rejected.

The completeness for this set of data is 100 percent, which exceeds the project-specified goal of 90 percent.

REFERENCES

EPA. 1994a. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency.

EPA. 1994b. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. U.S. Environmental Protection Agency.

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TABLE 1
SUMMARY OF DATA QUALIFIERS
SECOND QUARTER 2003 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES FL41, FL58, AND FL66

Data Package Number	Analyte	Qualifier	Sample Number	Reason
FL41	Bis(2-ethylhexyl)phthalate	J	RW1	High field duplicate RPD
FL41	Bis(2-ethylhexyl)phthalate	J	X	High field duplicate RPD
FL41	Ethylbenzene	J	LW007S	High field duplicate RPD
FL41	Ethylbenzene	J	B-1	High field duplicate RPD
FL41	Ethylbenzene	J	RW1	High field duplicate RPD
FL41	Ethylbenzene	J	X	High field duplicate RPD
FL41	m,p-Xylene	J	LW007S	High field duplicate RPD
FL41	m,p-Xylene	J	B1	High field duplicate RPD
FL41	m,p-Xylene	J	RW1	High field duplicate RPD
FL41	m,p-Xylene	J	X	High field duplicate RPD
FL41	o-Xylene	J	B1	High field duplicate RPD
FL41	o-Xylene	J	RW1	High field duplicate RPD
FL41	o-Xylene	J	X	High field duplicate RPD
FL41	1,3,5-Trimethylbenzene	J	B1	High field duplicate RPD
FL41	1,3,5-Trimethylbenzene	J	RW1	High field duplicate RPD
FL41	1,3,5-Trimethylbenzene	J	X	High field duplicate RPD
FL41	1,2,4-Trimethylbenzene	J	LW007S	High field duplicate RPD
FL41	1,2,4-Trimethylbenzene	J	B1	High field duplicate RPD
FL41	1,2,4-Trimethylbenzene	J	RW1	High field duplicate RPD
FL41	1,2,4-Trimethylbenzene	J	X	High field duplicate RPD
FL41	Isopropylbenzene	J	LW007S	High field duplicate RPD
FL41	Isopropylbenzene	J	B1	High field duplicate RPD
FL41	Isopropylbenzene	J	RW1	High field duplicate RPD
FL41	Isopropylbenzene	J	X	High field duplicate RPD
FL41	n-Propylbenzene	J	LW007S	High field duplicate RPD
FL41	n-Propylbenzene	J	B1	High field duplicate RPD
FL41	n-Propylbenzene	J	RW1	High field duplicate RPD
FL41	n-Propylbenzene	J	X	High field duplicate RPD
FL41	sec-Butylbenzene	J	LW007S	High field duplicate RPD
FL41	sec-Butylbenzene	J	B1	High field duplicate RPD
FL41	sec-Butylbenzene	J	RW1	High field duplicate RPD
FL41	sec-Butylbenzene	J	X	High field duplicate RPD
FL41	4-Isopropyltoluene	J	RW1	High field duplicate RPD
FL41	4-Isopropyltoluene	J	X	High field duplicate RPD
FL41	n-Butylbenzene	J	LW007S	High field duplicate RPD
FL41	n-Butylbenzene	J	B1	High field duplicate RPD
FL41	n-Butylbenzene	J	RW1	High field duplicate RPD
FL41	n-Butylbenzene	J	X	High field duplicate RPD
FL41	Gasoline	J	RW1	High field duplicate RPD

TABLE 1
SUMMARY OF DATA QUALIFIERS
SECOND QUARTER 2003 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES FL41, FL58, AND FL66

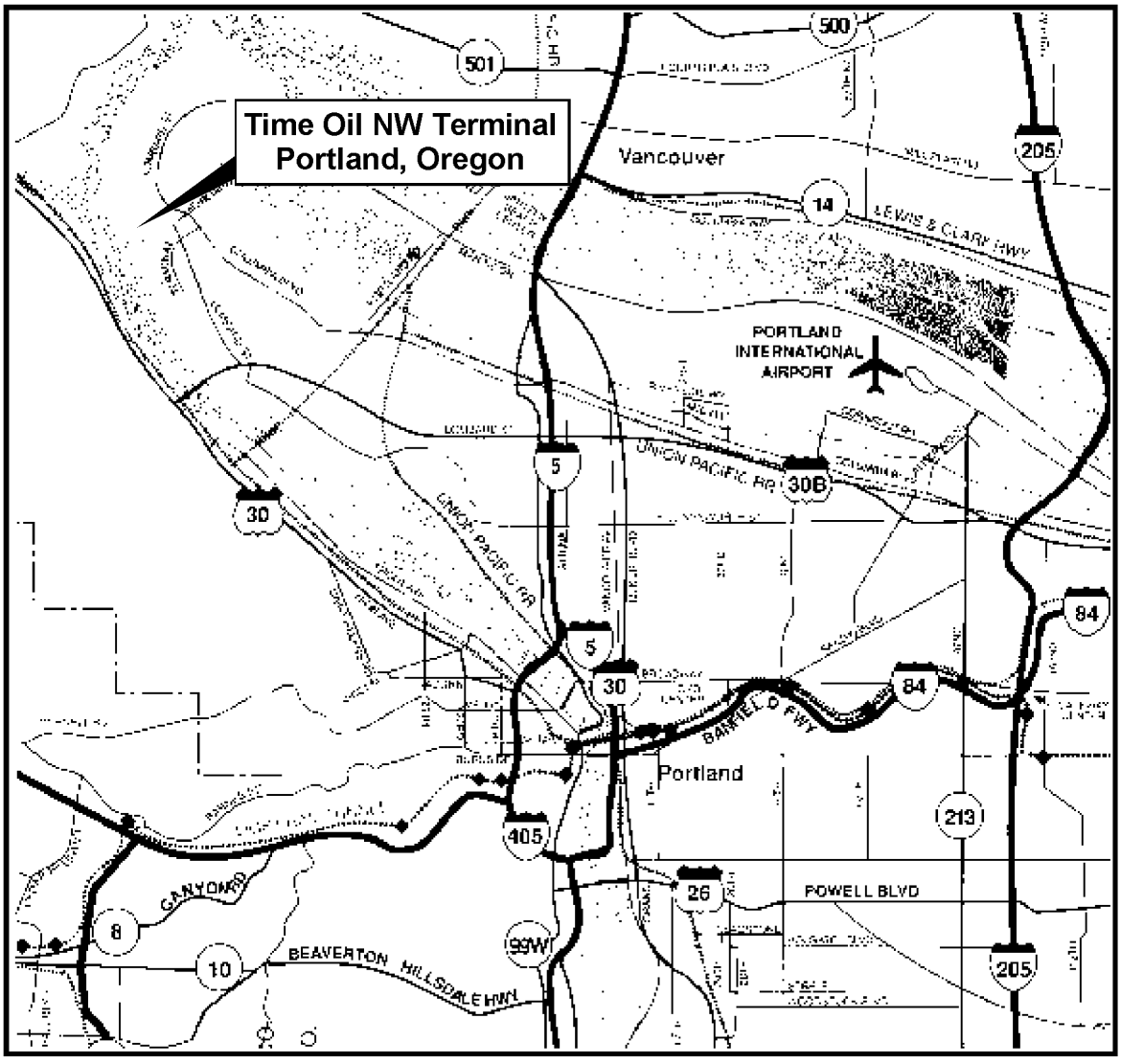
Data Package Number	Analyte	Qualifier	Sample Number	Reason
FL41	Gasoline	J	X	High field duplicate RPD
FL41	Zinc	J	LW007S	High field duplicate RPD
FL41	Zinc	J	K	High field duplicate RPD
FL41	Zinc	J	LW001D	High field duplicate RPD
FL41	Zinc	J	B2	High field duplicate RPD
FL41	Zinc	J	B1	High field duplicate RPD
FL41	Zinc	J	RW1	High field duplicate RPD
FL41	Zinc	J	X	High field duplicate RPD
FL58	All SVOCs	DNR	LW008S initial analysis	Do not report, low surrogate recoveries
FL58	All SVOCs	J/UJ	LW008S re-analysis	Holding time exceeded by 7 days
FL58	Gasoline	J	LW008S	High MS/MSD recoveries and MS/MSD RPDs
FL58	Gasoline	J	LW011S	High MS/MSD recoveries and MS/MSD RPDs
FL66	All base/neutral SVOCs	J/UJ	LW011D initial analysis	Low surrogate recoveries
FL66	All SVOCs	DNR	LW011D re-analysis	Do not report, analyzed past holding time

J = Indicates the analyte was positively identified; the associated numerical is the approximate concentration of the analyte in the sample.
U = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.
DNR = Do not report.

APPENDIX F

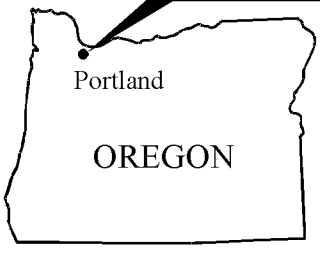
Laboratory Data

N



Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



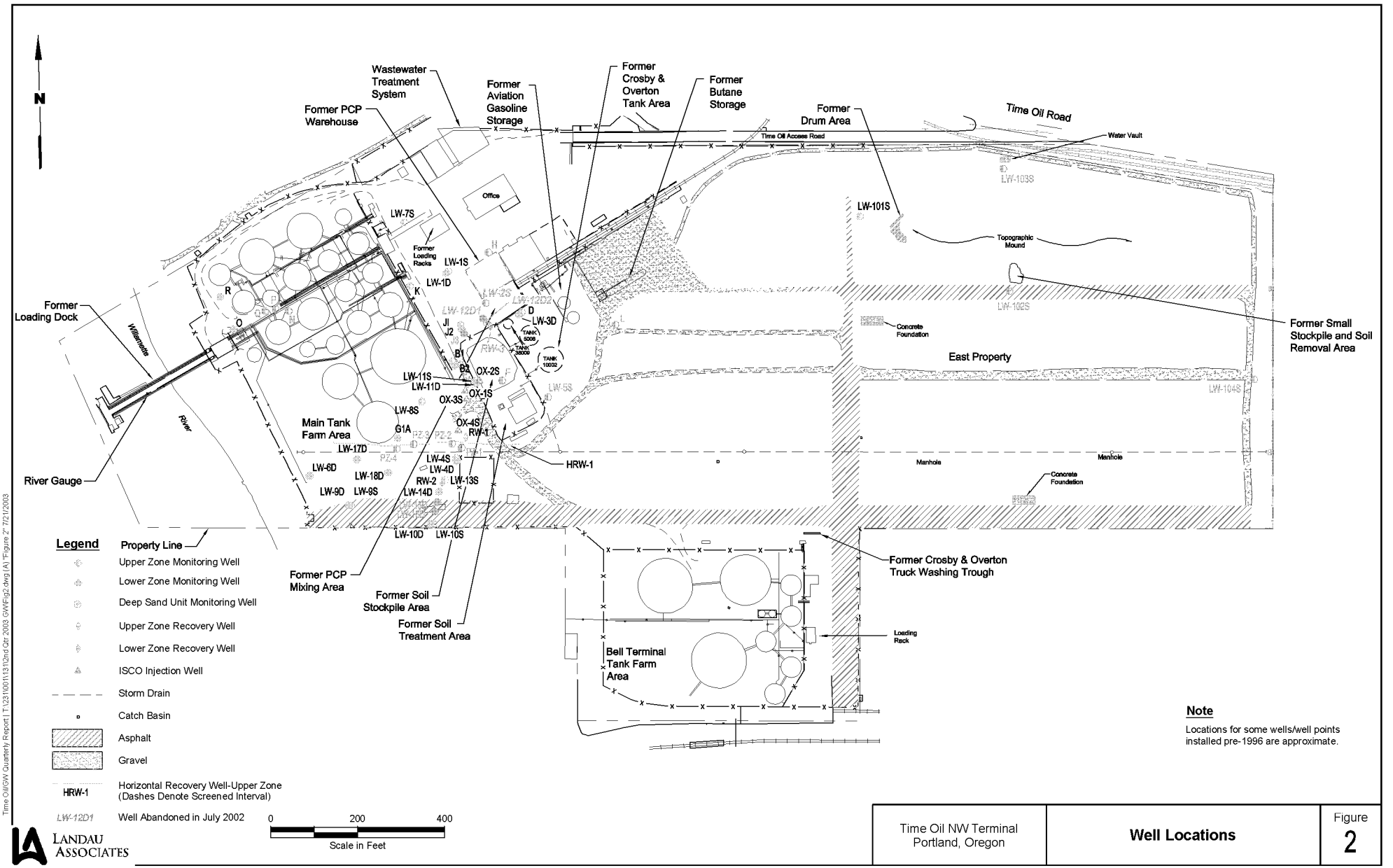
0 2 4
Approximate Scale in Miles

Time Oil | T:\231\001\Vicinity Map.cdr (C) 05/10/2002

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

BZTO104(e)017035

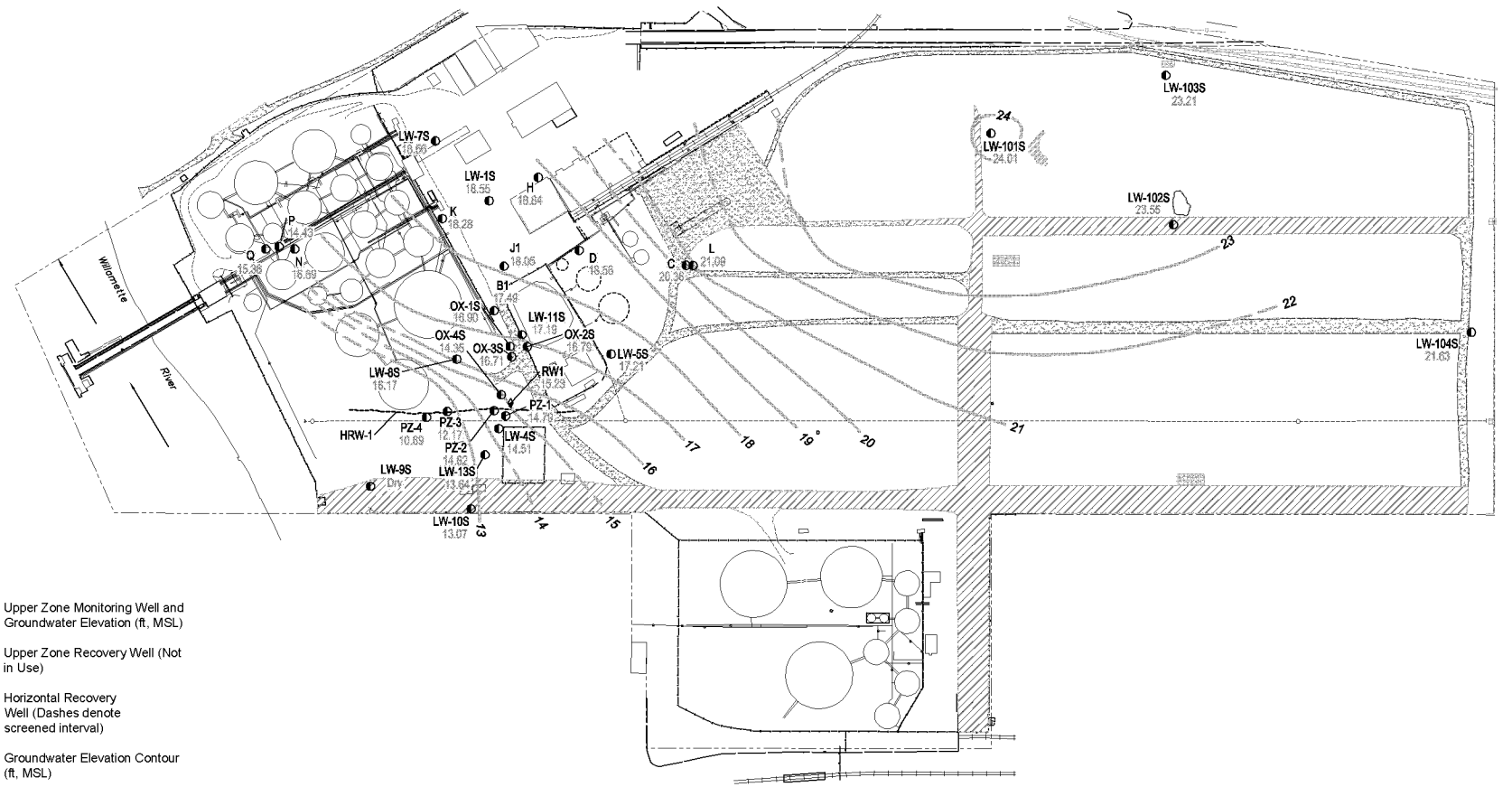


Time Oil/GW Quarterly Report | T:\231100\1311\2nd Qtr 2003 GW\Fig2.dwg (A) Figure 2" 7/21/2003

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Well Locations**	Figure 2

BZTO104(e)017036



Legend

- LW-8S 16.56 — Upper Zone Monitoring Well and Groundwater Elevation (ft, MSL)
- Upper Zone Recovery Well (Not in Use)
- HRW-1 — Horizontal Recovery Well (Dashes denote screened interval)
- 18 — Groundwater Elevation Contour (ft, MSL)

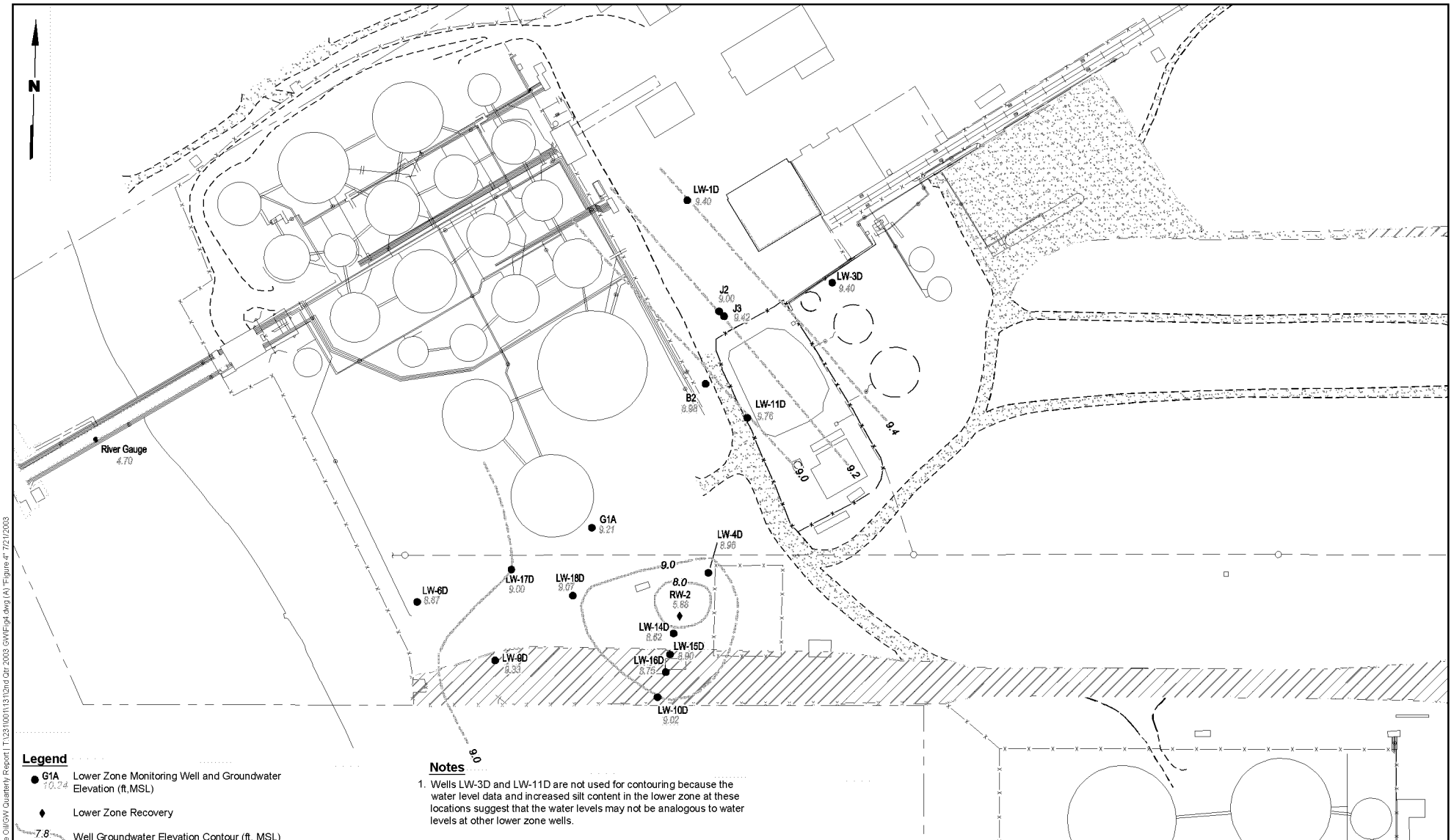
0 200 400
Scale in Feet

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Upper Zone, May 8, 2003**	Figure 3

Time Oil/GW Quarterly Report | T:\231100\1313\2nd Qtr 2003 GW\Fig3.dwg (A) "Figure 3" 7/21/2003

BZTO104(e)017037



Legend

- G1A 10.24 — Lower Zone Monitoring Well and Groundwater Elevation (ft,MSL)
- Lower Zone Recovery
- 7.8 — Well Groundwater Elevation Contour (ft, MSL)

0 100 200
Scale in Feet

Notes

1. Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.
2. An average groundwater elevation for lower zone wells J2 and J3 was contoured because these wells screen the lower zone at overlapping intervals.
3. RW-2 Data from 5/7/03.

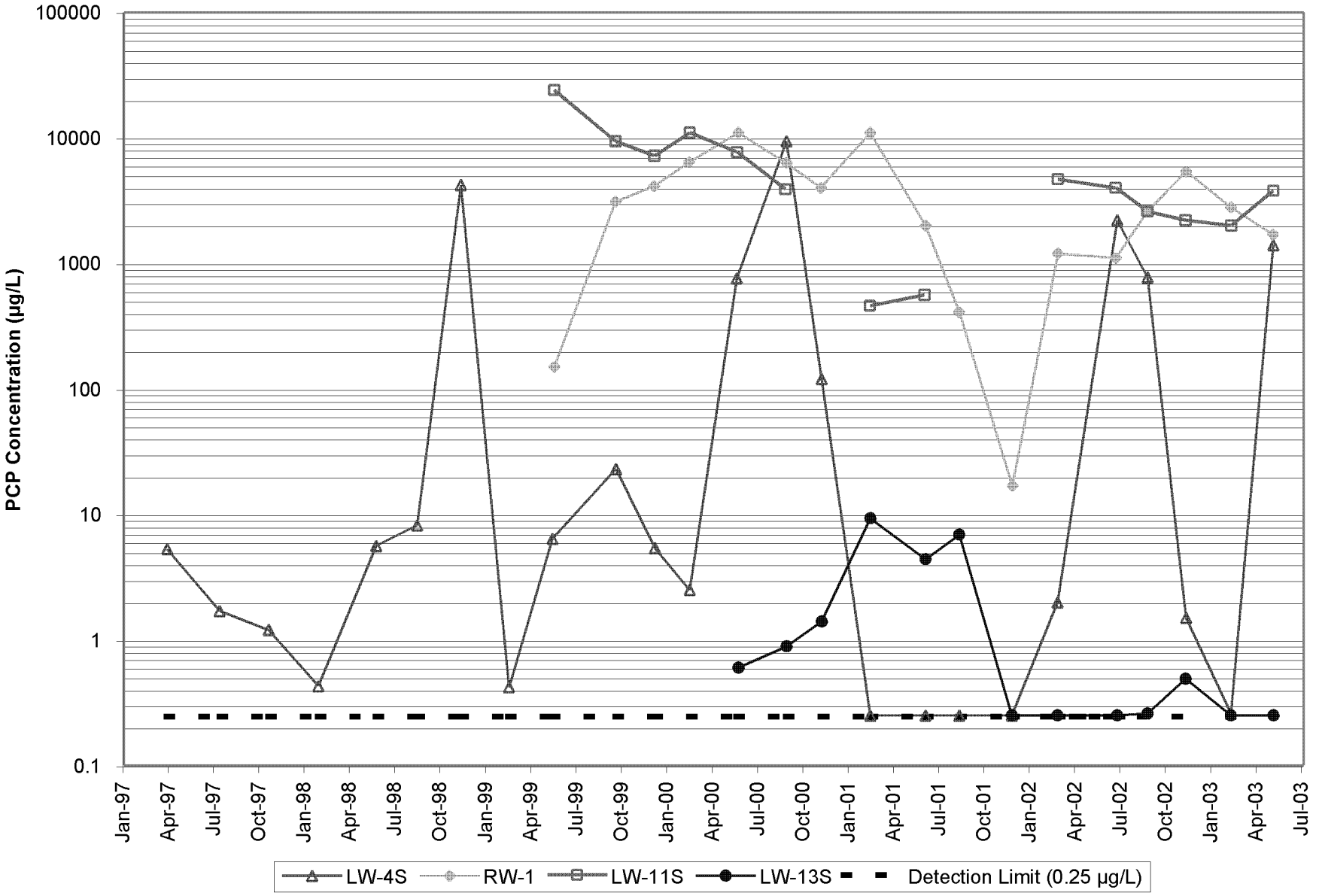
LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Lower Zone, May 8, 2003**	Figure **4**

Time Oil/GW Quarterly Report | T:\231\00\1\31\2nd Qtr 2003 GW\Fig4.dwg (A) "Figure 4" 7/21/2003

BZTO104(e)017038

Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls Log PCP vs. Time-Shallow

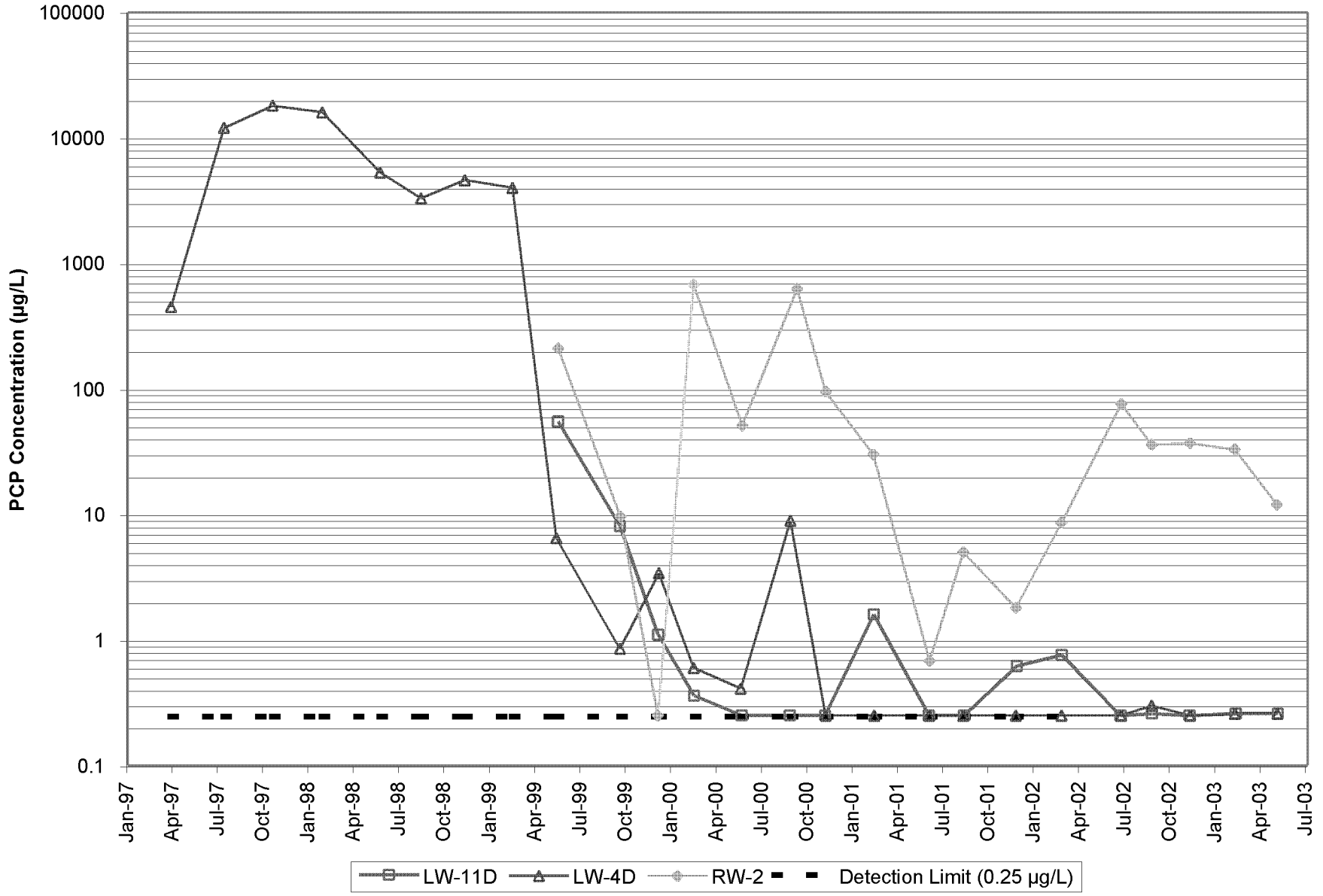


Time Oil NW Terminal
Portland, Oregon

PCP Concentrations,
Selected Upper Zone Wells
April 1997 – June 2003

Figure
5

Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls Log PCP vs. Time-Deep

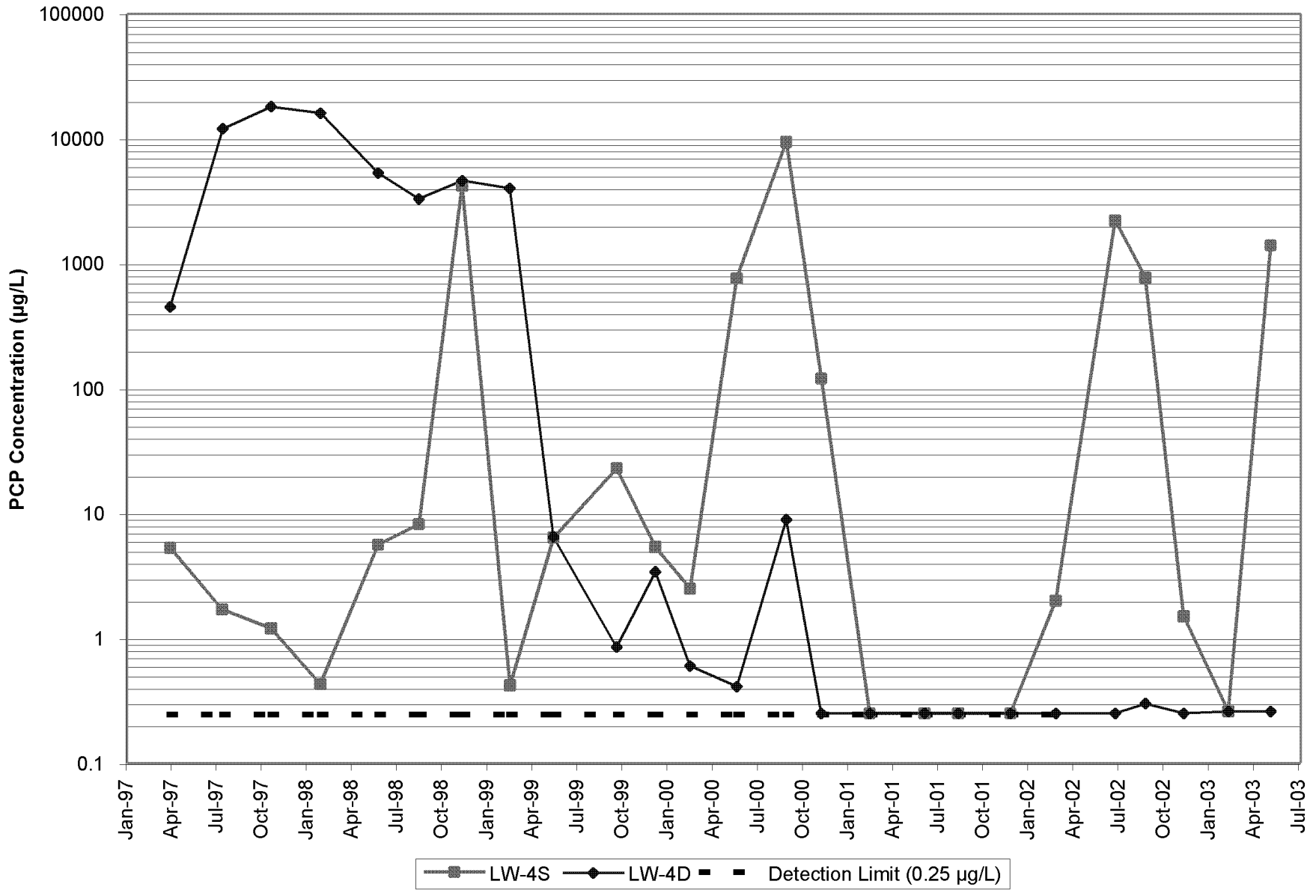


Time Oil NW Terminal
Portland, Oregon

PCP Concentrations,
Selected Lower Zone Wells
April 1997 – June 2003

Figure
6

Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls Log LW4S-LW4D-PCP

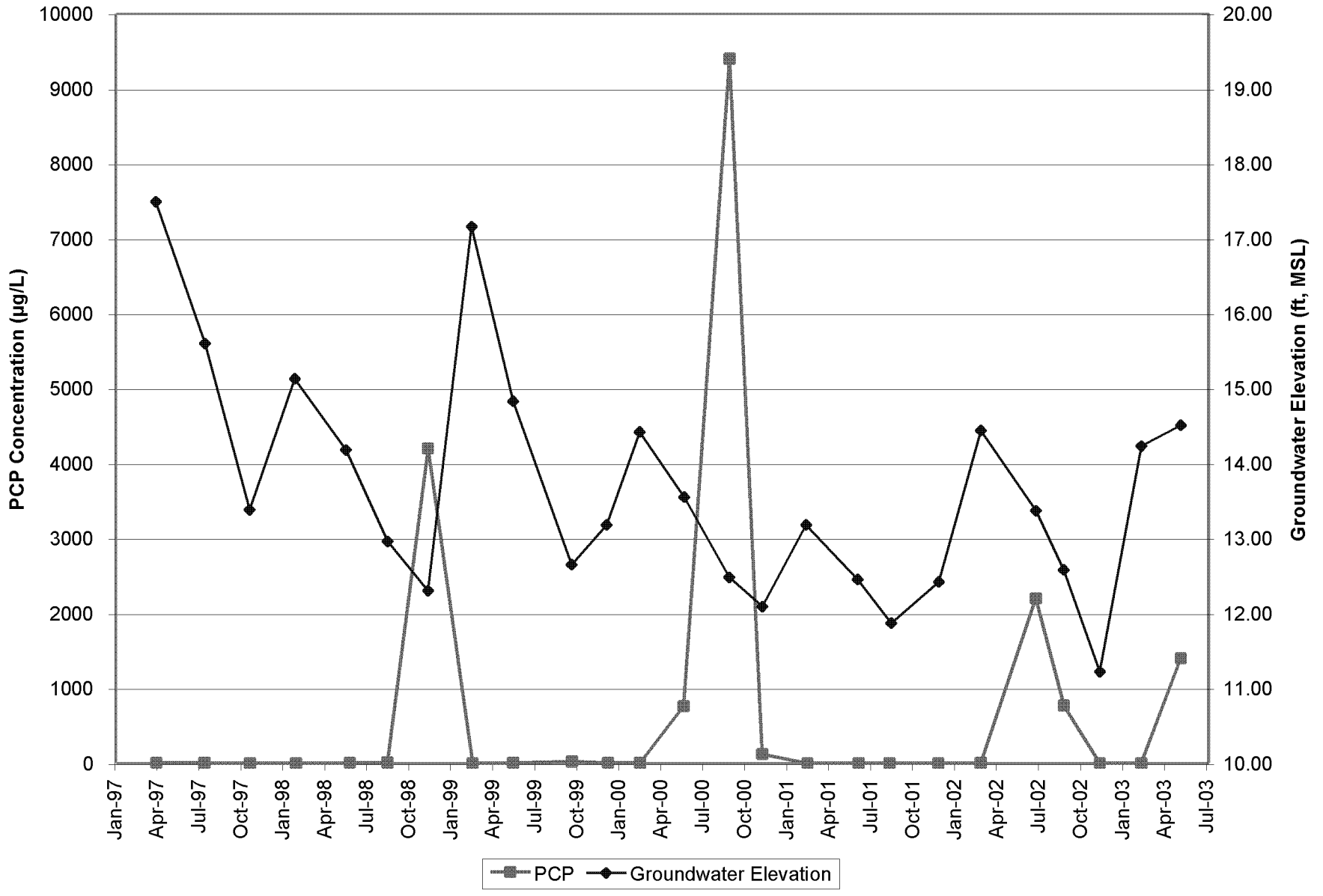


Time Oil NW Terminal
Portland, Oregon

PCP Concentrations,
Wells LW-4S and LW-4D
April 1997 – June 2003

Figure
7

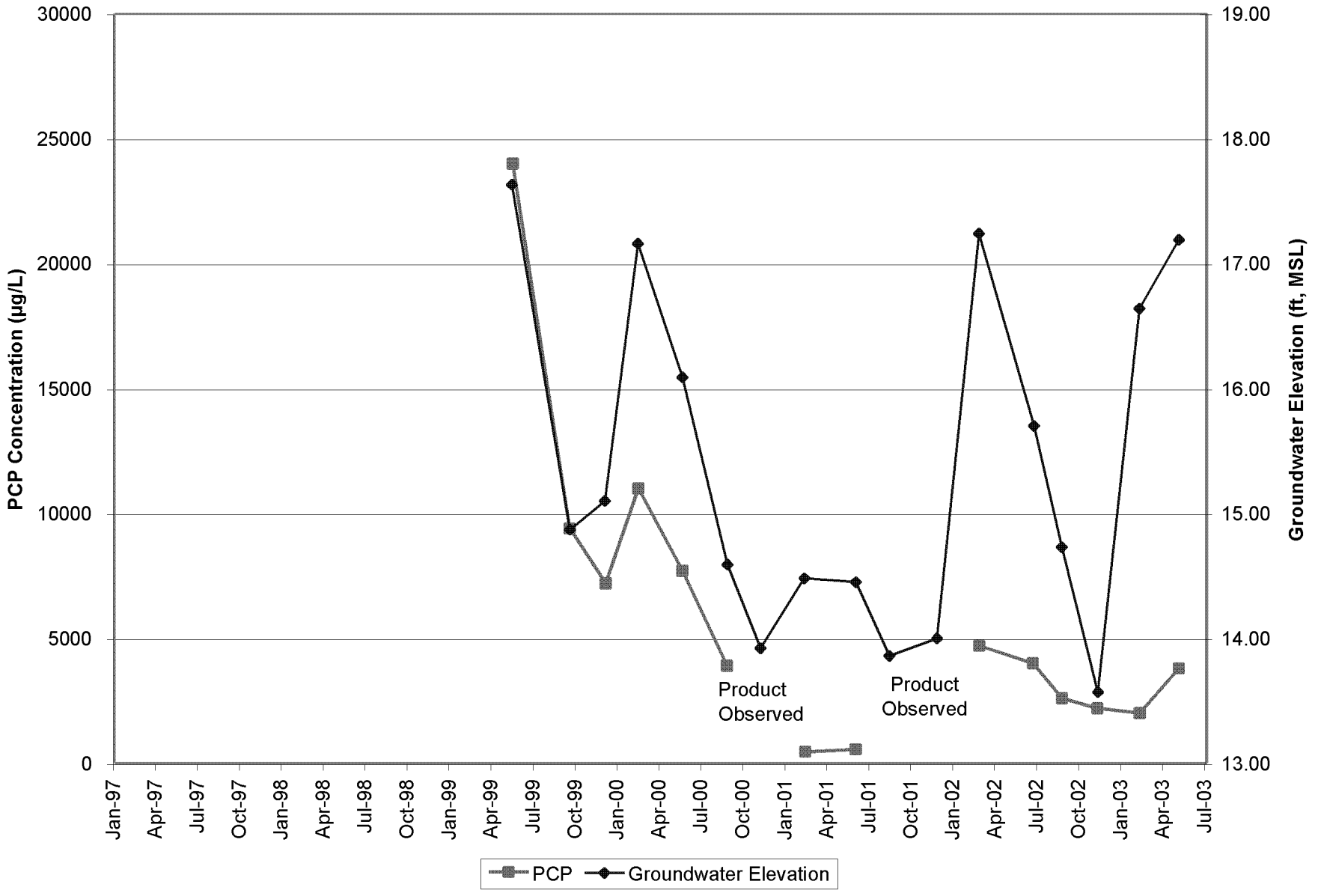
Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls LW4S PCP-WL



Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-4S April 1997 – June 2003**	Figure 8

BZTO104(e)017042

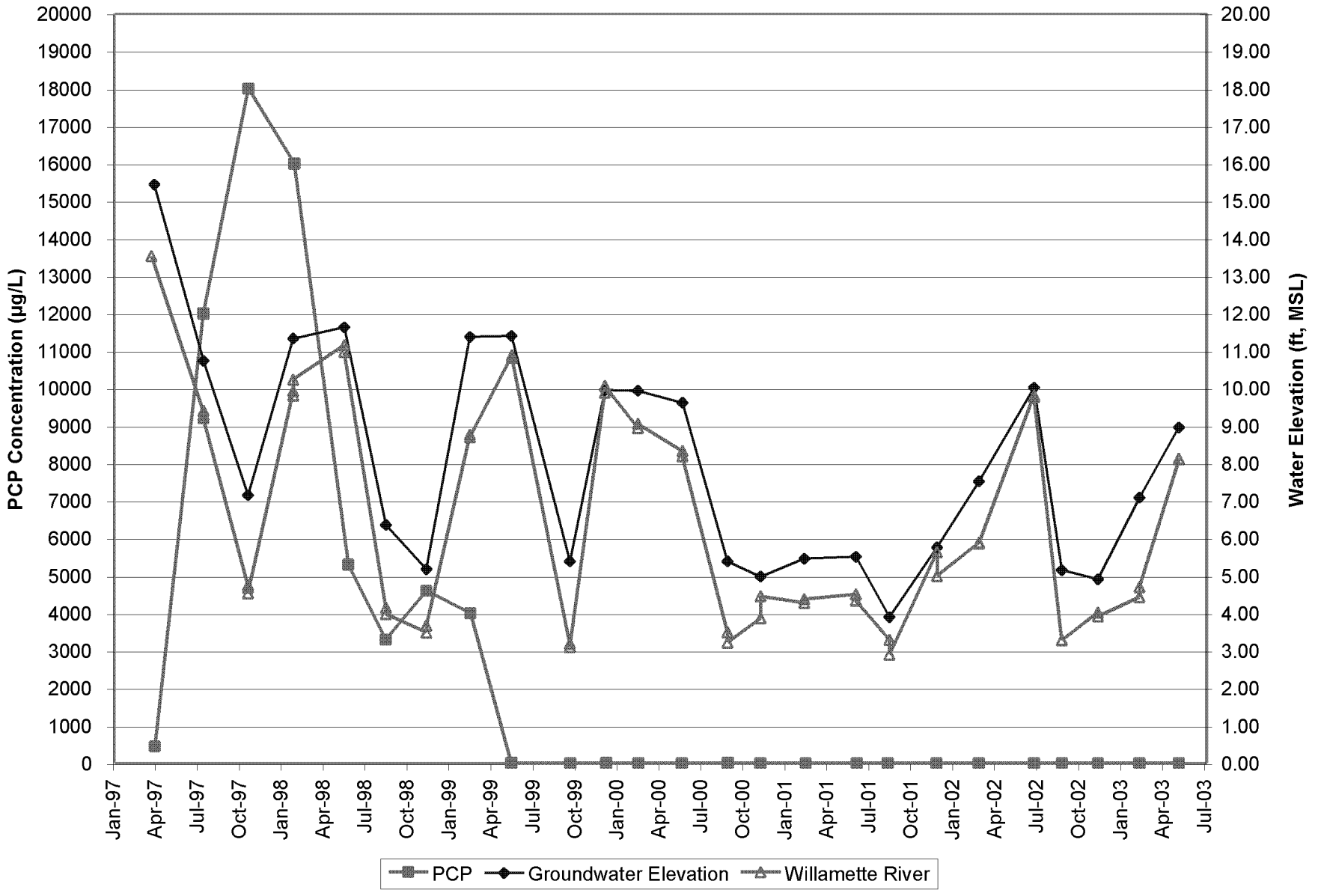
Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls LW11S PCP-WL



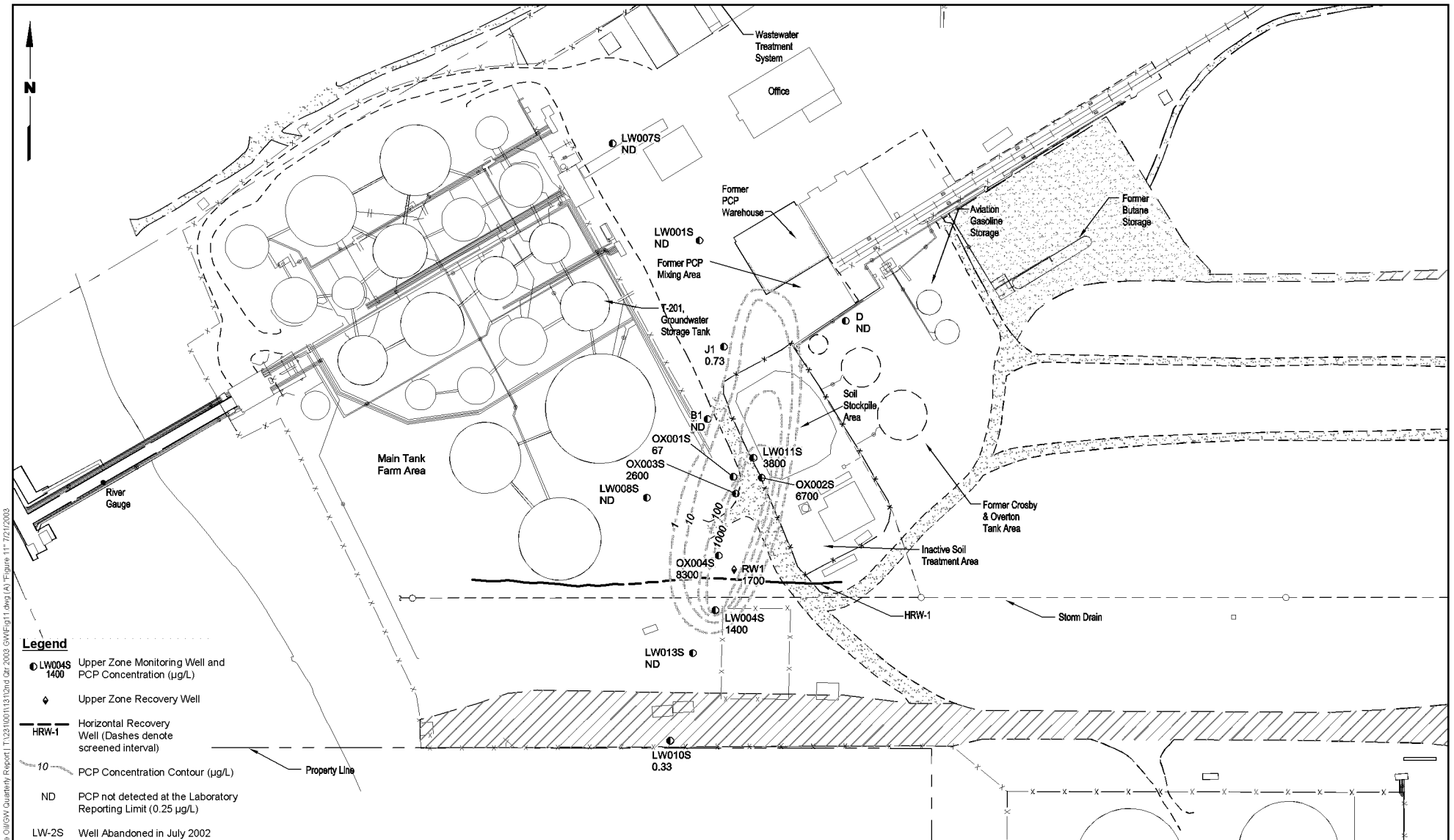
Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-11S April 1997 – June 2003**	Figure 9

BZTO104(e)017043

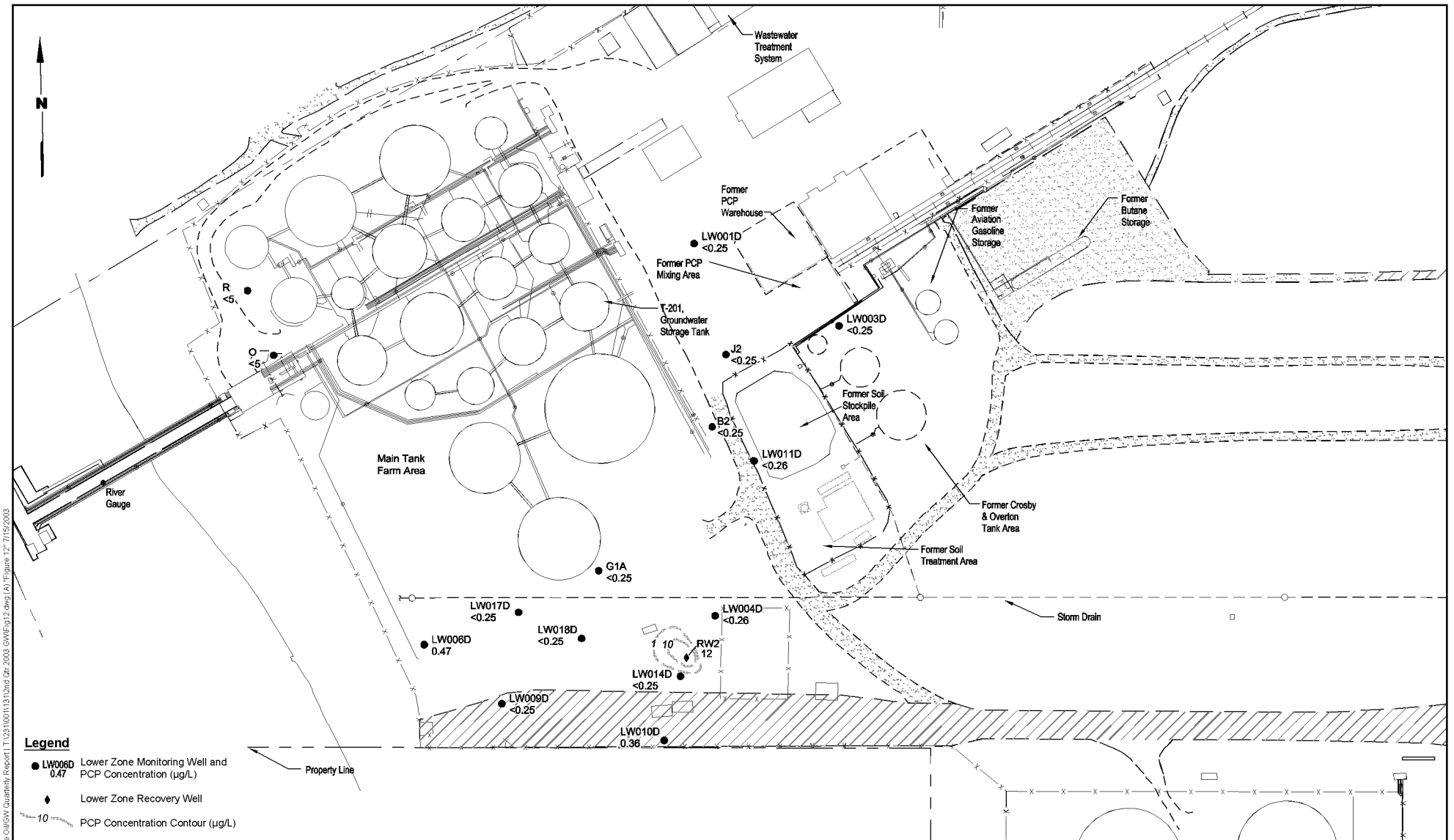
Source: S:\SHEETS\timeoil\ph2ri\PLOTS2002-2003.xls LW4D PCP-WL-RIVER



Time Oil NW Terminal Portland, Oregon	**PCP Concentrations, Groundwater Elevations, and River Stage, LW-4D April 1997 – June 2003**	Figure 10



BZTO104(e)017045



Time Oil/GW Quarterly Report | T:\231100\1311\2nd Qtr 2003 GW\Fig12.dwg (A) "Figure 12" 7/15/2003

BZTO104(e)017046

Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6945
TTY (503) 229-5471

October 21, 2003

Kevin Murphy
Time Oil Co.
2737 W. Commodore Way
Seattle, WA 98199-1233

RECEIVED
OCT 27 2003

Re: In Situ Chemical Oxidation Field Pilot Test Report,
Time Oil Co. Northwest Terminal

Dear Mr. Murphy:

The Department of Environmental Quality (DEQ) reviewed the March 26, 2003 *Field Pilot Test Report* and associated June 18, 2003 letter, prepared by Landau Associates, Inc. for the Time Oil site. DEQ approves Time Oil going forward with preparation of a work plan for full-scale implementation. We have a few comments that should be addressed in the work plan.

1. The figures provided in the letter are difficult to interpret and are not conclusive with respect to the effectiveness of treatment. Rather than relying on a single, pre-injection sampling round, it would be helpful to establish a typical range of concentration changes over time prior to treatment through use of the well data (LW11S and RW1) back to 1999. The effectiveness of the treatment could then be gauged relative to past variable contaminant concentrations.

2. As noted above, it is not clear that observed decreases in pentachlorophenol (PCP) concentrations are solely the result of the injected material versus other "natural" processes, including the degree of dilution related to injected volumes.

3. The observed increase in soil PCP concentrations at OX-2S and increase in groundwater PCP concentrations in some wells but not others may indicate non-homogeneous contaminant distribution and/or non-uniform delivery/treatment in the subsurface. This uncertainty should be a consideration in limiting the injection spacing for full-scale application.

4. If several full-scale injections are planned, the grid location should be staggered between events to provide better coverage (i.e., with 50-foot spacing, move the grid over 25 feet for the second round).

5. The discussion of potential by-products should be expanded to address metals, including the injected iron and potential oxidation of metals in the subsurface. While oxidized metals are often reduced with time/distance from the treatment area, we should confirm that a sensitive receptor (in the Willamette River) will not be exposed before such natural attenuation. In

addition to those metals analyzed as shown on Table 1, please include selenium, which can be mobilized by oxidation, and iron, which is being added to the formation.

6. Some treatment should be conducted in the spring during high groundwater conditions in order to treat contaminants in the capillary fringe.

Sincerely,

Thomas E. Roick, Project Manager
Cleanup & Portland Harbor

Cc: Tom Gainer, DEQ NWR
Rebekah Brooks, Landau Associates, Inc.
Patricia Dost, Schwabe, Williamson & Wyatt

LANDAU ASSOCIATES

RECEIVED OCT 1 4 2003

October 9, 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the September 2003 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
8/8/03 \\Edrmas\wproc\231\TRANSMIT FAX\Monthly Rpt_Ltr doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Ms. Cheryl Rath, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
September 2003

SUMMARY OF WORK PERFORMED

- Prepared and submitted the August 2003 monthly report to DEQ.

- Continued operation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 6.5 gpm. Continued operation of groundwater recovery in the upper zone at the groundwater intercept system at the east-west trending storm drain line at an average flow rate of 11 gpm. HRW-1 did not operate during September 2003 because it was dry due to low water level conditions. A total of approximately 13.5 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 497,700 gallons treated in September 2003.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1, the groundwater intercept system at SDM-1, and the onsite wastewater treatment plant (WWTP).

- Collected effluent samples from the WWTP approximately on a weekly basis throughout the month of September. The pentachlorophenol (PCP) concentration in the effluent samples ranged from 5.96 to 19.6 μg/L, but all were below the permitted maximum discharge limit (40 μg/L) identified in the industrial wastewater discharge permit. The WWTP was restarted on September 2, following suspension of operation of the WWTP on August 29 due to increasing PCP concentrations during August.

- Received approval from DEQ for installation of monitoring wells within and adjacent to the former PCP mixing area to replace some of those abandoned for the soil removal action in this area, and for abandonment of existing historical well points.

- Received approval from DEQ for modification to the abandonment method for the east property wells.

- Received a letter from DEQ containing questions and a request for clarification to some of our responses to DEQ comments on the Phase III Interim Subsurface Investigation technical memorandum. Prepared a letter providing clarification on these questions and provided to DEQ. Received approval from DEQ to proceed with the Phase III RI.

- Continued internal review of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report.*

- Continued internal review of the *Second Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report.*

- Conducted Phase II and east property well abandonments.

- Conducted Phase II replacement well installations and began Phase III RI field activities. The Phase III RI field activities are expected to be completed during the week of October 13, 2003.

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RESULTS COLLECTED

- Effluent samples from the WWTP. See discussion above. Samples dates and preliminary PCP results (in parentheses) are as follows: September 3 (19.3 μg/L), September 5 (19.6 μg/L), September 9 (7.09 μg/L), September 23 (16.9 μg/L), and September 29 (5.96 μg/L).

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2, HRW-1, and the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2, HRW-1, and the onsite wastewater treatment system.
- Continue to monitor the effluent from the WWTP on approximately a weekly basis.
- Complete field activities for the Phase III RI.
- Conduct the fourth quarter 2003 groundwater monitoring event during the weeks of October 20 and 27, 2003. This event is being conducted approximately 1 month prior to the regularly scheduled event (typically in November) in order to more expeditiously obtain information from the newly installed wells.
- Begin preparation of the *Third Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report.*
- Continue internal review of the *Second Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report* and submit to DEQ.
- Complete preparation of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation and submit to DEQ.
- Prepare a plan for conducting full scale *in situ* chemical oxidation (ISCO) groundwater interim action within the upper zone.
- Receive a no further action (NFA) determination from DEQ for the east property upon receipt of recorded E&ES from Multnomah County.

BZTO104(e)017051

Removal Actions Completion Report
Phases I/II RI Areas
Time Oil Northwest Terminal
Portland, Oregon

November 10, 2003

Prepared for

Time Oil Co.
2737 W. Commodore Way
Seattle, WA 98199-1233

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

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E	Data Validation Technical Memoranda
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1.0 INTRODUCTION

This report documents completion of removal actions conducted within three areas of the Time Oil Northwest Terminal in Portland, Oregon, (Figure 1) including the Phase I soil stockpile area, the Phase II former pentachlorophenol (PCP) mixing area and former PCP warehouse, and the Phase II former Crosby & Overton (C&O) tank area (Figure 2). Phases I and II refer to the phases of a remedial investigation/feasibility study (RI/FS) currently being conducted at the terminal for the soil stockpile and activities associated with the former PCP mixing area, respectively, under a Voluntary Cleanup Program agreement between the Oregon Department of Environmental Quality (DEQ) and Time Oil Co. (Time Oil) (DEQ No. WMCVC-NWR-96-07). The removal actions are also conducted under this agreement. The removal actions in the soil stockpile area and former Crosby & Overton (C&O) tank area have removed soil exceeding conservative cleanup action levels developed with DEQ to eliminate adverse risk to human health and ecological receptors and for protection of surface water receiving groundwater from these areas. Additional remediation of PCP-impacted groundwater and residual soil associated with historical wood treatment formulation activities within the former PCP mixing area and warehouse will be addressed in future remedial actions. *In situ* treatment techniques are currently being evaluated to address remaining soil and groundwater contamination in this area. Assessment of potential future exposures to human and ecological receptors will be addressed through a terminal-wide risk assessment following completion of the Phase III RI for areas of the terminal not addressed by Phases I and II.

The soil removal action within the soil stockpile area was conducted based on the recommended remedial alternative provided in the Phase I feasibility study (Landau Associates 2001a), as approved by DEQ in a letter dated September 25, 2001 (DEQ 2001). The stockpile remedial action objectives were:

- to protect human health and the environment
- to prevent migration of contaminants from the stockpile
- to eliminate the need for long-term management of the stockpile.

The Phase I soil stockpile was removed and disposed as outlined in the Phase I Soil Stockpile Removal Action Plan (Stockpile RAP) (Landau Associates 2002a) and amendment (Time Oil 2002), and as approved by DEQ.

The objective of the soil removal action within the former PCP mixing area was to remove *in situ* soil impacted with PCP, dioxins/furans, and PCP degradation products (e.g., tri- and tetrachlorophenols) to a maximum depth of 13 ft below ground surface (BGS) (the approximate water table). In order to gain unrestricted access to this area during soil removal activities, the former PCP warehouse and other site features including concrete walls, bulk storage tank 38009 (Tank 38009), and above and below ground

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piping required removal. The removal action within the former PCP mixing area and former PCP warehouse were conducted in accordance with the Warehouse Demolition and Soil Excavation RAP (*In Situ* Soil RAP) (Landau Associates 2002b), as approved by DEQ in a letter dated July 24, 2002 (DEQ 2002b).

The objective of the soil removal within the former C&O tank area was to remove polychlorinated biphenyls (PCBs) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) at concentrations that might pose unacceptable risk to human and ecological receptors. The timing of the soil removal in the C&O area (prior to the other removal actions) was to prevent tracking of impacted soil from this area during the removal actions for the soil stockpile and *in situ* excavation, to allow staging of removal action activities within this area, and to take advantage of the equipment and personnel already mobilized for the other removal actions. The removal action in the former C&O tank area was conducted as described in the August 16, 2002 letter to DEQ and as verbally approved by DEQ.

The following sections provide an overview of pre-removal investigations in each of the removal action areas, descriptions of the removal actions, verification sampling results, and backfilling activities. A regional map showing the location of the terminal is provided on Figure 1. Figure 2 is a site plan showing the location of the former soil stockpile area, former PCP mixing area, former PCP warehouse, and former C&O tank area. Tables 1 through 4 present analytical data from verification samples collected from the former soil stockpile footprint, *in situ* soil excavation, former C&O tank area excavation, and decontamination of debris from the former PCP warehouse and other miscellaneous items. Appendix A provides a description of the verification sampling procedures. Appendix B presents copies of approvals and the transportation and disposal permits. Appendix C presents disposal documentation for soil from the C&O tank area, the warehouse demolition and other miscellaneous items that include piping, Tank 38009, and concrete. A summary of soil transportation/disposal activities for the soil stockpile and *in situ* excavation removal actions is provided in Appendix D. Other soil disposal documentation, including manifests, are being maintained at the Time Oil Environmental Services office in Seattle, Washington. The data validation reports and associated laboratory data packages for the verification samples are provided in Appendix E and Appendix F, respectively.

2.0 BACKGROUND INFORMATION

This section provides an overview of background information for the terminal and for the removal action areas, including the former soil stockpile, former PCP mixing area and warehouse and the former C&O tank area. This section summarizes applicable results from previous soil investigations at the facility and discusses the cleanup action levels used for the removal actions.

2.1 TERMINAL DESCRIPTION AND HISTORY

The Time Oil Northwest Terminal (terminal) is a former bulk petroleum storage and transfer facility currently owned by Time Oil. The facility is located in Township 2 North, Range 1 West, Sections 34 and 35, in the industrialized Rivergate area of north Portland, Oregon as shown on Figure 1. The terminal is bordered to the east and south by heavy industrial property, to the north by heavy industrial property and undeveloped property maintained by the Port of Portland as a mitigation wetland and wildlife corridor, and to the west by the Willamette River. The terminal is approximately 52 acres in size and is generally flat with an average land surface elevation of about 28 ft above mean sea level (MSL). A chain-link fence is located on the perimeter of the terminal and access to the property is through the main gate at the termination of Time Oil Road. Within the terminal, there are several features that are distinguished by their historical uses, as shown on Figure 2.

From 1943 until 2001, the terminal was operated by Time Oil as the Northwest Terminal petroleum products facility. During operation, the terminal was used for the receipt, storage, and distribution of petroleum and petroleum-related products. Historically, Time Oil leased tank space to Crosby & Overton, Inc. (C & O) for storage of waste oils, and the Koppers Company (currently Beazer East, Inc.) leased tanks and property at the terminal for formulation of PCP-containing wood treatment products. Time Oil ceased operations at the terminal on October 31, 2001.

The geology at the terminal consists of alluvial sands and dredge fill material near the surface that is underlain by native interlayered river channel and overbank deposits. The shallowest groundwater zone (the upper zone) at the terminal occurs in the surficial alluvial sands and isolated areas of fill material, generally between about 5 to 20 ft BGS. The soil is described as a brown to gray, fine- to medium-grained sand with occasional silt and gravel layers. Hydrostratigraphic relationships and groundwater level data indicate that the upper zone appears to be an unconfined aquifer that is discontinuous in areas where the underlying confining unit is absent (e.g., toward the Willamette River and north of the former PCP mixing area). The top of the upper zone is defined by the shallow water table and varies based on seasonal fluctuations. Groundwater flow in the upper zone over most of the terminal is to the south-southwest toward the Willamette River.

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2.1.1 FORMER PCP MIXING AREA AND FORMER PCP WAREHOUSE

From 1967 to 1984, PCP-containing products were formulated at the terminal under an agreement with the Koppers Company. PCP-related operations included import of solid PCP, various carrier liquids (typically petroleum based) into which the PCP would be mixed, and various additives; interim storage of the chemicals in the former PCP warehouse and in product tanks within the former PCP mixing area; transfer and mixture of the chemicals to formulations specified by Koppers Company; interim storage of the PCP products; and transfer of the products to drums or containers for offsite transport. The former PCP mixing area is located in the approximate center of the terminal and includes the former PCP warehouse and the area south of the warehouse (former PCP mixing area) that was formerly occupied by various mixing and storage tanks (Figure 2). No PCP blending activities have occurred at the terminal since 1984.

2.1.2 PHASE I SOIL STOCKPILE

Environmental investigations and removal actions conducted by and for Time Oil since 1984 resulted in the 1989 excavation and placement of PCP-containing soil from the mixing area into a stockpile, located just southwest of the mixing area and north of the former soil treatment (bioremediation) area (Figure 2). Approximately 3,000 yd^3 of PCP-contaminated soil were excavated to depths ranging from less than 4 ft to a maximum of 12 ft below original ground surface grade (approximately equivalent to the groundwater table) within the former PCP mixing area. The excavated soil was stockpiled onsite in a bermed and lined area. The stockpile was also partially surrounded by a concrete wall and temporary chain-link fencing. The stockpile was also covered to minimize dust generation and contact with precipitation, and to minimize exposure to PCP-impacted soil by human and ecological receptors. The excavated area was backfilled to ground surface elevation with clean fill.

Resource Conservation and Recovery Act (RCRA) land disposal restrictions in effect at the time of excavation prevented placement of treated soil onsite and offsite disposal of PCP-contaminated soil without treatment. A soil treatment process, incorporating slurry-phase bioremediation, was implemented to treat the contaminated soil excavated from the former PCP mixing area. The slurry-phase biological treatment was terminated due to inability to reach the established treatment goal. In the fall of 1996, Time Oil upgraded the management of the stockpile to incorporate a new cover system and improved stormwater collection systems (Landau Associates 1996). Approximately 600 yd^3 of PCP-contaminated soil were added to the stockpile in the fall of 1996 and fall of 1997, with DEQ's approval, following interim removal actions on the undeveloped eastern portion of the property and investigation activities for

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the Phase II RI (Landau Associates 1997). An additional 10 yd^3 of soil from well drilling activities for the second additional groundwater investigation (Landau Associates 1999) were added to the stockpile in August 1999. In August 1999, a new cover was added to the stockpile (over the existing cover) because of visible damage to the old cover.

Based on volume calculations conducted for the soil characterization and biotreatability assessment (Landau Associates 2001a), the soil stockpile was volumetrically reduced (from about 3,600 yd^3 to about 2,400 yd^3), likely due to compaction from construction equipment used on the stockpile and longer-term settlement since original construction. The total mass of the stockpile had not changed since 1999. Soil samples collected from the stockpile in May 2001 indicated that the material in the soil stockpile was predominantly fine- to medium-grained sand, with traces of silt and gravel.

2.1.3 FORMER CROSBY & OVERTON TANK AREA

From 1974 to 1989, two aboveground storage tanks (ASTs 5006 and 10002) were leased from Time Oil by C&O for storage of materials generated from offsite projects. C&O reportedly provided services to collect and store waste oils from separators, oil slop tanks, ship tank cleaning, and related tasks. Based on supporting analytical results, material from the tanks was removed and disposed at the St. Johns Landfill as a nonhazardous waste in 1987 and 1989. Spills of PCB-contaminated substances onto soil in the area resulted in the excavation and removal of about 1.3 yd^3 (four 55-gallon drums) of PCB-contaminated soil from an area about 20 ft east of tank 10002 in 1989. The soil was disposed by C&O in June 1989 at EnviroServices, Inc., Arlington, Oregon (ECOVA 1991). The two ASTs were subsequently dismantled and removed.

Analytical results for samples collected in the C&O area as part of the Phase II RI in 1997 showed detected concentrations of PCBs and polycyclic aromatic hydrocarbons (PAHs) within the upper 6 inches of soil in the former tank area. The former C&O tank area, including the approximate outlines of the former tanks, is shown on Figure 2.

2.2 PRE-REMOVAL CONDITIONS

Data regarding the nature and extent of soil impacts in and around the former PCP mixing area and warehouse, within the former C&O tank area, and in the soil stockpile were collected during various investigations and interim remedial actions conducted since 1984. These data were used to define soil conditions within the removal areas prior to commencement of the removal actions and are summarized below. The analytical soil PCP data from historical events within the former PCP mixing area and former PCP warehouse area, which represent soil concentrations following the 1989 excavation, are shown on

Figure 3. A summary of the individual historical sampling events in these areas and a complete set of available analytical data was provided in the Phase II RI Report (Landau Associates 2001b). Soil characterization data from the soil stockpile was provided in the Phase I FS (Landau Associates 2001a). Historical analytical data collected from the former C&O tank area before the removal action are shown on Figure 4 for PCBs and Figure 5 for selected polycyclic aromatic hydrocarbons (PAHs). A summary of the previous investigations at the terminal for each of the removal action areas is provided below.

2.2.1 FORMER PCP MIXING AREA AND WAREHOUSE

The previous sampling events conducted in and adjacent to the former PCP mixing area and warehouse included the following:

- 1984 to 1989 - Several soil sampling and remediation events were conducted within the former PCP mixing area and below the former PCP warehouse during this period. The main focus of the historical investigations was to identify the extent of PCP contamination within and adjacent to the former PCP mixing area resulting from historical use of these areas for formulation of wood treatment products. In 1989, approximately 3,000 yd^3 of soil was excavated from this area (Figure 3) and placed into the current soil stockpile, as described earlier. Soil PCP data from the historical sampling events, containing only data representing soil concentrations remaining within the former PCP mixing area after the 1989 excavation, are included on Figure 3.

- Phase II RI - In fall 1996 and spring 1997, soil samples were collected from 15 soil borings, 5 surface soil samples, and 4 monitoring well boreholes in and adjacent to the former PCP mixing area and former PCP warehouse. In addition, in 1999, soil was collected from 4 cone penetrometer technology (CPT) locations and during the installation of a new monitoring well (RW-3). The sample results are included on Figure 3.

- Phase II Supplemental Sampling - In September 2001, supplemental soil sampling was conducted within and adjacent to the former PCP mixing area and former PCP warehouse to evaluate the extent of soil contamination and to address data gaps identified by DEQ in its comments on the Phase II RI report. Soil samples were collected from 15 soil borings in and around the former PCP mixing area. The sample results are included on Figure 3.

- Pre-Removal Investigation (PRI) - In August 2002, soil was collected and analyzed from the following: 1) 3 locations in the area previously identified as "clean fill" or overburden from the 1989 excavation within the former PCP mixing area to determine whether this material could be reused as backfill following the removal action, 2) 7 locations near the perimeter of the proposed excavation to provide additional data coverage, and 3) 5 locations where PCP concentrations were expected to range between 5 and 20 mg/kg for demonstration that groundwater concentrations will not be adversely impacted by residual soil PCP concentrations of 5 mg/kg or less, if left in place at the completion of the removal action. PCP results for these samples are shown on Figure 3. The results for the groundwater protection demonstration are discussed in Section 2.3.1. Detailed results for the PRI are provided in a technical memorandum prepared in September 2002 (Landau Associates 2002c).

PCP results from the investigations within and adjacent to the former PCP mixing area representing soil concentrations after the 1989 excavation provided the basis for the extent of contamination identified for the removal action in this area. PCP was used as the indicator compound for completion of the removal action because of the volume of soil impacted by PCP within these areas and the high concentrations relative to other detected constituents.

2.2.2 SOIL STOCKPILE

In May 2001, soil samples were collected from 18 locations in the soil stockpile to determine the pre-removal soil concentrations. The soil samples were analyzed for semivolatile organic compounds (SVOCs), metals, dioxin/furan compounds, biological parameters, and soil physical parameters. Similar to the former PCP mixing area, PCP was considered to be the indicator compound of the identified chemicals of concern for the soil stockpile, but the other constituents were evaluated for purposes of profiling the soil for disposal.

PCP was detected in each of the 18 grid sample locations, ranging in concentration from 3.7 mg/kg to 570 mg/kg. Using the 95 percent upper confidence limit (95% UCL) on the arithmetic mean calculation, the representative PCP concentration in the soil stockpile was reported to be 110 mg/kg. Based on a 95 percent UCL calculation, the representative concentrations of dioxin and furan compounds in the stockpile ranged from 0.0005 to 0.578 mg/kg (results as total equivalency quotient, TEQ). The 95 percent UCL is considered by United States and some Canadian soil disposal facilities to be a representative concentration for the total volume of the stockpile. Detailed results for the other analyzed constituents are provided in the Phase I FS (Landau Associates 2001a).

2.2.3 FORMER CROSBY & OVERTON TANK AREA

As discussed in Section 2.1.3, analytical results from investigations conducted in the C&O tank area between 1987 and 1989 showed elevated PCB concentrations in soil associated with waste oil releases that occurred historically from the tanks and led to soil removal in this area. In 1997, as part of the Phase II RI, soil samples were collected from 13 borings and 2 well boreholes (five of these borings and one well borehole were included in the investigations cited above for the former PCP mixing area). The Phase II RI sample results indicated detected concentrations of PCBs ranging from less than 1 to 16 mg/kg and PAHs ranging from less than 1 mg/kg to a maximum of about 27 mg/kg for benzo(a)pyrene and 67 mg/kg for pyrene within the upper 6 inches of soil. The occurrence of PAHs in this area appears to be from the presence of asphalt-containing tank foundations and, to a lesser extent, from the presence of historical asphalt-containing roadbed material, based on historical aerial photographs. The PCB

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concentrations detected in the C&O area during the Phase II RI are shown on Figure 4. The concentrations for selected carcinogenic PAHs (cPAHs) from the Phase II RI are shown on Figure 5. The complete set of results for these samples are included in the Phase II RI report (Landau Associates 2001b).

2.3 CLEANUP ACTION LEVELS

Cleanup action levels were identified for the removal actions conducted for the *in situ* soil excavation and the soil stockpile and for the former C&O tank area. The following sections provide the cleanup action levels and discuss the rationale for use of the identified cleanup levels for the removal actions. Residual chemical concentrations remaining in the removal areas following excavation will be considered in the risk assessment and evaluated in the feasibility study to determine whether further remedial action in these areas is necessary.

2.3.1 *IN SITU* SOIL EXCAVATION AND SOIL STOCKPILE

As mentioned in Section 2.2.1, one of the objectives of the PRI was to collect soil samples within the former PCP mixing area to demonstrate that groundwater concentrations would not be adversely impacted by residual soil PCP concentrations of 5 mg/kg or less, if left in place at the completion of the removal action. Soil samples were collected from five locations near the proposed horizontal extent of the *in situ* excavation boundary where soil PCP concentrations were expected to be in the range of approximately 5 to 20 mg/kg and at depths ranging from 0 to 10 ft BGS. All samples were initially analyzed for total PCP and PCP using the synthetic precipitation leaching procedure (SPLP). Comparison of the SPLP data to the leachate reference concentration for PCP (80 µg/L) (OAR 340-122-045; Appendix A) indicated that the sample with the PCP concentration closest to the proposed cleanup level [PRI-14(11-12); total PCP concentration of 4.51 mg/kg and SPLP PCP concentration of 3.31 µg/L] would be protective of groundwater. The sample results are documented in the Pre-Removal Investigation Results Technical Memorandum (Landau Associates 2002c).

The main pathway of concern at the terminal from soil concentrations within the former PCP mixing area is groundwater to surface water. Given the distance (approximately 700 ft) from the source area downgradient (south-southwest) to the Willamette River, attenuation factors in groundwater (e.g., dilution, dispersion, adsorption, and degradation) would likely reduce groundwater concentrations originating within the former PCP mixing area before discharge to the river. Therefore, DEQ approved a PCP concentration of 5 mg/kg as protective of surface water receiving groundwater and as a cleanup action level for the removal action at the former PCP mixing area and warehouse (DEQ 2002a).

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Because the soil originated from the same source as the PCP mixing area and because of the similarity in overall contaminant concentrations, the 5 mg/kg soil cleanup action level for PCP was also used for the soil stockpile area for protection of surface water receiving groundwater.

2.3.2 CROSBY & OVERTON TANK AREA

The chemicals of concern in the former C&O tank area were PCBs and PAHs. As indicated earlier, the occurrence of PAHs in shallow soil in this area appears to be the result of the presence of asphalt-containing tank foundation material, or, to a lesser extent, historical asphalt-containing roadbed material or waste oil releases. Because of the similarity in the source material and concentrations of cPAHs in the C&O tank area with those for the east property prior to the remedial action in that area (Landau Associates 2003), and because PAHs were not detected in groundwater from the monitoring well (LW-5S) in this area, the cleanup action level used for the east property for PAHs was also used to demonstrate the effectiveness of the soil removal in the C&O tank area. The cleanup action level is 1 mg/kg for the seven cPAHs identified as contaminants of concern (COCs) for the east property. The action level is based on the industrial maximum allowable soil concentration (SOCLEAN) referenced in OAR 340-122-045, Appendix A.

PCBs detected in shallow soil in the C&O area appear to have resulted from waste oil releases that occurred during historical use of the tanks in this area. Because PCBs were not detected in groundwater at the monitoring well (LW-5S) in this area and the soil removal meets the criteria for cleanup under SOCLEAN (OAR 340-122-045), the industrial maximum allowable SOCLEAN concentration for PCBs (sum of detected individual Aroclor concentrations) of 0.7 mg/kg was used to assess the effectiveness of the removal of soil impacted by PCBs in the C&O area.

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3.0 DESCRIPTION OF REMOVAL ACTIONS

This section describes the removal action activities that were conducted to address the removal and disposal of the soil stockpile, demolition of the former PCP warehouse, and the removal and disposal of soil from and adjacent to the former PCP mixing area and the former C&O tank area. This section includes the removal action methodology, the disposition of materials disposed offsite, and the details and results of the verification sampling, which was conducted to demonstrate that the removal action objectives were achieved.

3.1 REMEDIAL ACTION METHODOLOGY

As described in the RAPs for the soil stockpile (Landau Associates 2002a) and the warehouse demolition/*in situ* soil excavation (Landau Associates 2002b) and in the letter to DEQ for the C&O area exacavation (Landau Associates 2002c), the methodology used for the removal actions in each area consisted of physical removal of soil and/or debris and offsite disposal. This method was selected because it was determined to provide the most practical, safe, expedient, and cost-effective way to address impacted soil concentrations in each of the removal action areas and to eliminate the need for a long-term remedial action for impacted soil at the terminal. Removal activities were conducted by Time Oil's remediation contractors (HAZCO and Envirocon, Inc.) under the oversight of authorized Time Oil or Landau Associates personnel. The removal activities and verification sampling were conducted by appropriately trained personnel following the applicable health and safety protocols as outlined in the RAPs and the health and safety plan prepared by the remediation contractor (Envirocon, Inc.).

Removal action activities for the soil stockpile and *in situ* soil excavation began on September 3, 2002 and concluded on November 20, 2002. The removal actions in these areas consisted of the removal and disposal of about 9700 tons of soil, including the soil stockpile, the *in situ* soil excavation within and adjacent to the former PCP mixing area, the earthen berm surrounding the stockpile, and surface soil directly below the stockpile footprint. Removal action activities in the former C&O tank area began on August 22 and were completed on September 23, 2002, and consisted of the removal and disposal of 819 tons of soil from depths ranging from about 6 to 30 inches BGS. The removal actions were staged as follows:

- the soil removal in the former C&O area began first to facilitate construction of a truck decontamination pad on the south side of the C&O area for use following loading of soil from the soil stockpile area and to prevent tracking of impacted soil from the area during the removal actions

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- the warehouse decontamination and demolition and removal of miscellaneous items, as described in Sections 3.1.2.4, 3.1.2.5, and 3.1.3 were conducted before *in situ* soil excavation within the former PCP mixing area and below the warehouse to allow for direct access to the removal areas

- the removal of the soil stockpile was conducted before the *in situ* excavation in and adjacent to the former PCP mixing area so that once the stockpile was removed, the area could be used for staging of the *in situ* soil prior to loading and transport to the disposal facility.

Soil removed from the stockpile and *in situ* soil excavation was disposed at the Swan Hills Treatment Center (SHTC - an incineration and landfill facility) in Swan Hills, Alberta, Canada, as approved by DEQ (2002b), EPA (2002), and Environment Canada (2002). Metal debris from the warehouse demolition and other miscellaneous material (e.g., Tank 38009, pipelines) were decontaminated using the procedures described in Section 3.1.2 and recycled at Schnitzer Steel in Portland, Oregon. Tires used to secure the soil stockpile cover were decontaminated as described in Section 3.1.4.2 and disposed at the Tire Disposal Co. Inc., in Molalla, Oregon. Concrete and wood framing were decontaminated as described in Section 3.1.3.1 and disposed at the Hillsboro Municipal Landfill in Hillsboro, Oregon, as approved by DEQ (2002c). Soil removed from the C&O tank area was treated and disposed at TPS Technologies in Lakewood, WA. Manifests for soil disposal are being maintained in the project files located at the Time Oil Environmental Services office in Seattle, Washington. A summary of shipping activities for the soil transported to the SHTC is included in Appendix C. The following sections discuss activities conducted for the removal actions.

3.1.1 APPROVALS AND PERMITS

Before mobilization of equipment and personnel to the site for the removal actions, Time Oil and Beazer East, Inc. received approvals from the United States Environmental Protection Agency (EPA), Environment Canada, and DEQ to treat and dispose the stockpiled and excavated soil at the SHTC in Swan Hills, Alberta, Canada. The SHTC is a hazardous waste incineration and land disposal facility owned by the Government of Alberta, Canada, and operated by Sensor Environmental during the time that soil removal activities were completed. In addition, Envirocon obtained all necessary permits for the soil removal and warehouse demolition activities, including a land disturbance permit and a building demolition permit. Transportation permits were obtained by the Canadian-based subcontractor (Hazco) responsible for the import-export of the waste soil. Time Oil obtained an electrical permit for removal and re-routing of electrical utilities associated with the warehouse. Copies of these approvals and the transportation and disposal permits are provided in Appendix B. Copies of other permits and pertinent

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documentation are maintained in project files at the Time Oil Environmental Services office in Seattle, Washington.

3.1.2 SITE PREPARATION

Site preparation work began on August 19, 2002. Before the start of soil removal activities, the following site preparation activities were conducted:

- definition of work zones and setup of truck loading/decontamination areas and personnel decontamination stations
- stormwater system alteration and removal
- well abandonment
- aboveground tank removal
- product pipeline removal and abandonment
- concrete wall removal.

These activities are described in more detail below. In addition, a local electrician re-routed or removed electrical utilities in the former PCP warehouse before demolition, as overseen by Time Oil personnel. Because the warehouse was constructed only of bare wood framing and metal siding, an asbestos inspection was determined not to be necessary by DEQ.

3.1.2.1 Work Zones

Work zones were established to designate areas for specific tasks performed for the removal actions, as described in the RAP for the warehouse demolition/*in situ* soil excavation. These work zones included a removal action zone, truck loading/decontamination zone, personnel decontamination zone, and clean zone. The work zone area designations are shown on Figure 6.

The removal action zone included the areas where demolition or soil removal activities were being conducted. Only authorized personnel, specifically those meeting project health and safety requirements, were allowed in these areas.

Following removal of soil in the southern portion of the C&O tank area, the remediation contractor prepared a truck loading and decontamination zone within the former soil treatment area at the southern end of the soil stockpile and within the former C&O area. The truck loading and decontamination area was constructed by first removing a section of the concrete wall bounding the eastern side of the soil treatment area and then installing a 4-inch thick asphalt pad measuring approximately 85 ft by 20 ft, as shown on Figure 6. The asphalt pad was contoured to drain to the stormwater catch basin located at the southeast corner of the stockpile. The stormwater catch basin valve

was closed and the basin was used as a sump for truck decontamination liquid. The use of "dry decontamination" methods (e.g., using a broom to remove soil from truck bodies and wheels limited the generation of decontamination liquid. Crushed rock was placed in an area adjacent to the truck loading/decontamination pad for a truck turnout area.

The personnel decontamination stations were placed at two locations: adjacent to the truck loading station and at the northwest corner of the former PCP warehouse just outside of the removal action zone boundary, as shown on Figure 6. The personnel decontamination stations were used to decontaminate site personnel exiting the removal action zone or the truck decontamination zone before entering the clean zone. Procedures described in the warehouse demolition/*in situ* soil RAP and in the project health and safety plan prepared by Envirocon were used for personnel decontamination in this zone.

The clean zone was an area restricted to the boundaries of the terminal property. The clean zone was used for truck staging, ingress and egress for the site, sanitary facilities, and office activities.

3.1.2.2 Stormwater System Alteration and Removal

Two stormwater catch basins located to the southeastern and northeastern corners of the stockpile were re-configured prior to removal activities to prevent stormwater runoff from the stockpile area from entering the storm drain during the removal actions. During removal activities, stormwater was not permitted to discharge directly to the stormwater drain line without treatment and was routed through the existing onsite wastewater treatment system. This was accomplished by shutting off the discharge valves located in the stormwater catch basins, and collecting any surface water runoff in the remedial action zone during the removal activities in the catch basins without movement to the stormwater drain line. The remediation contractor set up pumps in the stormwater catch basins to transfer water from the catch basins, as necessary, to the stockpile leachate collection sump.

The leachate collection sump was located adjacent to the northeastern stormwater catch basin. Surface water runoff from the catch basins or decontamination water from the truck decontamination area was collected in the sump and then pumped into Tank 38009 for temporary storage and treatment at the onsite wastewater treatment system. At completion of the soil removal activities, the remediation contractor abandoned the leachate collection system and the adjacent stormwater catch basin. Leachate collection piping was removed from beneath the stockpile and the leachate collection sump was removed from the subsurface, decontaminated with a pressure washer, and disposed of at the Hillsboro Municipal Landfill in Portland, Oregon. The stormwater catch basin adjacent to the leachate collection sump was removed from the subsurface and decontaminated with a pressure washer and was also disposed of at the Hillsboro Municipal Landfill. All catch basin piping was capped and left in place. The stormwater catch

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basin located within the truck loading area was decontaminated at the conclusion of soil removal activities and the catch basin was restored for use in the stormwater collection system.

3.1.2.3 Well Abandonment

Five monitoring wells (well F, RW-3, LW-2S, LW-12D1, and LW-12D2), located within the former PCP mixing area and stockpile remedial action areas, were abandoned prior to stockpile removal, warehouse demolition and removal, and *in situ* excavation activities. These wells were abandoned in accordance with State of Oregon monitoring well regulations (OAR 690-240-0135) and the RAPs.

Well abandonment activities were conducted by Cascade Drilling, Inc. on August 7-8, 2002 and were supervised by Landau Associates personnel. The driller provided well abandonment records to Oregon Water Resources Department (OWRD) following completion of abandonment activities. Well F was located within the southern extent of the stockpile and was abandoned for ease of removal of the stockpile. Wells RW-3, LW-2S, LW-12D1 and LW-12D2 were all located within the limits of the *in situ* soil excavation. Abandoned monitoring well locations are presented on Figure 7. Monitoring wells F, LW-12D1, and LW-12D2 were constructed of 2-inch diameter PVC and extended to approximately 19, 34.5, and 85.5 ft BGS, respectively. Monitoring well LW-2S was constructed with 4-inch diameter PVC and extended to approximately 17.5 feet BGS. Recovery well RW-3 was 6 inches in diameter and extended to approximately 16.7 feet BGS. Well abandonment procedures included the redrilling of the borehole to the original drilled diameter and depth, removing of all casing, screen, annular seal material, drill cuttings, debris, and filter pack material and sealing the borehole with a bentonite grout slurry.

3.1.2.4 Tank 38009 Decontamination, Demolition, and Removal

Tank 38009 was located within the former C&O tank area as shown on Figure 2. Until recently, this tank had been used to store leachate from the stockpile and investigation-derived wastewater from quarterly groundwater monitoring events and other environmental investigations at the terminal. Tank 38009 required removal to allow for the *in situ* soil excavation in the former PCP mixing area. Prior to removal, the contents of the tank were transferred to the onsite wastewater treatment system. After removing the water, the interior of the tank was decontaminated using a hot water pressure washer. Decontamination of the interior of Tank 38009 was conducted by West Coast Marine Cleaning of Portland, Oregon. The decontamination water was also transferred to the onsite wastewater treatment system. After Tank 38009 was decontaminated, a wipe sample (Tank 38009) was collected by Landau Associates field personnel and analyzed for PCP by Specialty Analytical prior to removal. PCP was not detected in the wipe sample. The decontamination verification sample results are discussed further in

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Section 4.5 and are summarized in Table 4. The tank was then loaded onto a truck and transported to Schnitzer Steel recycling facility in Portland, Oregon. Disposal documentation is provided in Appendix C.

3.1.2.5 Pipeline Decontamination, Abandonment, and Removal

Envirocon decommissioned six former product pipelines located approximately 60 ft south of the former PCP warehouse. The pipelines were located above and below ground surface, and ranged in diameter from 2 to 8 in. The pipelines were decommissioned by removing the pipelines from a point approximately 50 ft west of the northeastern corner of the soil stockpile to a point approximately 120 ft to the east. The portions of the pipeline that were left in place were permanently decommissioned by grouting the lines with concrete (Figure 7). The petroleum product pipelines were reportedly cleaned during terminal closure activities completed in 2001. However, during visual inspection of the pipelines prior to removal, one pipeline contained ethanol. Approximately 20 to 30 gallons of ethanol was spilled during decommissioning of the product pipeline. The spill was contained near the pipeline valve station located approximately 30 to 40 ft east of the former PCP mixing area. Approximately 5 yd^3 of soil was impacted by the ethanol release. The ethanol-impacted soil was added to the soil being removed from the east property for disposal at the TPS facility in Portland, Oregon. The remainder of the ethanol in the pipeline was recovered by West Coast Marine Cleaning. The pipelines were flushed with water from the hydrant system onsite. This water was vacuumed directly from the pipelines by West Coast Marine Cleaning and transferred to Tank 16804 for subsequent treatment by the onsite wastewater treatment system. Once the pipelines were flushed and visually inspected, the pipelines were cut into transportable pieces and recycled at Schnitzer Steel recycling facility. About 14 tons (27,300 lbs) of piping was recycled. Disposal documentation is provided in Appendix C.

3.1.2.6 Concrete Wall Decontamination, Demolition, and Removal

Envirocon personnel decontaminated and removed concrete walls located east of the soil stockpile and southeast of the former PCP warehouse to provide access for the soil removal activities. Each of these walls was approximately 3 ft high by 8 in thick and the combined total linear footage was approximately 250 ft. Before removing the walls, the remediation contractor decontaminated portions of the concrete that were located directly adjacent to the former PCP mixing area or soil stockpile using a hot water pressure washer. Following decontamination, a Landau Associates field representative collected pulverized concrete samples (PCPWH-007 and –017) for PCP analysis by Specialty Analytical. PCP was not detected in any of the samples collected. The decontamination verification sample results

are discussed further in section 4.5 and are summarized in Table 4. As discussed earlier and as approved by DEQ, the concrete walls were then broken into transportable pieces and transported offsite for disposal at the Hillsboro Municipal Landfill with the debris from the warehouse demolition. Disposal documentation is provided in Appendix C.

3.1.3 FORMER PCP WAREHOUSE DEMOLITION

Before excavating soil from within the former PCP mixing area, the former PCP warehouse was removed in order to gain unrestricted access to impacted soil under the building. Warehouse removal activities included disconnecting and removing all utilities, decontamination of the building interior, metal siding, wood framing, concrete walls, and foundations; and segregation and disposal of demolition debris. As mentioned earlier, because the warehouse building materials consisted only of bare wood framing and metal siding, an asbestos survey was not conducted, as agreed upon verbally with DEQ.

The following section discusses the methods used for decontamination and demolition of the former PCP warehouse. Decontamination verification sampling results are further discussed in Section 4.4 and are summarized in Table 4. Debris disposal documentation is provided in Appendix C.

3.1.3.1 Warehouse Decontamination

Before demolition of the warehouse, Envirocon used a pressure washer to decontaminate the interior of the building. As described in the October 17, 2002 letter to DEQ (Schwabe et.al. 2002), the decontamination procedure was conducted in compliance with 40 CFR §268.45 and was consistent with the approach formerly approved by DEQ's Voluntary Cleanup and Hazardous Waste programs (DEQ 1997). The warehouse was decontaminated twice, first using a cold water pressure washer, followed by a hot-water pressure water to decontaminate wood framing, metal siding and supports, and the concrete walls and foundation of the warehouse. The pressure washer was used to physically remove the upper surface layer (about 1 millimeter) of material coating the wood framing resulting in a clean wood surface. The metal siding and concrete were pressure washed thoroughly to a clean debris surface. Decontamination water was contained by lining the interior building perimeter with a temporary berm consisting of straw bales and diverting the water toward low areas in the floor. The decontamination water was vacuumed from the floor and placed into 55-gallon drums. The drummed decontamination water was then transferred to Tank 38009 for subsequent treatment at the onsite wastewater treatment system.

The decontamination process was conducted over a period of three days, beginning on August 19, 2002. On August 20, 2002 after the cold water decontamination process was completed, Landau

Associates collected two wood core verification samples (PCPWH-003 and -004) from the wood framing, two concrete chip samples (PCPWH-005 and -006) from the concrete walls and foundation, and two metal wipe samples (PCPWH-001 and -002) from the metal siding to verify adequacy of the decontamination procedure. These samples were analyzed for PCP by Specialty Analytical. On September 9, 2002, after the analytical results for the initial verification samples showed PCP concentrations exceeding 1 ppm, Envirocon personnel conducted an additional round of decontamination using a hot water pressure wash, taking extra precaution to confirm visually that decontamination was complete. On September 10, 2002, Landau Associates collected an additional two wood core verification samples (PCPWH-011 and -012), four concrete chip samples (PCPWH-013 through -016), and three metal wipe samples (PCPWH-008 through -010) for PCP analysis. As discussed further in Section 4.4 and summarized in Table 4, the second set of results indicated that PCP concentrations in the metal wipes and in the concrete samples were nondetect or less than 1 mg/kg and were less than 4 mg/kg in the wood cores following the second cleaning. As approved by DEQ (2002c), the warehouse demolition debris was considered to be sufficiently decontaminated based on these results and debris was classified as non-hazardous waste. Figure 16 presents the final verification sampling locations and PCP results.

3.1.3.2 Warehouse Demolition

After decontamination and verification sampling was completed, the remediation contractor demolished the former PCP warehouse. During demolition, the building debris was segregated for disposal. Approximately 1.5 tons (2950 lbs) of corrugated metal roof and siding and associated structural supports were recycled at the Schnitzer Steel recycling facility in Portland, Oregon. The results of the verification samples for the concrete (see Section 4.4) confirmed that the materials are not considered hazardous waste. Residual PCP concentrations detected in wood core verification samples appeared to be from use of treated wood during construction of the warehouse; therefore, DEQ determined that the wood is not hazardous waste (DEQ 2002c). Based on DEQ's approval, a total of 197 tons of the wood framing and concrete were disposed of at the Hillsboro Municipal Landfill in Hillsboro, Oregon, a permitted RCRA Subtitle D solid waste facility.

3.1.4 SOIL REMOVAL AND DISPOSAL

As discussed previously, soil removal and disposal for the three removal actions were staged to facilitate setup and completion of the subsequent removal actions. Because of similarities in the methodology used for soil removal within the removal action areas, this section combines the description for this activity. Details specific to each removal action are provided in the subsections below.

3.1.4.1 Crosby & Overton Tank Area

To facilitate setup of truck decontamination and turn-around areas for the soil removal actions associated with the stockpile and *in situ* soil excavation in the former PCP mixing area, and to prevent tracking of impacted soil from this area during the removal actions, the soil removal in the former C&O tank area was initiated first.

The soil removal work in the former C&O tank area was initiated on August 22, 2002 and the last of the excavated material was loaded out on September 23, 2002. The initial work consisted of removal of an approximate 6-inch thick layer of soil from the area shown on Figure 13. Additional visibly dark-stained soil was also removed at the locations of the former tank pads. The excavated soil was either directly loaded into trucks for offsite disposal or staged temporarily in stockpiles located adjacent to the excavation areas prior to transport of the soil to the offsite disposal facility.

Once the visibly impacted soil had been removed, verification samples were collected. Additional soil was subsequently removed from selected areas where the initial verification samples indicated concentrations of total PCBs greater than 700 µg/kg or individual PAHs greater than 1,000 µg/kg. The approximate final soil removal depths ranged from a minimum of about 0.5 ft over much of the area to a maximum of about 30 inches in the former location of Tank 10002. The final verification sample results represent the concentrations remaining in soil at the base of the excavated areas, as shown on Figure 13 and 14 for total PCBs and selected cPAHs, respectively. The results for the verification samples are discussed further in Section 4.3. A total of 819 tons of soil were removed from the C&O tank area for treatment and disposal at the TPS Technologies, Inc. facility in Lakewood, Washington. A copy of the disposal certificate for the C&O area soil is included in Appendix C.

3.1.4.2 PCP-Impacted Soil Stockpile

Removal of the PCP-impacted soil stockpile began on September 3 and concluded on November 20, 2002. Removal of the soil stockpile was conducted by Envirocon using a trackhoe to load the soil directly onto plastic-lined trucks in the designated truck loading area (Figure 6). The trackhoe and a bulldozer were used to move the soil to the southern side of the stockpile area for easy access during truck loading. The stockpile cover was only removed to allow access to the portions of the stockpile that were being loaded and the cover was reinstalled over the stockpile and secured at the conclusion of each work day. The removal action for the stockpile resulted in the removal and disposal of approximately 2,400 yd^3 of soil.

After the soil stockpile was removed, Envirocon also removed the stockpile liner, and an additional 0.5 to 1 ft of soil within the stockpile footprint. Landau Associates collected verification samples from below the stockpile footprint to confirm that visibly impacted soil had been removed. In areas where the verification soil samples contained PCP concentrations exceeding 5 mg/kg, additional impacted soil was removed to final excavation depths ranging from 0.5 to 3 ft BGS (Figure 15). Verification sampling activities and results are discussed further in Section 4.1.

The stockpile covers and liners were incorporated with the soil and transported and disposed with the soil at the SHTC. The water tubes used to hold the stockpile cover in place prior to removal were drained of water and also disposed at the SHTC. Tires that historically were used to secure the cover of the soil stockpile were decontaminated by Envirocon using a hot water pressure washer and disposed at Tire Disposal Co. Inc. in Molalla, Oregon (Appendix C).

3.1.4.3 *In Situ* Soil Excavation

Following demolition of the warehouse, soil impacted with PCP within and adjacent to the PCP mixing area and beneath the footprint of the warehouse was removed. The *in situ* soil excavation began on September 23, 2002 and concluded on October 23, 2002. The soil designated for removal was divided into three types, including: "clean" overburden soil, "impacted" soil, and "high PCP impacted" soil (approximately greater than 1,000 mg/kg PCP) based on the pre-removal soil concentrations. The extent of the *in situ* excavation was further divided into three excavation depths or tiers to minimize sloughing of clean ground surface and sidewall soil into the excavation, to limit the need for shoring of the excavation, and to allow for reasonable segregation of PCP-impacted soil and the clean fill. The boundaries of the "clean" overburden soil are shown on Figure 8. The shallow excavation, as shown on Figure 9, included a 0 to 0.5 ft excavation area to the west of the former PCP warehouse, a 0 to 2 ft excavation area in the southeastern portion of the former PCP mixing area and the north portion of the former C&O tank area, and a 0 to 5 ft excavation area within and adjacent to the former PCP mixing area. The 5 to 10 ft and the 10 to 13 ft excavation areas were defined within the boundary of the 0 to 5 ft excavation area, as shown on Figures 10 and 11. The boundaries for each of the excavation areas were surveyed by Landau Associates personnel using a Global Positioning System (GPS) prior to soil removal.

Once the boundaries of the "clean" overburden soils were delineated in the field, the remediation contractor removed the soil to the desired approximate depths and limits as directed by the Landau Associates field representative by utilizing a trackhoe and bulldozer. The overburden soil was removed first so that the clean overburden soil could be segregated from the impacted soil for later use as backfill in the excavation area. Most of the overburden soil was temporarily stockpiled just beyond the northern and southern extents of the *in situ* excavation. The clean overburden soil removed from beneath the

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footprint of the former soil stockpile and from the area adjacent to the north side of the soil stockpile was temporarily stockpiled at the east side of the southwestern lobe of the excavation area. A total of about 1,700 yd^3 of clean overburden soil was removed from the excavation, stockpiled, and ultimately used as backfill for the excavation.

Following the removal and segregation of clean overburden, the PCP-impacted soil was removed. As described above, the excavation of the impacted soil was conducted in 5-ft lifts (tiers) to minimize sloughing of clean sidewall soil into the excavation and to only target PCP-impacted soil during removal of each tier. Whenever possible, the high PCP-impacted soil was removed first before the impacted soil. Landau Associates personnel used field screening instruments (e.g., photoioniziation detector) and pre-removal results to delineate high PCP-impacted soil. The high PCP impacted soil was stockpiled separately from the impacted soil following removal and during transport to the disposal facility. The maximum depth of the *in situ* excavation was to about 13 feet BGS, the approximate depth of the water table. The *in situ* excavation effort resulted in the excavation of approximately 6,400 yd^3 of PCP-impacted soil, including approximately 90 yd^3 of high PCP-impacted soil from beneath the southwest corner of the PCP warehouse.

Impacted soils were removed from the excavation and placed directly within the footprint of the former soil stockpile located south of the excavation. (Note that the soil stockpile was almost completely removed from the site for disposal before soil from the *in situ* excavation was staged in the soil stockpile area.) Soil impacted with high PCP concentrations was also placed within the footprint of the former stockpile, but stockpiled separately from all other soils. Offsite disposal of the impacted soil was conducted in conjunction with the removal of the soil stockpile and followed the protocols discussed in Sections 3.1.6 and 3.1.7.

Following completion of the *in situ* excavation of impacted soil for each tier, a Landau Associates' field representative collected soil verification samples at the base and sidewalls of the excavation to verify that the cleanup action levels were met. Based on the initial verification sampling results, the excavation was extended where soil PCP concentrations exceeded 5 mg/kg, including along the south and southwestern boundaries of the excavation to a total depth of 13 ft (approximate water table), and along the southeastern extent of the excavation to a total depth of 2 ft. The extent of the excavation boundaries and the verification sample locations and PCP concentrations are shown on Figures 9, 10, and 11. Soil verification sample results are discussed further in Section 4.2.

3.1.5 STORMWATER MANAGEMENT

During soil removal activities and temporary stockpiling of soil before loading onto trucks for disposal, the remediation contractor conducted stormwater management to prevent contaminant migration

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from the removal action areas. The remediation contractor conducted the following stormwater management activities:

- Keeping the stockpiled material covered with the current stockpile cover or with minimum 4-mil thick polyethylene sheeting at times when the material was not being loaded on trucks

- Using a portion of the clean fill material removed from the excavation to create a berm around the perimeter of the excavation area to divert stormwater around the excavation area

- Diverting stormwater from remedial action zones to two stormwater catch basins located near the southeast and northeast corners of the stockpile. As referenced in Section 3.1.2.2, the discharge piping from the catch basins was closed during site preparation and soil removal activities to prevent stormwater from flowing into the stormwater drain line that discharges to the Willamette River. Accumulated stormwater was pumped from the stormwater catch basins to the leachate collection sump located near the northeastern side of the stockpile and then transferred to the onsite wastewater treatment system.

After completion of the removal actions, the stormwater catch basin on the northeast side of the soil stockpile was removed, decontaminated, and disposed offsite at the Hillsboro Municipal Landfill. The stormwater catch basin located in the truck loading area was decontaminated in place and restored for use in the stormwater collection system onsite.

3.1.6 TRUCK LOADING/DECONTAMINATION

Truck loading/decontamination for the soil stockpile and *in situ* soil excavation removal actions was conducted within the designated zone for this activity (see Section 3.1.2.1) and in general accordance with the RAP for the warehouse demolition/soil excavation. A trackhoe was used to load soil directly onto trucks from the southern side of the soil stockpile area. Before the trucks exited the loading area, the remediation contractor would either dry brush visible soil from the sides of the truck boxes and tires or would use a water pressure washer during rainy conditions to clean the sides of the truck boxes and tires until all visible soil was removed. When necessary, the decontamination liquid collected in the sump was pumped to Tank 38009 for treatment in the existing onsite wastewater treatment system. The solid residual was incorporated into the soil for offsite disposal at the SHTC. Before leaving the site, the trucks were weighed using an onsite weight scale to ensure the proper traveling weight was achieved (Figure 7). All loads were then covered with tarps, secured, and placarded.

Soil removed from the former C&O tank area was loaded directly from the temporary stockpile for transport to the TPS Technologies facility in Lakewood, Washington, for treatment and disposal. As necessary, trucks were decontaminated and loads secured as described above. Disposal documentation is provided in Appendix C.

3.1.7 MATERIAL TRANSPORT/DISPOSAL

Each truck transporting PCP-impacted soil or materials from the soil stockpile or *in situ* soil excavation from the terminal was accompanied by a proper manifest for crossing the USA-Canada border and for transporting the material on USA and Canadian highways. The waste manifests identified the generator of the material, the transporter of the material, the point of departure and the destination of the material, the type of material being transported, the quantity of material, the loading date, and any approval codes (import/export and disposal) that were necessary to properly track the waste. Truck drivers followed one of three pre-determined routes from the terminal to the SHTC.

Upon arrival at the SHTC, truck drivers followed a standard facility procedure to dispose of their loads. The trucks were routed though an entrance gate and the truck drivers presented gate personnel with the manifest for their load. The gate personnel recorded the weight of all trucks and provided direction to the proper deposition location for the soil and the soil liner and cover. Prior to exiting the facility, trucks were decontaminated as directed by facility personnel. Truck drivers remained in their cabs during the decontamination process and during unloading.

3.1.8 EQUIPMENT REMOVAL/SITE DEMOBILIZATION

Following the completion of soil and miscellaneous material loading, the truck loading area was decommissioned. The asphalt pad was swept to remove any loose soil and the pad was left in place. All heavy equipment used during the removal action was decontaminated at the truck decontamination station and the decontamination water was transferred to the onsite wastewater treatment system. Following decontamination of the equipment, accumulated soil in the sump or on the grate was added to material for offsite disposal at the SHTC. The stormwater catch basin on the northeast side of the former soil stockpile and the adjacent leachate sump were removed from the subsurface and decontaminated before removal from the site. The metal grate was decontaminated in place and decontamination water was collected, to the extent possible, and transferred to the wastewater treatment system. The sump and heavy equipment were loaded onto flatbed transport trucks for removal from the site.

4.0 VERIFICATION SAMPLING RESULTS

Verification samples were collected at the completion of decontamination and soil removal activities to verify completion of the activities and to demonstrate compliance with designated cleanup action levels. Soil verification samples were collected from the base and sidewalls of the excavation within the former PCP mixing area, from the base of the excavation within the soil stockpile footprint, and from the base of the excavation in the former C&O tank area following soil removal. Verification samples were also collected of wood framing, concrete foundation and supports, and metal siding from the former PCP warehouse before demolition, concrete walls bounding the removal action areas, and tank 38009 before removal. This section discusses the sampling locations and analytical results for the verification sampling. Final verification sampling locations and PCP results for the *in situ* soil excavation are presented on Figures 9 through 11 for the three tiers (0 to 5 ft, 5 to 10 ft, and 10 to 13 ft, respectively). Final verification sampling locations and results from beneath the stockpile footprint are presented in Figure 15. Final verification sample locations and total PCBs and cPAH results for the former C&O tank area are shown on Figures 13 and 14. Sample locations and PCP results for the verification decontamination samples within the former PCP warehouse and from the concrete walls before demolition are shown on Figure 16. Verification sample results are provided in Tables 1 through 4. Verification sampling procedures are provided in Appendix A. Quality assurance/quality control procedures were conducted in accordance with the quality assurance project plan for the terminal (Landau Associates 2001c).

4.1 SOIL STOCKPILE AREA

Following the removal of the soil stockpile and soil from beneath the stockpile footprint at depth up to 3 ft BGS, as described in Section 3.1.4.2, verification samples were collected from the base of the excavation. A total of 20 verification samples were collected; the results from seven [SP-1-CONF, SP-2(1.5), SP-3-CONF, SP-4-CONF, SP-5-RECONF, SP-6-CONF, and SP-7-CONF] of these locations represent soil conditions in place at completion of the removal action in the soil stockpile area. Soil from the additional 13 locations was subsequently removed and disposed offsite because PCP concentrations exceeded the soil cleanup action level of 5 mg/kg. The final verification samples were located at approximately the same sample locations as the initial samples that were removed, but at greater depths where additional excavation occurred. The final verification sampling locations, soil removal depths, and PCP results are presented on Figure 15. Table 1 includes the analytical results for the soil stockpile verification samples Data validation reports and laboratory data packages are included in Appendices E and F, respectively.

Final PCP concentrations ranged from nondetect [SP-1-CONF, SP-2(1.5), SP-4-CONF, SP-5-RECONF, and SP-6-CONF) to 1.46 mg/kg (SP-7-CONF]. Dioxin/furan and metals analyses were also performed at SP-1-CONF and SP-3-CONF. The analytical results indicated dioxin/furan concentrations (as total TEQ) ranged from 13.7 ng/kg (SP-1-CONF) to 1,135.56 ng/kg (SP-3-CONF). Concentrations of the six metals analyzed (arsenic, chromium, copper, lead, nickel and zinc), ranged from nondetect to 354 mg/kg with the highest concentration occurring at sample location SP-3-CONF for zinc.

A discussion of the final verification sample results in relation to achieving the removal action objectives and cleanup action levels is presented in Section 6.0.

4.2 *IN SITU* SOIL EXCAVATION

At completion of *in situ* soil excavation activities within and adjacent to the former PCP mixing area, soil verification samples were collected at the base and the sidewalls of the excavation to verify that soil cleanup action goals were met at completion of the removal action in this area. Verification samples were collected at the locations shown on Figures 9, 10, and 11 as excavation for each of the tiers was completed. Following evaluation of the analytical data, the tiers were expanded if the cleanup level goals were not obtained, and additional verification samples were collected for coverage of the expanded areas As discussed previously, the limits of the impacted soil excavation were extended approximately 10 ft to the south and approximately 15 to 20 ft to the southwest in areas where verification sample results showed PCP concentrations exceeding the soil cleanup action level of 5 mg/kg. Because the verification sample results indicated that PCP concentrations were nondetect or less than 2 mg/kg for the 0 to 5 ft and 5 to 10 ft lifts in the extended excavation areas, the soil excavated from approximately 0 to 7 ft BGS in these areas were segregated from the impacted soil and used for backfill in the excavation areas. Figures 9 through 11 present the final verification sampling locations and analytical results. A total of 13 base of excavation and 31 sidewall samples were collected from the *in situ* soil excavation. Of these, 18 sidewall and 8 base of excavation verification samples represent PCP concentrations remaining in soil in this area at completion of the removal action. Sample results for all *in situ* soil excavation verification samples collected are presented in Table 2.

PCP concentrations for the final soil verification samples collected from the shallow excavation (total excavation depth ranged from 0.5 to 5 ft) ranged from nondetect to 1.7 mg/kg (SW-5-6A), as shown on Figure 9. Residual PCP concentrations in soil at the 5 to 10 ft excavation depth ranged from nondetect to 3.1 mg/kg (SW-10-6) (Figure 10). Residual PCP concentrations in soil at the 10 to 13 ft excavation depth ranged from nondetect to 44.7 mg/kg at the base of the excavation (B-15-3). All of the final verification sample PCP results collected from the west and southwest portions of the 10 to 13 ft excavation exceeded the soil cleanup action level, ranging from 7.7 to 44.7 mg/kg. Excavation was

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terminated to the southwest due to the close proximity to the access road and monitoring wells (J1, J2, and J3). Groundwater analytical results from these wells have consistently shown low levels of PCP over the historical monitoring period (1997 to present).

Five of the final verification samples were also analyzed for dioxins/furans, including sample locations B-10-02, B-15-01, SW-05-06A, SW-10-08, and SW-15-05. Dioxin/furan results for these samples (as total TEQ) ranged from 0.114 ng/kg (SW-10-08) to 350.09 (SW-05-06A) ng/kg. The dioxin/furan results are presented in Table 2.

The data validation technical memoranda and laboratory data packages for the verification samples within the *in situ* soil excavation are included in Appendices E and F, respectively. A discussion of the final verification sample results in relation to achieving the removal action objectives and cleanup action levels is presented in Section 6.0.

4.3 CROSBY & OVERTON AREA

A total of 11 soil samples were collected from the former C&O tank area during the soil removal action activities. Of the samples collected, the results for 6 samples represent the concentrations of PCBs and PAHs remaining in place following the removal action. The 6 final verification sample locations and results used to document the removal action are shown on Figure 13 for total PCBs and Figure 14 for selected cPAHs. At 4 of the 6 final sample locations, PCBs were not detected at concentrations greater than the laboratory reporting limits. Results for the remaining 2 locations (samples COTA-001 and COTA-006B) showed detectable concentrations of total PCBs at concentrations of 0.13 and 1.61 mg/kg, respectively. The individual cPAH results at these locations ranged from nondetect concentrations [benzo(a)anthracene at COTA-003A and COTA–005A; benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene at COTA-005A] to a maximum concentration of 2.37 mg/kg [benzo(b)fluoranthene at COTA-003A]. The PCB and PAHs results for the C&O area verification soil samples are presented in Tables 1 and 2, respectively. The laboratory data packages and the data validation technical memorandum for the former C&O tank area samples were provided with the east property remedial action completion report (Landau Associates 2003).

A discussion of the final analytical results in relation to the remedial action objectives and project cleanup levels is presented in Section 6.0.

4.4 FORMER PCP WAREHOUSE

Verification sampling of the decontamination procedures of debris associated with demolition of the former PCP warehouse included 2 separate sampling events of wood, metal, and concrete prior to

demolition. A total of 5 metal wipe samples, 4 wood samples and 6 concrete samples were collected from within the warehouse for disposal characterization.

PCP concentrations for the final verification metal wipe samples ranged from nondetect to about 0.04 mg/wipe at PCPWH-008. PCP concentrations for the final verification concrete sample results ranged from nondetect to about 0.61 mg/kg at PCPWH-013. PCP results for the 4 wood samples collected during both rounds of verification sampling ranged from about 0.13 mg/kg (PCPWP-004) to 3.69 mg/kg (PCPWH-011). As discussed in Section 3.1.3, DEQ determined that none of the warehouse debris materials were hazardous waste and all materials were disposed at the Hillsboro Landfill. Figure 16 presents the final verification sampling locations and results for decontamination of the former PCP warehouse. PCB results from the decontamination sampling are provided in Table 4. The data validation report and laboratory data packages are included in Appendices E and F, respectively.

4.5 MISCELLANEOUS ITEMS

Verification samples were also collected from the bulk storage Tank 38009 and concrete walls east of the former PCP mixing area and adjacent to the east side of the soil stockpile and analyzed for PCP to verify completion of decontamination. PCP results for the metal wipe sample and the concrete samples were all nondetect. These materials were recycled and disposed offsite as described in Sections 3.1.2.4 and 3.1.2.6. PCP results for the verification samples collected from miscellaneous items following decontamination are summarized in Table 4. The data validation report and laboratory data packages are included in Appendices E and F, respectively

5.0 EXCAVATION BACKFILL ACTIVITIES

Following completion of verification sampling activities, the soil removal action areas were backfilled using the clean overburden material removed from the *in situ* soil excavation and clean imported fill. The clean fill was acquired from the Morse Brothers Angell Quarry in Portland, Oregon. The clean overburden material was first placed at the base of the excavation and the remaining portion of the excavation was backfilled using the imported fill material. Envirocon placed the backfill in the excavation in approximately 1-ft lifts using a front-end loader or backhoe, and compacted it using a roller compactor. Following backfilling and compaction, the ground surface was graded to approximately pre-removal surface elevation and was graded so that surface water runoff was diverted away from the former PCP mixing area.

Prior to placing and compacting backfill in the excavation area, Time Oil gained approval from the DEQ Underground Injection Control (UIC) Division to install injection points that could potentially be used for remedial activities in the future. Landau Associates oversaw the installation of 6 horizontal manifolds (MPLINE01, MPLINE02E, MPLINE02W, MPLINE03E, MPLINE03W, and MPLINE04) at the locations indicated on Figure 14. The remediation manifolds were placed at the base of the excavation at approximately 12 ft BGS and consisted of six separate pipeline laterals covering the excavation area. The piping consisted of 4-inch diameter schedule 80 PVC screen with 4-inch schedule 80 PVC risers on each end of the screened sections. The screen intervals were covered by a cloth filter and surrounded with approximately 6 inches of gravel to prevent clogging of the screen sections. At the time the manifolds were installed, it was anticipated that the manifolds could be utilized for a variety of remedial applications including *in situ* chemical oxidation (ISCO), bioventing, biosparging, air sparging, and soil vapor extraction (SVE). A memorandum providing a plan for use of the remediation manifolds and the construction information is currently being prepared by Landau Associates.

6.0 SUMMARY AND CONCLUSIONS

This report documents completion of removal actions within Phase I and II areas of the Time Oil Northwest Terminal, including the former soil stockpile area, the former PCP mixing area, the former PCP warehouse, and the former C&O tank area. The removal action activities included the following:

- Removal of a total of 9,695 tons of PCP-impacted soil from the stockpile and *in situ* soil excavation and disposal at the SHTC in Swan Hills, Alberta, Canada.

- Removal of a total of 819 tons of PCB and PAH-impacted soil from the former C&O tank area and treatment and disposal at the TPS Technologies facility in Lakewood, Washington.

- Demolition of the former PCP warehouse.

- Removal of former PCP warehouse demolition debris and miscellaneous items, including Tank 38009, concrete walls bounding the removal action areas, and tires used to secure the soil stockpile cover. A total of 2.95 tons of metal debris was recycled at Schnitzer Steel Products Co. recycling facility in Portland, Oregon; the concrete from the warehouse and walls and the wood framing from the warehouse were disposed at the Hillsboro Municipal (Subtitle D) Landfill, in Hillsboro, Oregon, following approval from DEQ that the debris was non-hazardous waste. Tires previously used to secure the soil stockpile cover were disposed at the Tire Disposal Co., Inc. in Molalla, Oregon.

- Collection of soil verification samples from each of the soil removal action areas following completion of excavation to determine if soil concentrations remaining following removal met cleanup action level goals. Collection of decontamination verification samples of warehouse demolition debris and miscellaneous items to verify completion of the decontamination process prior to demolition and/or disposal.

- Installation of remediation manifolds within the former PCP mixing area for use in future soil and groundwater remediation activities.

- Backfill of the removal action areas following completion of excavation with clean overburden material and clean imported fill, and compaction and grading to the approximate original surface.

Removal action objectives and cleanup action levels for each of the removal actions are identified in Section 2.3. These objectives and cleanup goals were achieved for all of the removal actions, with two exceptions:

- In the former PCP mixing area, PCP concentrations exceeded the cleanup action level of 5 mg/kg in about a 6,000 ft^2 area within the west-southwest portion of the 10 to 13 ft excavation. Concentrations exceeding the cleanup level were not excavated because of the logistics associated with excavation below the groundwater table and the costs and timing associated with continual removal of soil for offsite disposal at SHTC. An ISCO technique has been tested for use at the terminal for reduction of PCP concentrations in soil and groundwater at depths within the groundwater smear zone within the former PCP mixing area. It is anticipated that additional implementation of the ISCO technique will be effective in reducing PCP concentrations to acceptable levels.

- In the former C&O tank area, PCB and cPAH concentrations at a single verification sample location within the southern portion of the area exceeded soil cleanup action levels. The residual total PCB and individual cPAH concentrations exceeding the cleanup levels are limited in extent and are not expected to provide a complete exposure pathway to ecological or human receptors because the soil is buried under approximately 1.5 ft of backfill and groundwater quality results in this area at well LW-5S before the removal action showed nondetect PCB and cPAH concentrations over a 1 year period from 1997 to 1998.

The information provided within this report indicates that the removal actions are complete for the soil stockpile area, the *in situ* soil excavation area, and the former C&O tank area. Additional remediation in the former PCP mixing area will be addressed as an additional interim removal action or as a final remedy. The removal actions and additional remediation activities will be incorporated into the Record of Decision (ROD) for the terminal.

Risk to human and ecological receptors at the terminal will be assessed in a terminal-wide risk assessment following completion of Phase III remedial investigation activities. The risk assessment will be used to establish site-specific cleanup levels that are protective of human health and the environment for all remaining constituents of concern, including PCP present in residual soil, for use in conducting a terminal-wide feasibility study (FS) and for recommending terminal-wide remedial action. Time Oil believes that the soil removal actions described herein assure protection of human health and the environment and that no further action will be necessary for vadose zone soil below the former soil stockpile and within the former C&O tank area.

7.0 USE OF THIS REPORT

This completion report has been prepared by Landau Associates for the exclusive use of Time Oil Co. for specific application to the Northwest Terminal. Services for this project were conducted in accordance with the Environmental Services Contract between Time Oil Co. and Landau Associates, Inc. Landau Associates has performed our services in accordance with generally accepted engineering and consulting standards for environmental work in effect at the time and locality services were performed. The reuse of information, conclusions, and recommendations provided herein by Time Oil Co. or others in connection with any site other than the Northwest Terminal without Landau Associates written permission shall be at the sole risk of Time Oil Co. and without liability to Landau Associates.

This document was prepared under the supervision and direction of the following key staff.

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BZTO104(e)017085

8.0 REFERENCES

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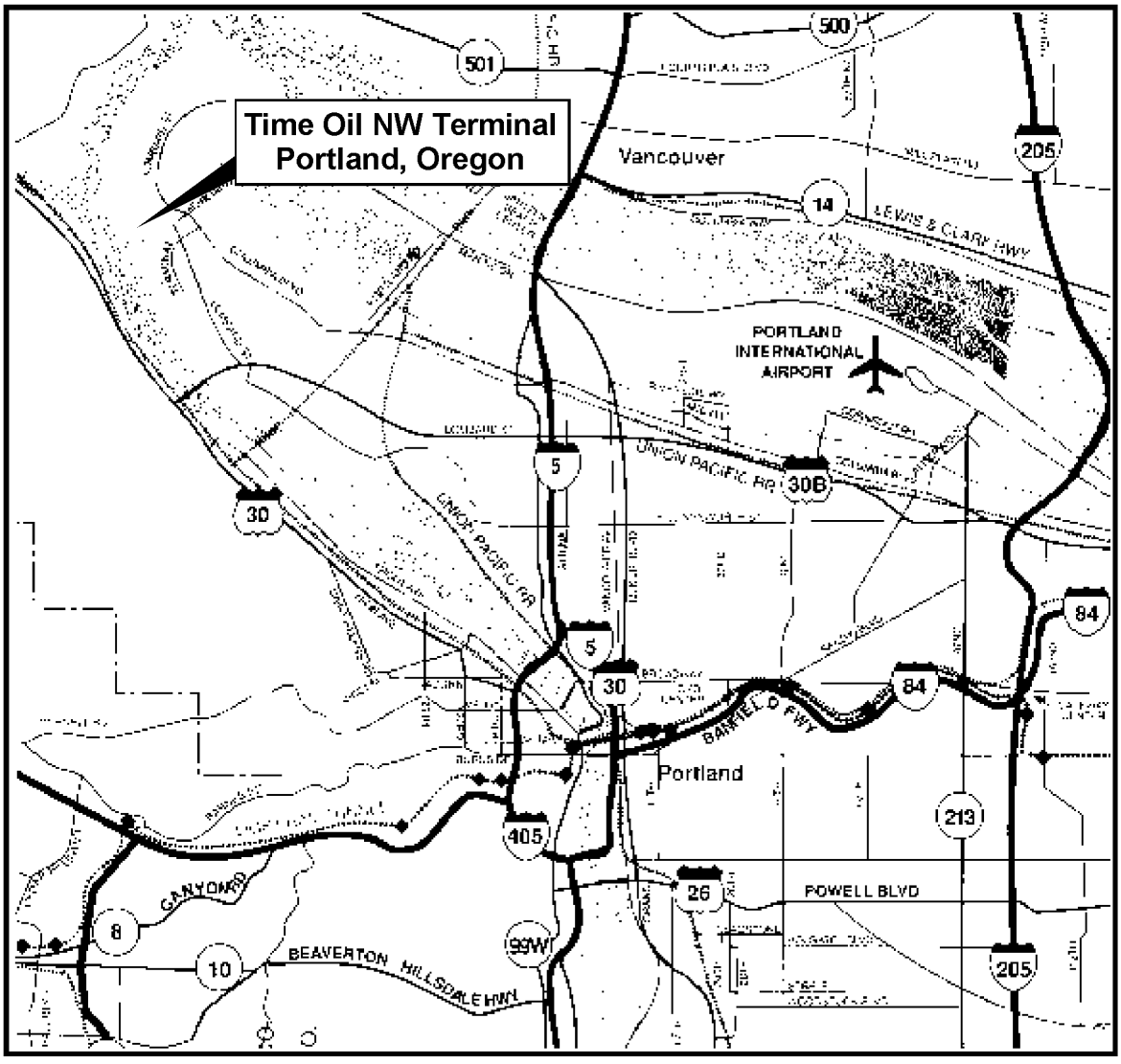
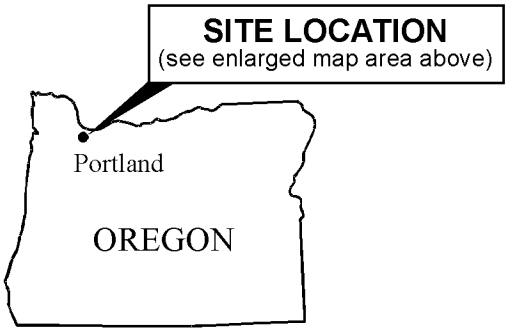


Map from MetroAmerica 1995



0 2 4

Approximate Scale in Miles

Time Oil/Phase I/II Areas Soil Removal Action Completion Report | T:\231\00\11172\Phase I-II Areas Soil Removal Action Completion Report\Fig1.cdr (C) 06/13/2003

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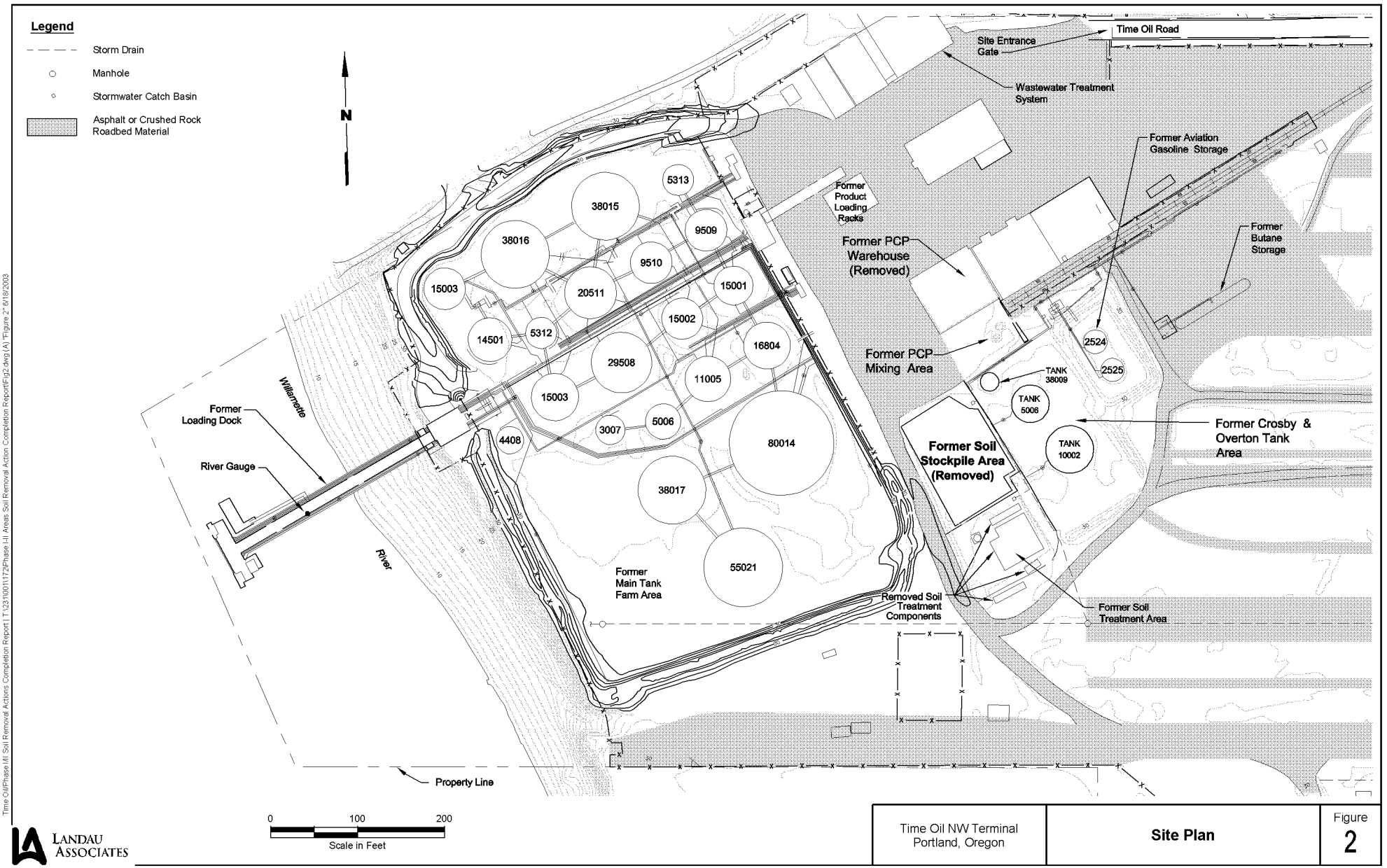
Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

BZTO104(e)017088



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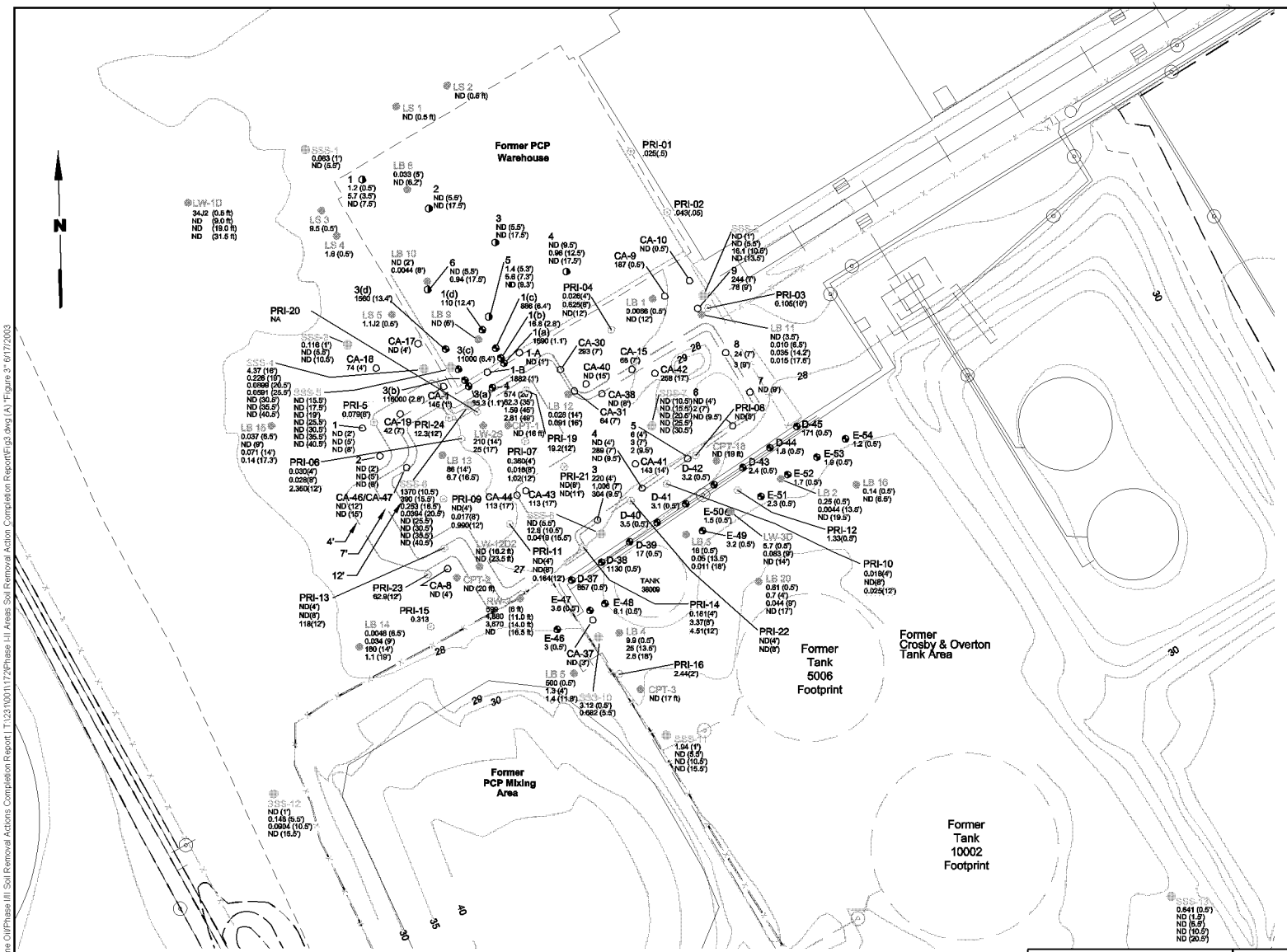
Time Oil NW Terminal Portland, Oregon	Site Plan	Figure 2

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig2.dwg (A) "Figure 2" 6/18/2003

BZTO104(e)017089



Legend:

- Soil Data from Phase II RI
- Historical Soil Data (Ecova 1989)
- Historical Soil Data (Riedel 1985)
- Historical Soil Data (SRH 1986)
- Phase II Supplemental Sampling Data
- Pre-Removal Investigation Data
- ND Not Detected
- NA Not Analyzed

Location Identifier → LB 10

PCP Concentration (mg/kg) { ND (2') / 0.0044 (8') } Depths Below Ground Surface in ft

Approximate Limits of Excavation (Ecova 1989)

28 Pre-Removal Ground Surface Elevation Contour

Notes:

1. Samples 1(a), 1(b), 1(c), and 1(d) were collected from one angled well boring (Well 1).
2. Samples 3(a), 3(b), 3(c), and 3(d) were collected from one angled well boring (Well 3).
3. All concentration units are mg/kg.
4. The depth of sample is the base of the sample interval.
5. The sample result is the maximum concentration of field duplicates and analyses by EPA Methods 8040 and 8270.
6. Sample results are not shown for soil excavated in 1981.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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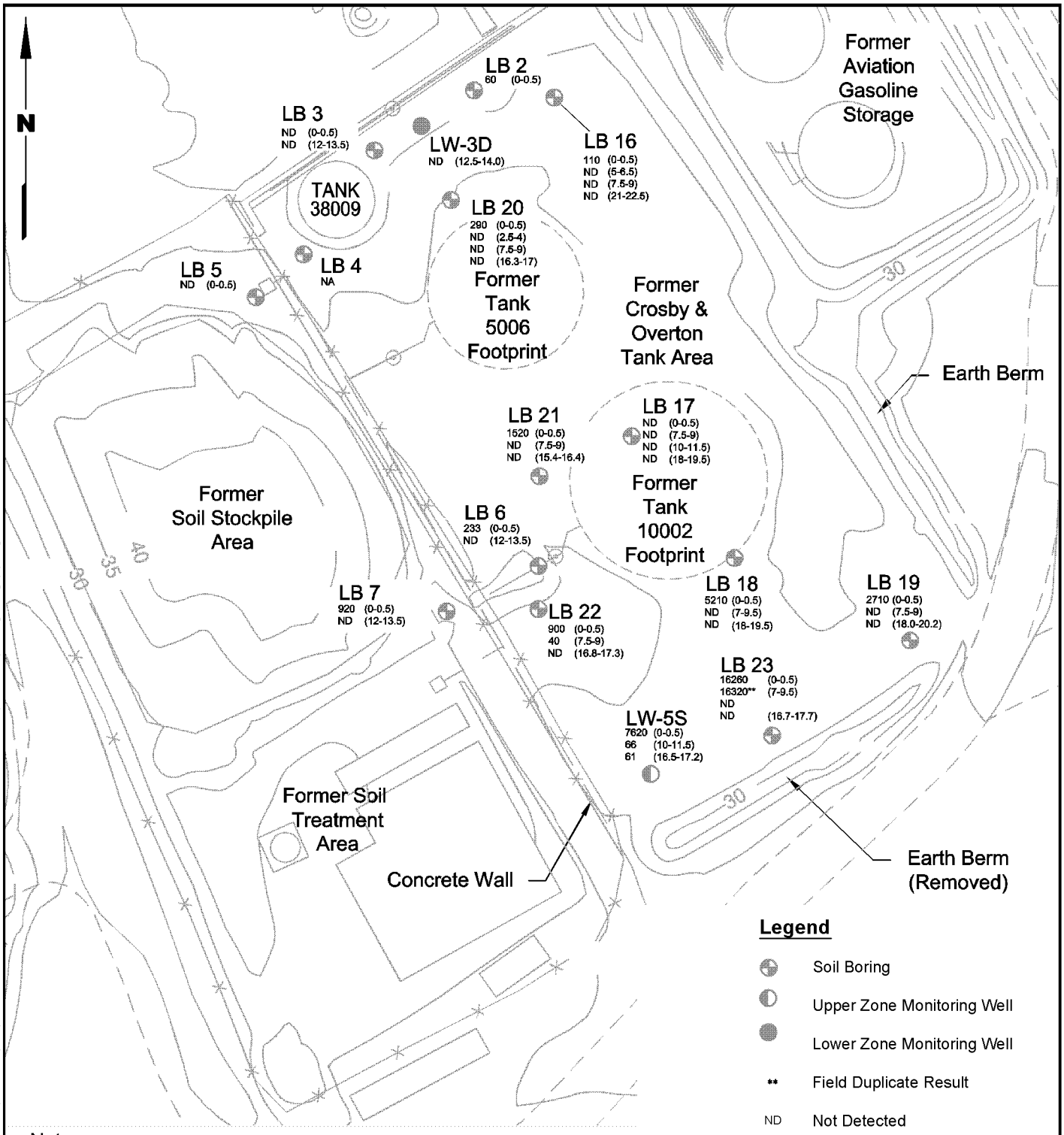
Time Oil NW Terminal Portland, Oregon	**Pre-Removal PCP Soil Concentrations Former Crosby & Overton Tank Area**	Figure 3

Time Oil\Phase III Soil Removal Actions Completion Report | T:\231\00\1\72\Phase III Areas Soil Removal Action Completion Report\Fig3.dwg (A) "Figure 3" 6/17/2003

BZTO104(e)017090



Note

1. Total PCB results represent the sum of detected concentrations of individual Aroclors.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig4.dwg (A) "Figure 4" 6/17/2003

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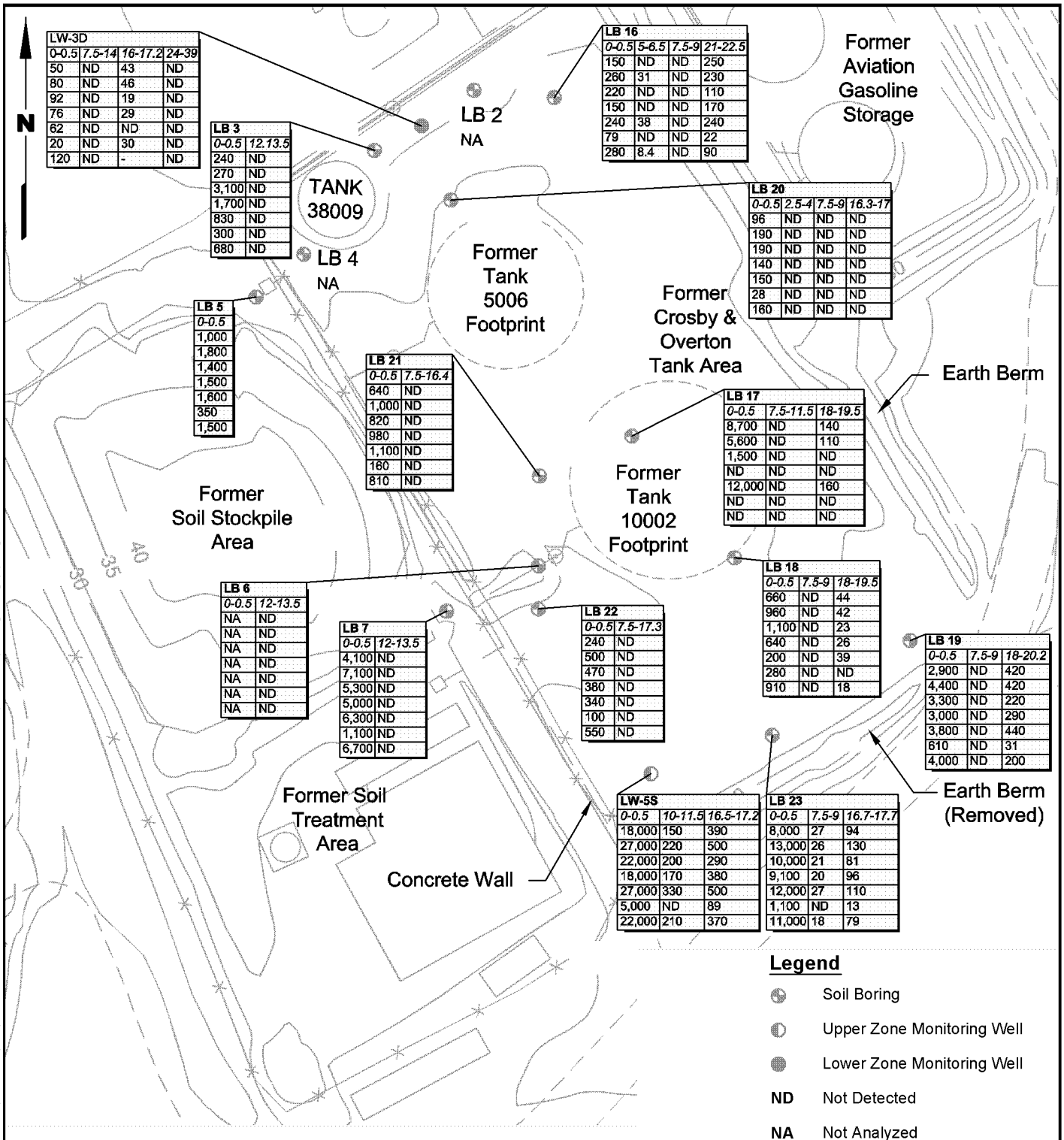
Time Oil NW Terminal
Portland, Oregon

Pre-Removal Total PCB Soil Concentrations Former Crosby & Overton Tank Area

Figure 4

BZTO104(e)017091



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 40 80
Scale in Feet

0-0.5 Depth Below Ground Surface, in ft

150	Benzo(a)anthracene	cPAH Concentrations in (µg/kg)
260	Benzo(a)pyrene	
220	Benzo(b)fluoranthene	
150	Benzo(k)fluoranthene	
240	Chrysene	
79	Dibenzo(a,h)anthracene	
280	Indeno(1,2,3-cd)pyrene	

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig5.dwg (A) "Figure 5" 6/18/2003

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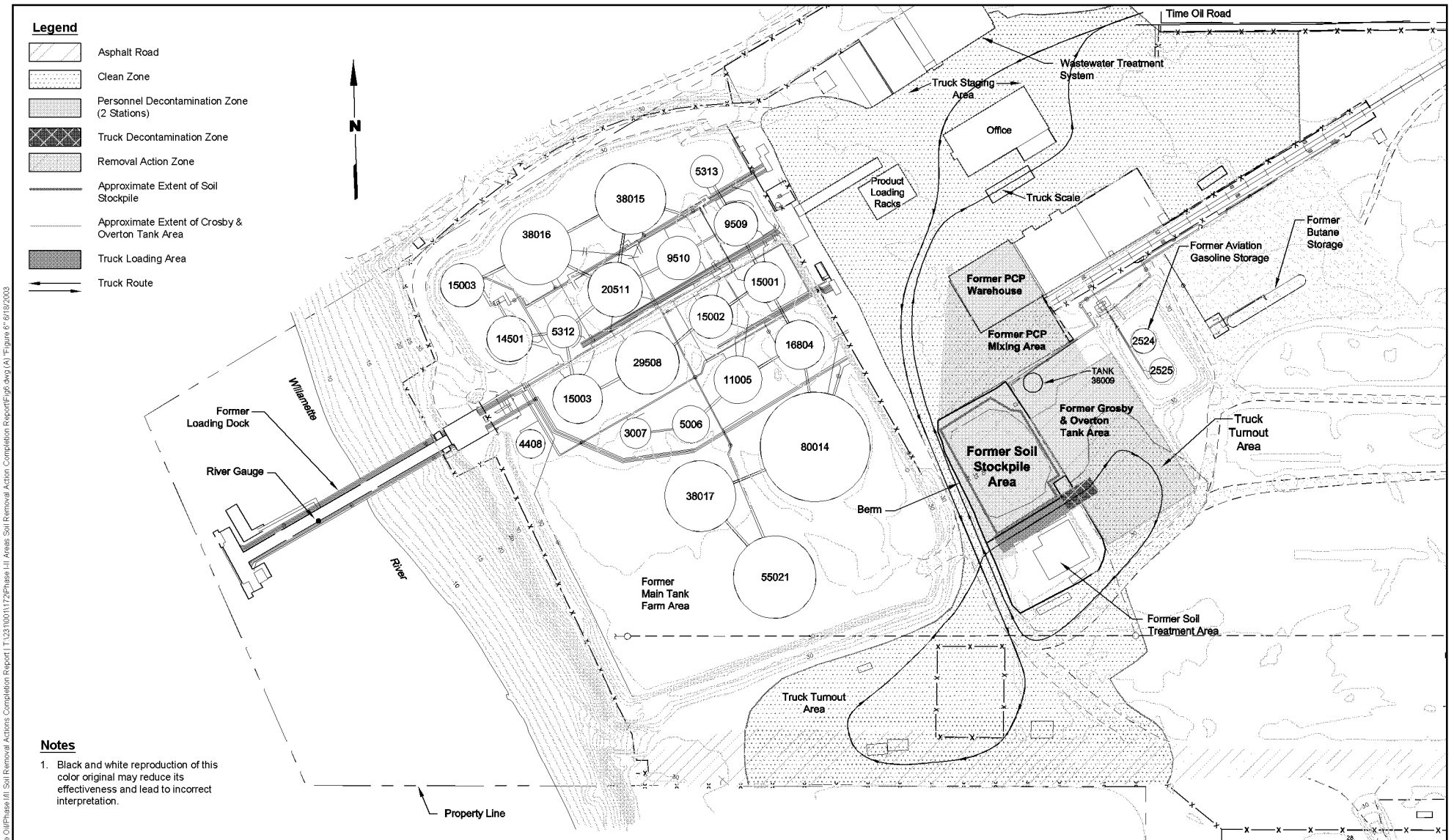
Time Oil NW Terminal
Portland, Oregon

Pre-Removal Selected cPAH Soil Concentrations Former Crosby & Overton Tank Area

Figure 5

BZTO104(e)017092



Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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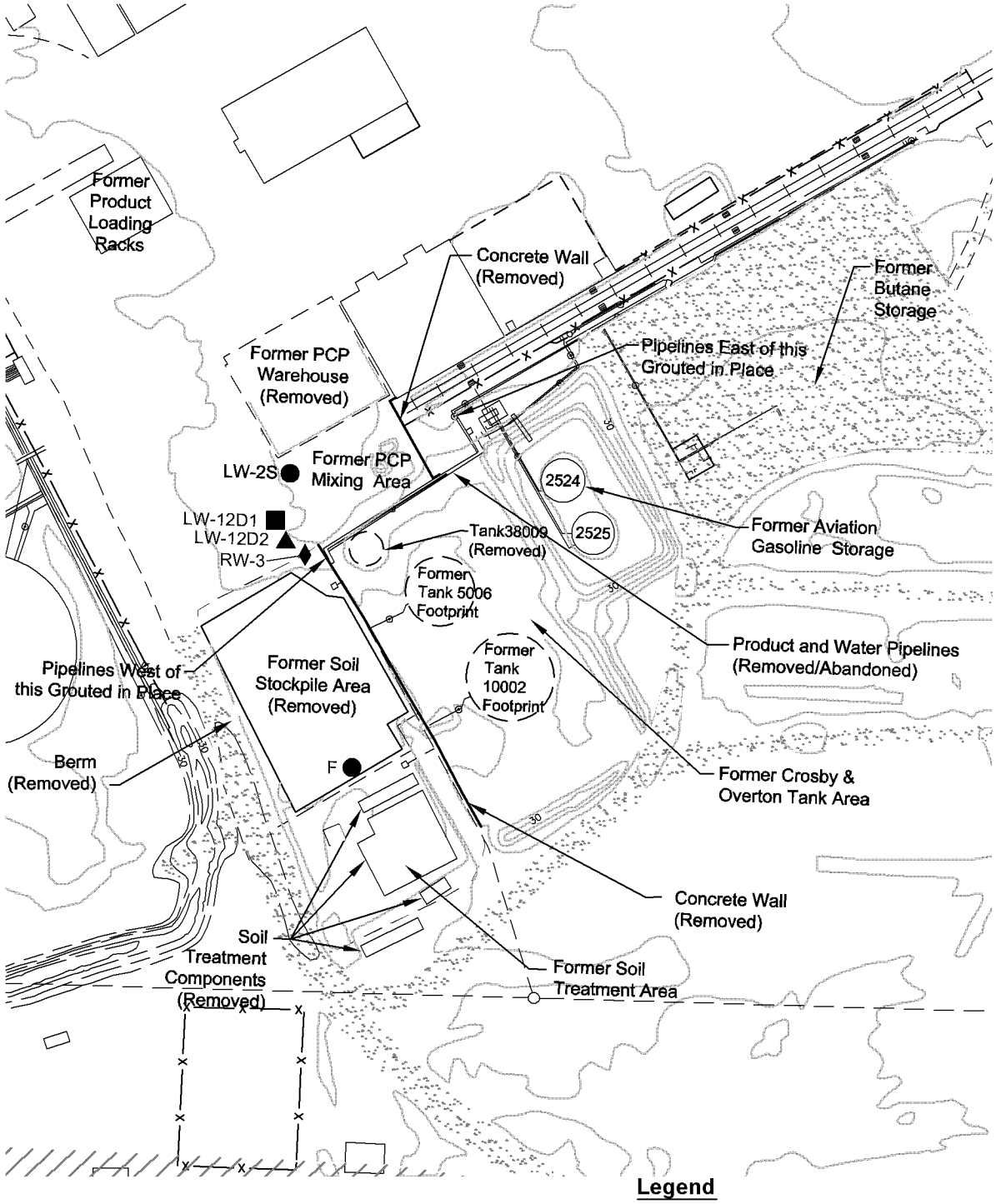
Time Oil NW Terminal Portland, Oregon	**Definition of Work Zones**	Figure 6

Time Oil/Phase III Soil Removal Actions Completion Report | T:\2310\01\172\Phase III Areas Soil Removal Action Completion Report\Fig6.dwg (A) "Figure 6" 6/19/2003

BZTO104(e)017093



Legend

- Upper Zone Monitoring Well (Abandoned)
- Upper Zone Extraction Well (Abandoned)
- Lower Zone Monitoring Well (Abandoned)
- Upper Sand Unit Monitoring Well (Abandoned)

0 100 200
Scale in Feet

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig7.dwg (A) "Figure 7" 6/17/2003

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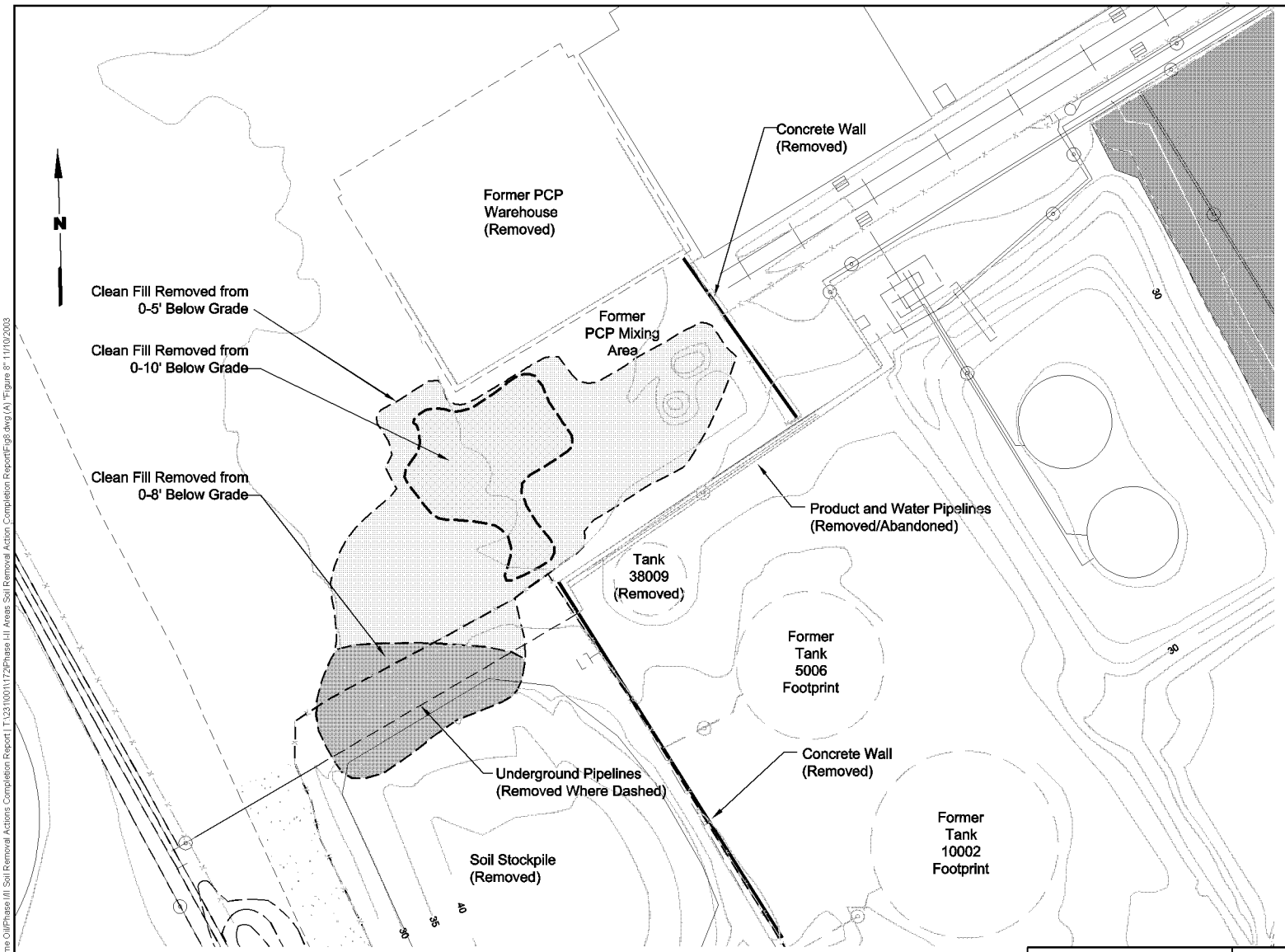
Time Oil NW Terminal Portland, Oregon	**Abandoned Monitoring Wells and Removed Features**	Figure 7

BZTO104(e)017094



Legend:

- 28 — Pre-Excavation Ground Surface Elevation Contour
- Approximate Extent of Clean Fill Removed from 0-5 ft Below Grade
- Approximate Extent of Clean Fill Removed from 0-8 ft Below Grade
- Approximate Extent of Clean Fill Removed from 0-10 ft Below Grade

Note:

Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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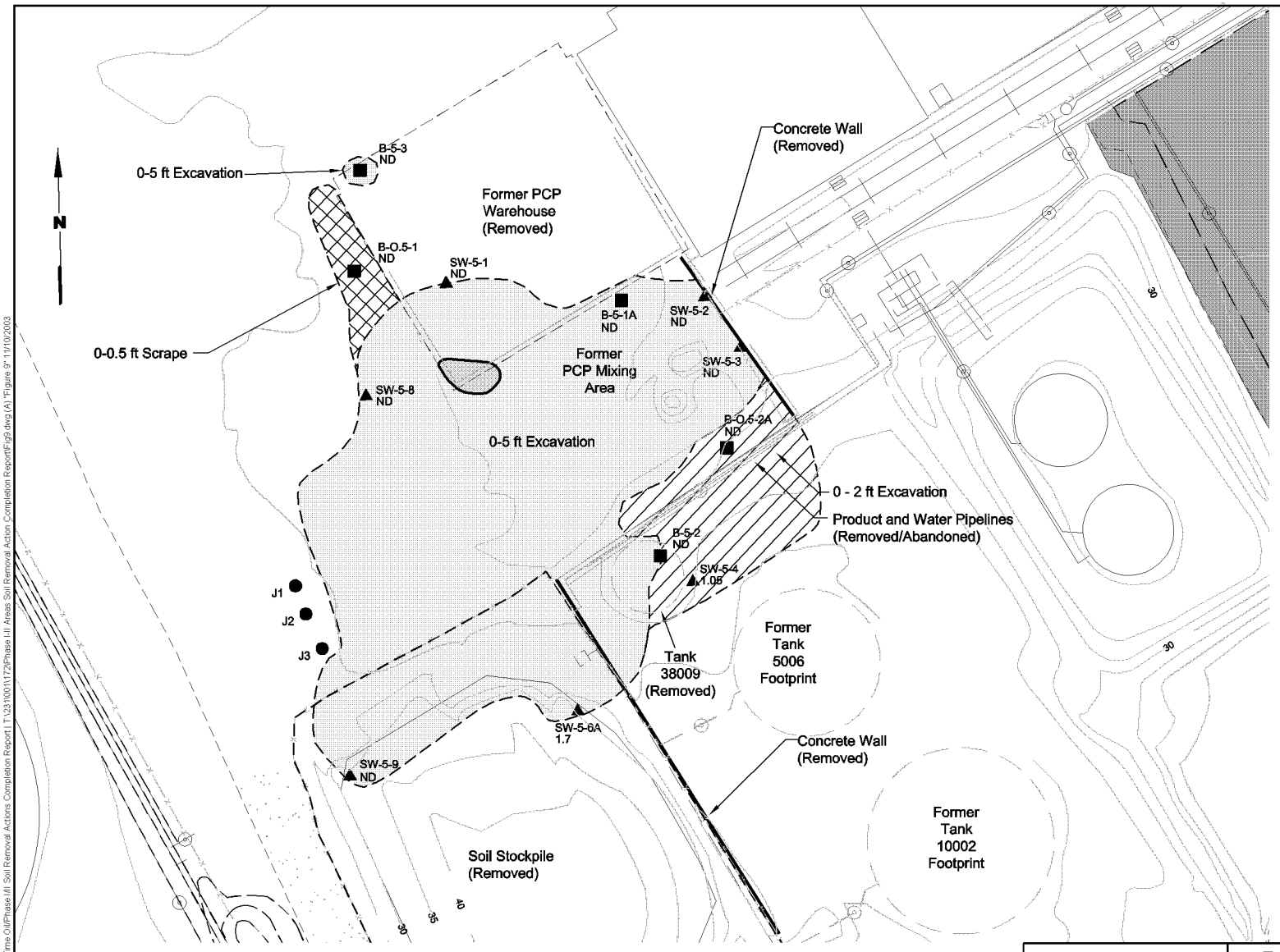
0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Extent of Clean Fill Removed and Used As Backfill**	Figure 8

Time Oil\Phase III\ Soil Removal Actions Completion Report | T:\231\001\172\Phase I,II Areas Soil Removal Action Completion Report\Fig8.dwg (A) "Figure 8" 11/10/2003

BZTO104(e)017095



Legend:

- Approximate Extent of High PCP Concentration Segregated for Offsite Disposal
- Approximate Extent of Excavation from 0 - 5 ft BGS
- Approximate Extent of Excavation from 0 - 2 ft BGS
- Approximate Extent of Excavation from 0 - 0.5 ft BGS
- ■ Verification Soil Sample Location Base of Excavation
- ▲ Verification Soil Sample Location Side Wall of Excavation
- SW-5-8 Sample Location Identifier
- 1.7 PCP Concentration (mg/kg)
- ND Not Detected
- ● Monitoring Wells

Note:

1. All concentration units are mg/kg.
2. Sample results are maximum concentrations of field duplicates.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Extent of Shallow Excavation, and Verification Sample Results Former PCP Mixing Area**	Figure 9

Time Oil\Phase III\ Soil Removal Actions Completion Report | T:\231\00\1\172\Phase III Areas Soil Removal Action Completion Report\Fig9.dwg (A) "Figure 9" 11/10/2003

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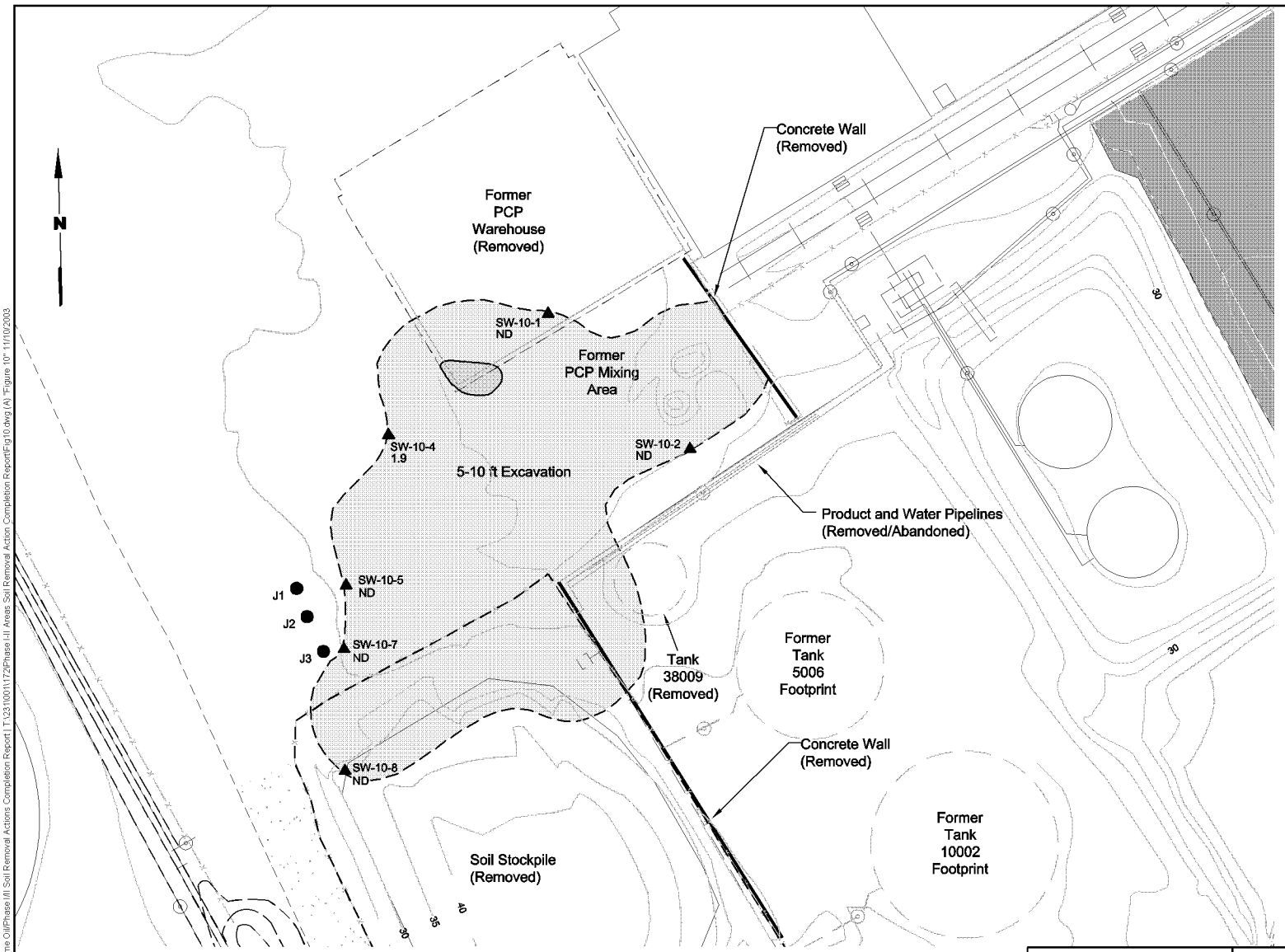

Legend:

- Approximate Extent of High PCP Concentration Segregated for Offsite Disposal
- Approximate Extent of Excavation from 5 to 10 ft BGS
- ■ Verification Soil Sample Location Base of Excavation
- ▲ Verification Soil Sample Location Side Wall of Excavation
- SW-10-8 Sample Location Identifier
- 1.9 PCP Concentration (mg/kg)
- ND Not Detected
- ● Monitoring Wells

Notes:

1. All concentration units are mg/kg.
2. Sample results are maximum concentrations of field duplicates.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Extent of 5-10 ft Excavation and Verification Sample Results Former PCP Mixing Area**	Figure 10

Time Oil\Phase III Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig10.dwg (A) "Figure 10" 11/10/2003

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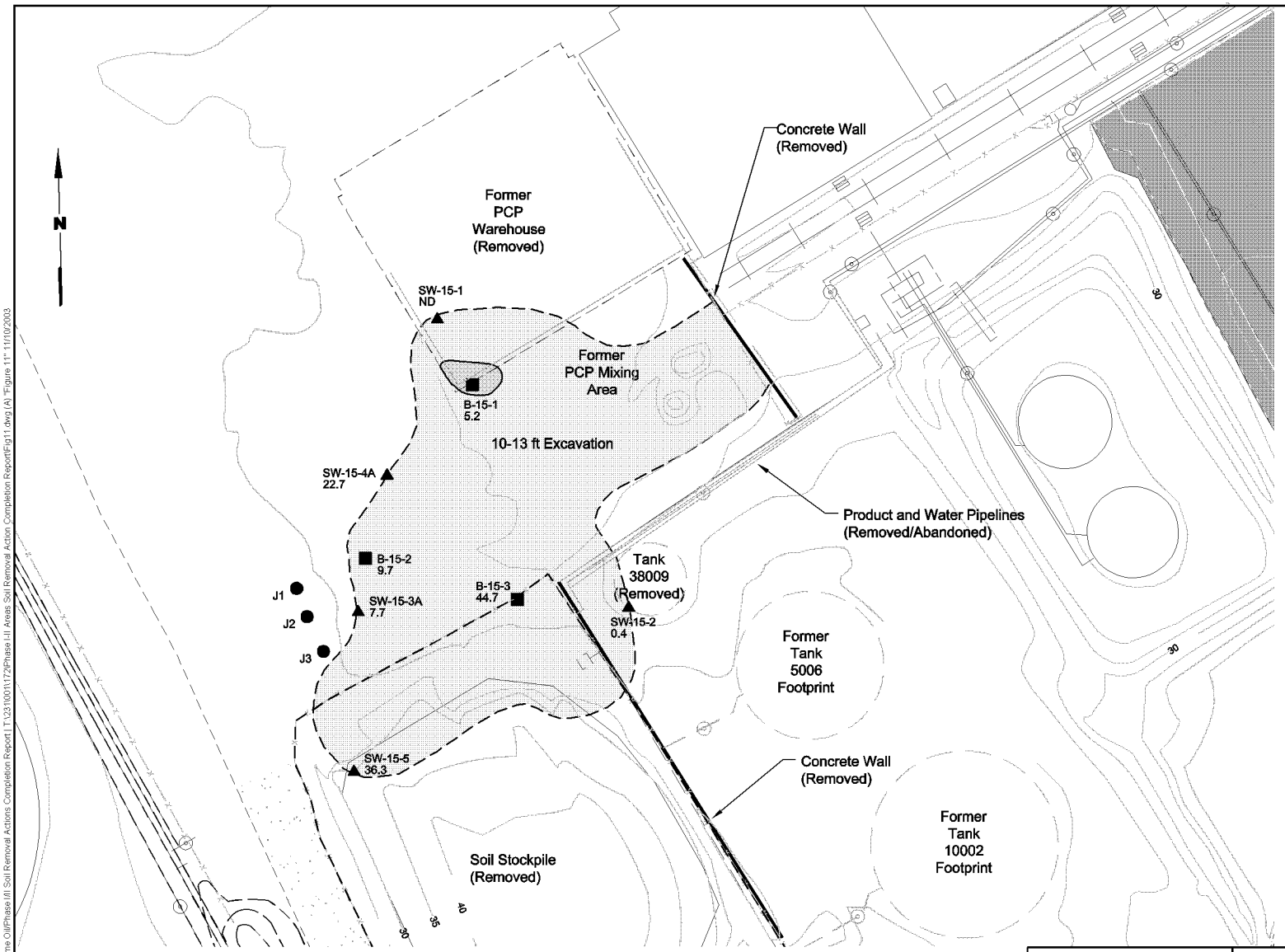

Legend:

- Approximate Extent of High PCP Concentration Segregated for Offsite Disposal
- Approximate Extent of Excavation from 10 - 13 ft BGS
- ■ Verification Soil Sample Location Base of Excavation
- ▲ Verification Soil Sample Location Side Wall of Excavation
- SW-15-2 Location Identifier
- 0.4 PCP Concentration (mg/kg)
- ND Not Detected
- ● Monitoring Wells

Notes:

1. All concentration units are mg/kg.
2. Sample results are maximum concentrations of field duplicates.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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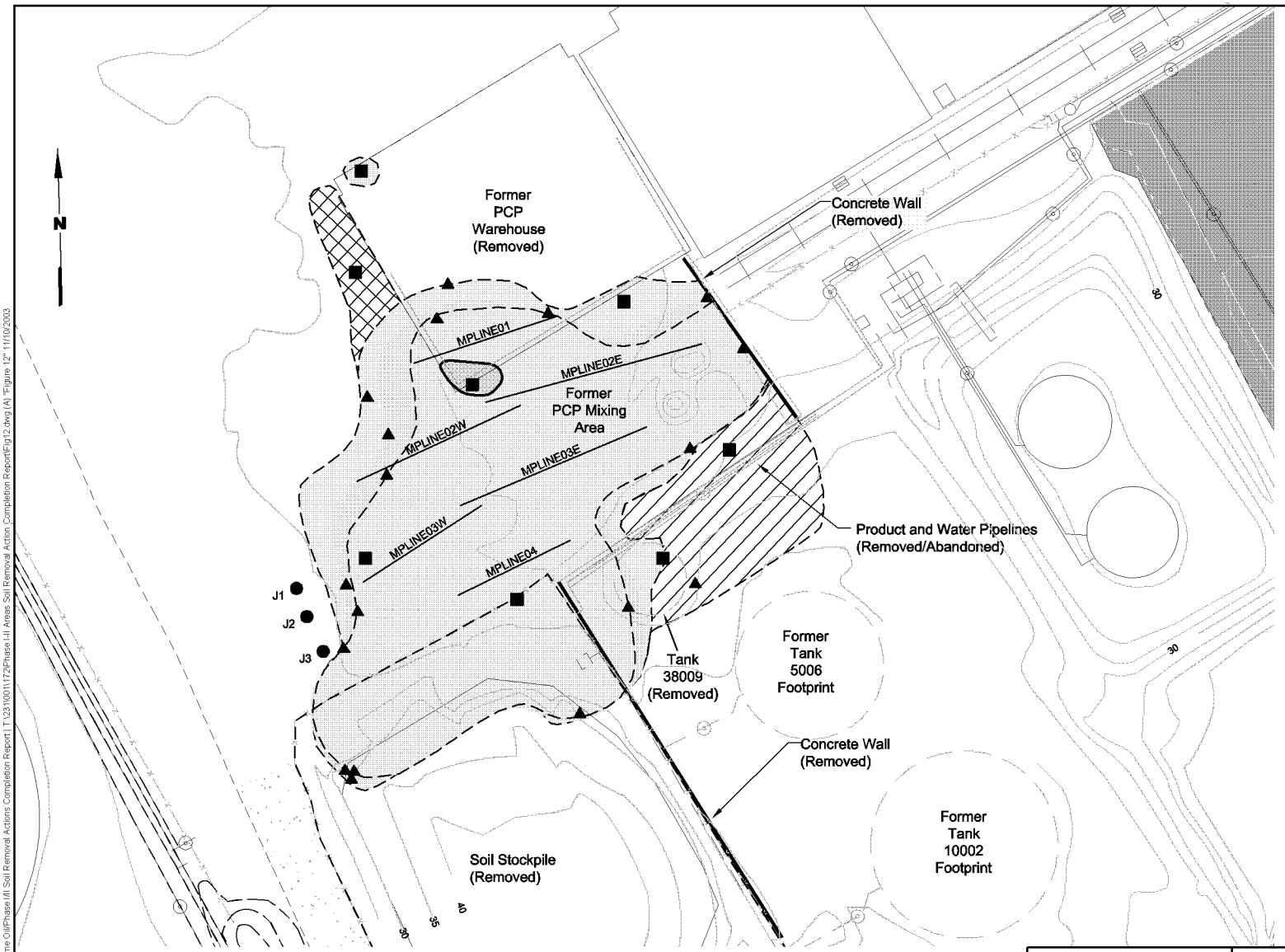
0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Extent of 10-13 ft Excavation and Verification Sample Results Former PCP Mixing Area**	Figure 11

Time Oil\Phase III Soil Removal Actions Completion Report | T:\231\00\1\72\Phase I-II Areas Soil Removal Action Completion Report\Fig11.dwg (A) "Figure 11" 11/10/2003

BZTO104(e)017098



Legend:

- Approximate Extent of High PCP Concentration Segregated for Offsite Disposal
- Approximate Extent of Excavation from 0 - 0.5 ft BGS
- Approximate Extent of Excavation from 0 - 2 ft BGS
- Approximate Extent of Excavation from 0 - 5 ft BGS
- Approximate Extent of Excavation from 5 - 10 ft BGS
- Approximate Extent of Excavation from 10 - 13 ft BGS
- MPLINE — Approximate Location of Manifold Piping
- Verification Soil Sample Location Base of Excavation
- Verification Soil Sample Location Side Wall of Excavation
- Monitoring Wells

Note:

Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	***In Situ* Soil Excavation And Manifold Piping Locations**	Figure 12

Time Oil\Phase III\ Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig12.dwg (A) "Figure 12" 11/10/2003

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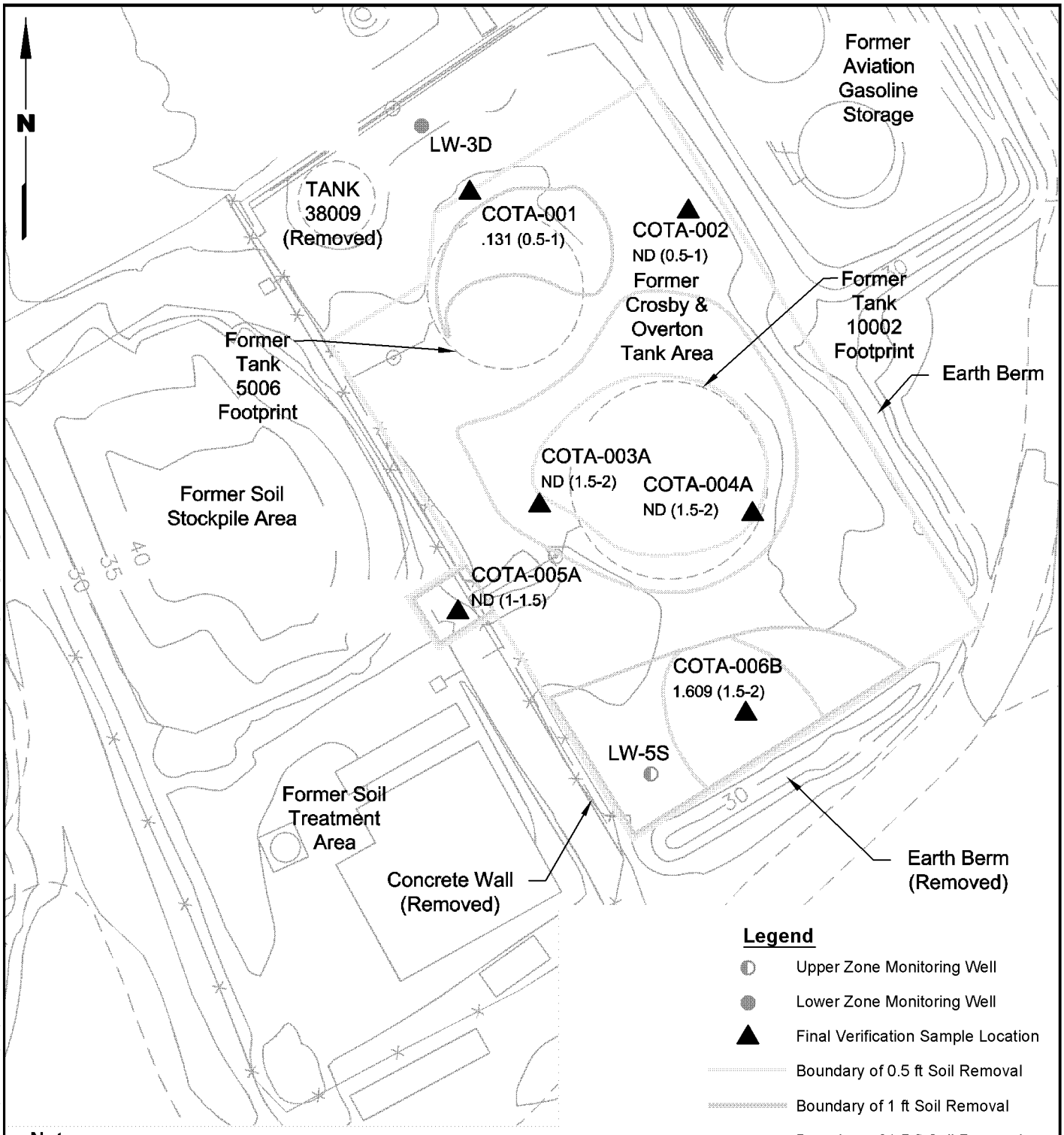

Legend

- Upper Zone Monitoring Well
- Lower Zone Monitoring Well
- Final Verification Sample Location
- Boundary of 0.5 ft Soil Removal
- Boundary of 1 ft Soil Removal
- Boundary of 1.5 ft Soil Removal
- Boundary of 2.5 ft Soil Removal
- ND Not Detected

PCB Concentration (mg/kg) { 130.8 (0.5-1) } Depth Below Ground Surface in ft

Note

1. Total PCB results represent the sum of detected concentrations of individual Aroclors.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 40 80
Scale in Feet

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig13.dwg (A) "Figure 13" 11/10/2003

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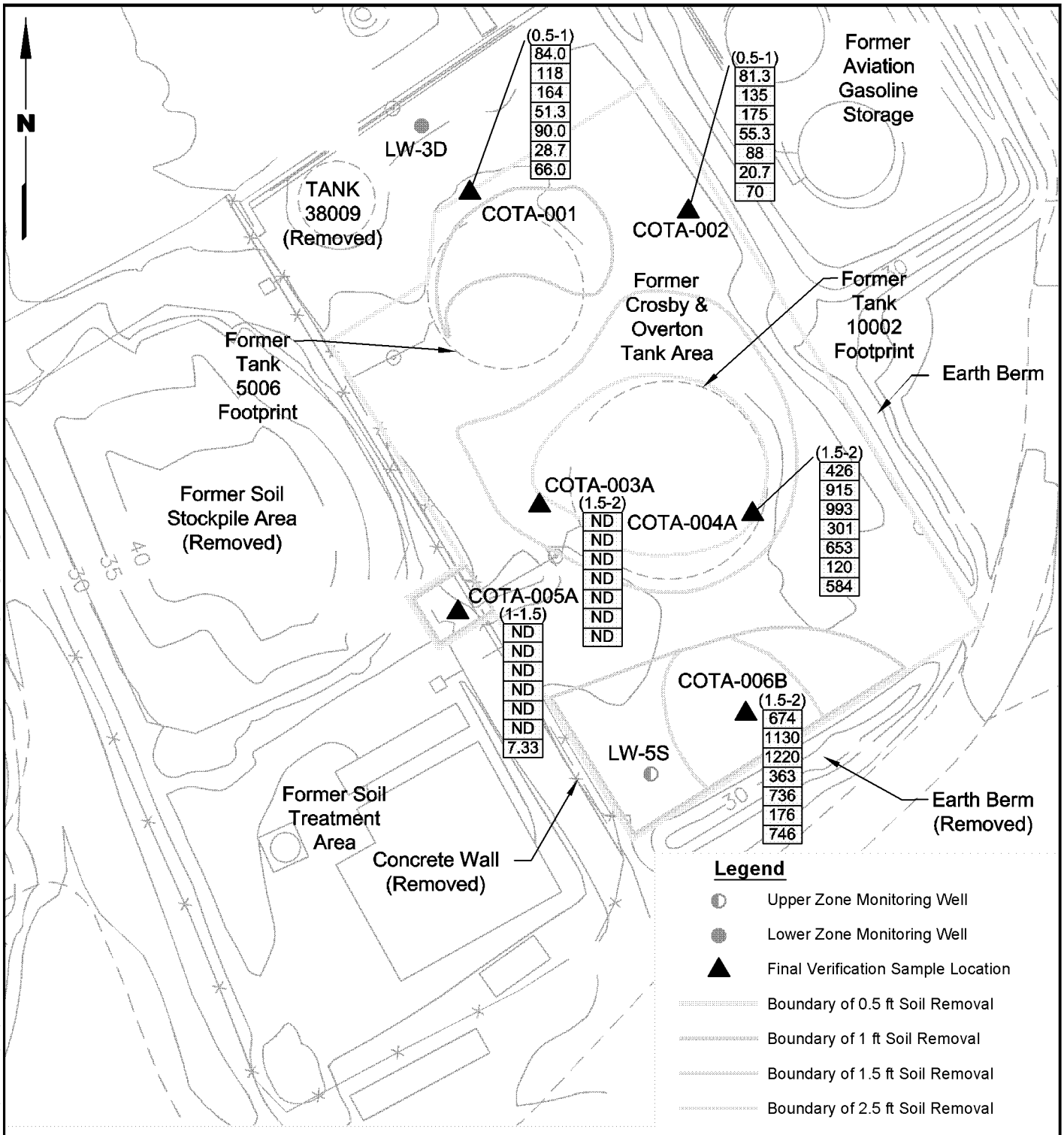
Time Oil NW Terminal
Portland, Oregon

Removal Boundaries and Verification Soil Sample PCB Results Former Crosby & Overton Tank Area

Figure 13



Legend

- Upper Zone Monitoring Well
- Lower Zone Monitoring Well
- Final Verification Sample Location
- Boundary of 0.5 ft Soil Removal
- Boundary of 1 ft Soil Removal
- Boundary of 1.5 ft Soil Removal
- Boundary of 2.5 ft Soil Removal

ND Not Detected

(0-0.5) Depth Below Ground Surface, in ft

150	Benzo(a)anthracene	cPAH Concentrations in (µg/kg)
260	Benzo(a)pyrene	
220	Benzo(b)fluoranthene	
150	Benzo(k)fluoranthene	
240	Chrysene	
79	Dibenzo(a,h)anthracene	
280	Indeno(1,2,3-cd)pyrene	

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 40 80

Scale in Feet

Time Oil/Phase I/II Soil Removal Actions Completion Report | T:\231\001\172\Phase I-II Areas Soil Removal Action Completion Report\Fig14.dwg (A) "Figure 14" 6/17/2003

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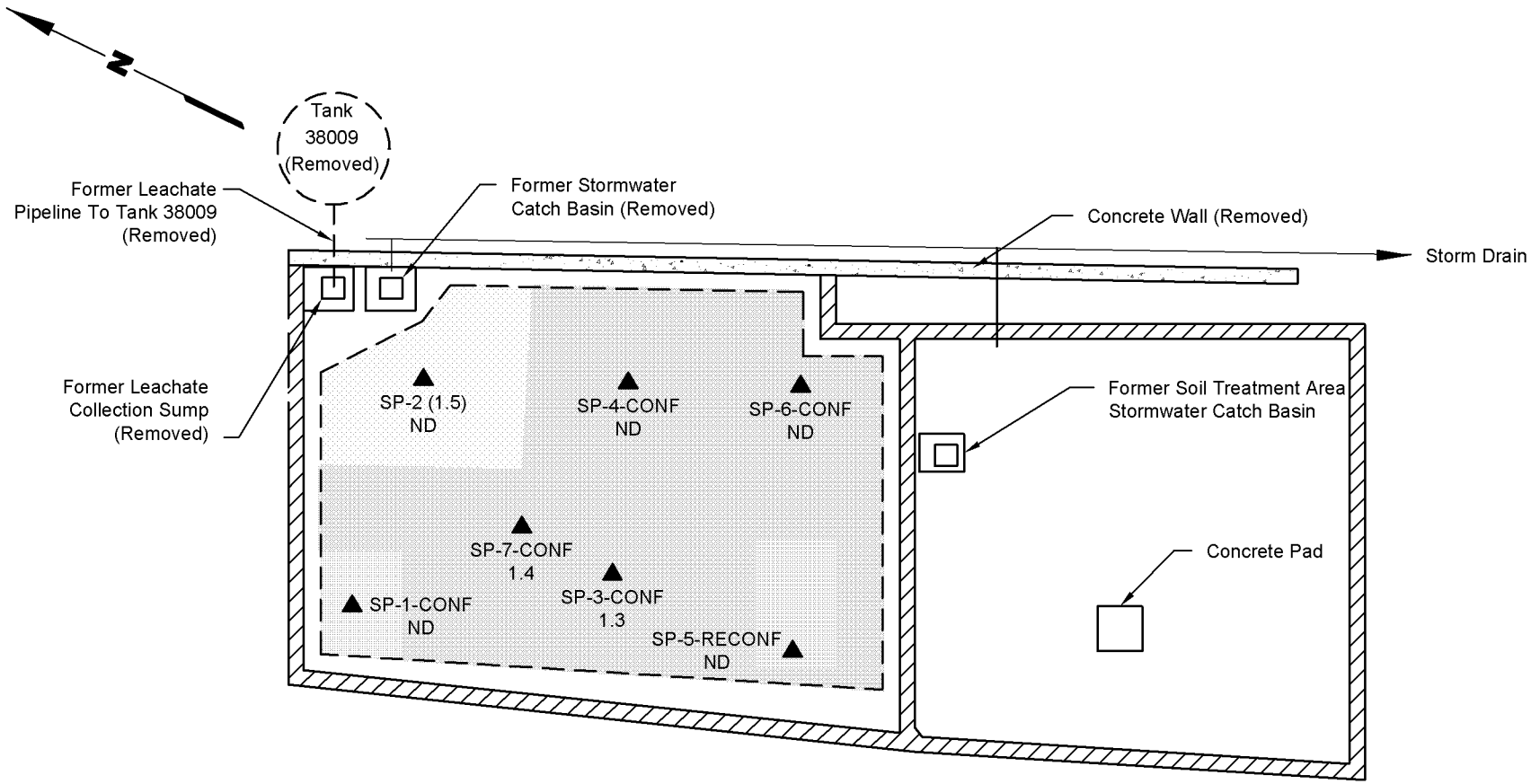
Time Oil NW Terminal
Portland, Oregon

Removal Boundaries and Verification Soil Sample cPAH Results Former Crosby & Overton Tank Area

Figure 14

BZTO104(e)017101



Legend

- Approximate Footprint of Soil Stockpile
- Earthen Berm (Removed)
- ▲ Verification Soil Sample Location
- 1.3 PCP Concentration (mg\kg)
- ND Non Detected
- Approximate Extent of Excavation from 0-0.5 ft BGS
- Approximate Extent of Excavation from 0-1.5 ft BGS
- Approximate Extent of Excavation from 0-2 ft BGS
- Approximate Extent of Excavation from 0-3 ft BGS

Notes:

1. All concentration units are mg/kg.
2. Sample results are maximum concentrations of field duplicates.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 40' 80'

Scale in Feet

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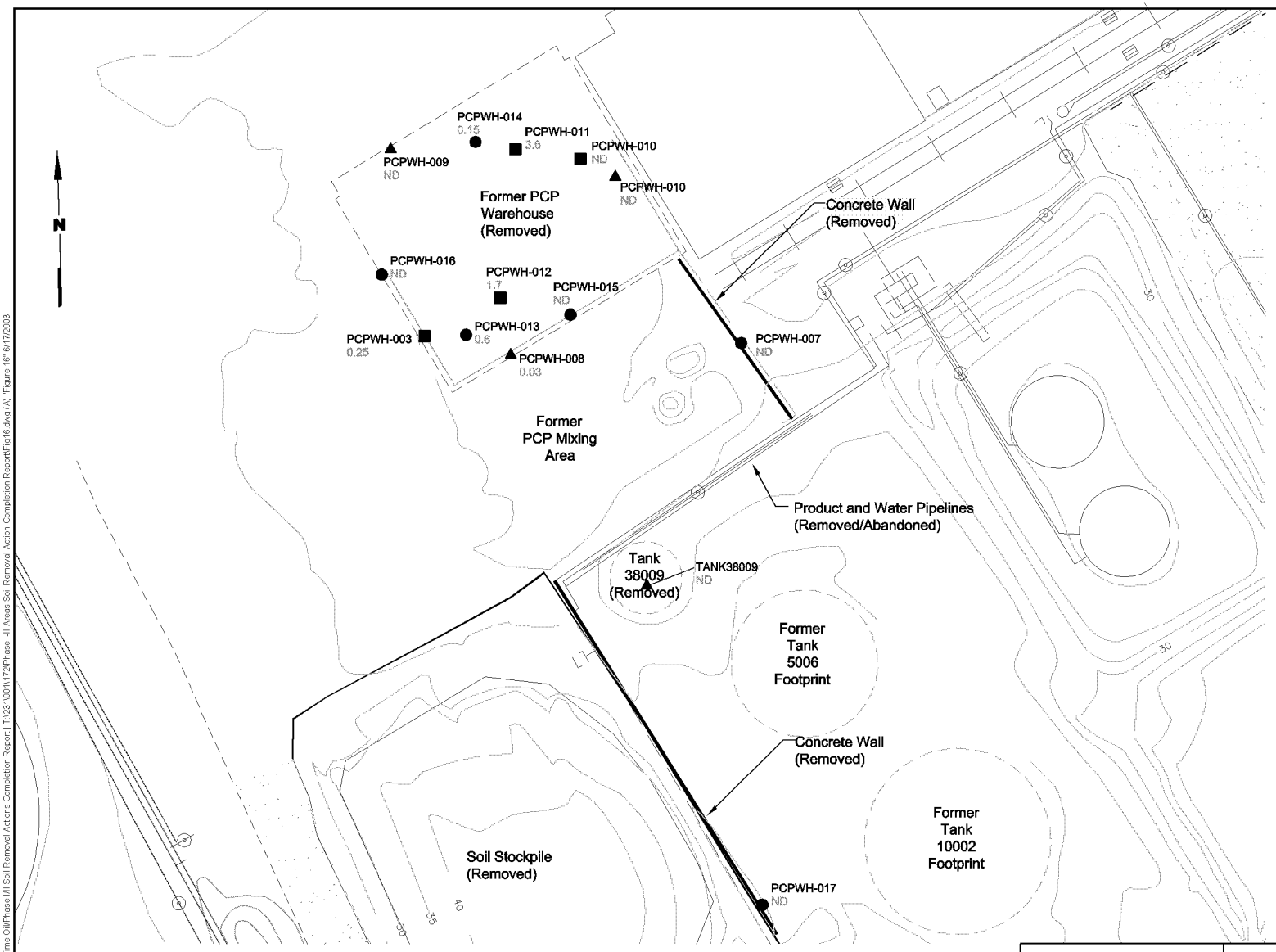
Time Oil NW Terminal
Portland, Oregon

Stockpile Verification Soil Sample PCP Results

Figure 15

BZTO104(e)017102



Legend:

- ● Concrete Decontamination Verification Sampling Location
- ▲ Metal Decontamination Verification Wipe Sampling Location
- ■ Wood Decontamination Verification Sampling Location
- ND Not Detected
- 3.6 PCP Concentration (mg/kg)

Note:

1. Sample results are maximum concentrations of field duplicates.

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0 30 60
Scale in Feet

Time Oil NW Terminal Portland, Oregon	**Former PCP Warehouse and Miscellaneous Items Decontamination Verification Sample PCP Results**	Figure **16**

Time Oil\Phase I\Ri Soil Removal Actions Completion Report | T:\231\00\11\72\Phase I-II Areas Soil Removal Action Completion Report\Fig16.dwg (A) "Figure 16" 6/17/2003

BZTO104(e)017103

TABLE 1a
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL (METHOD 8270)
SOIL STOCKPILE REMOVAL ACTION,
TIME OIL NORTHWEST TERMINAL

PERIOD: From 11/04/2002 thru 11/13/2002 (inclusive)
SAMPLE TYPE: soil

CONSTITUENT	SITE	SP-1 (0.5')	SP-1 (2')	SP-1 (3.5')	SP-1-CONF	SP-2 (0.5')	SP-2 (1.5')
	DATE	11/04/2002	11/06/2002	11/06/2002	11/11/2002	11/07/2002	11/07/2002
	DEPTH (ft)	0.50	2.00	3.50	2.00	0.50	1.50
Pentachlorophenol	ug/kg	19000	333 U	333 U	333 U	1920	333 U

Landau Associates

The following qualifiers exist: [illegible] analyzed

TABLE 1
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL METHOD 8270
SOIL STOCKPILE REMOVAL ACTION
TIME OIL NORTHWEST TERMINAL

PERIOD: From 11/04/2002 thru 11/14/2002, inclusive
SAMPLE TYPE: Soil

CONSTITUENT	SITE	SP-3 (0.5')	SP-3 (1.0')	SP-3-CONF	SP-4-CONF	SP-5-CONF	SP-5-RECONFIR
	DATE	11/07/2002	11/07/2002	11/11/2002	11/11/2002	11/15/2002	11/18/2002
	DEPTH (ft)	0.50	1.00	0.50	0.50	1.00	3.00
Pentachlorophenol	mg/kg	562	333 U	1300	333 U	92700	333 U

Cardinal Associates

The following qualifiers exist: U = Not Detected; NT = Not analyzed

BZTO104(e)017105

TABLE 1a
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL (METHOD 8270)
SOIL STOCKPILE REMOVAL ACTION
TIME OIL NORTHWEST TERMINAL

PERIOD: From 11 04 2002 thru 11 15 2002 Inclusive
SAMPLE TYPE: Soil

CONSTITUENT	SITE	SP-6-CONF	SP-7-CONF
	DATE	11-15-2002	11-11-2002
	DEPTH (ft)	0.50	0.50
Pentachlorophenol	mg/kg	333 J	1460

Landau Associates

The following qualifiers exist: CLP-Q ... NT=Not analyzed

TABLE 1b
SOIL VERIFICATION SAMPLING RESULTS
DIOXINS & FURANS (METHOD 8290)
SOIL SITE DEBRIS REMOVAL ACTION
UNIT 2 - NORTHWEST TERRITORY

PERIOD: [illegible] 11:04:00 [illegible] 11/13/2002 - [illegible]
SAMPLE TYPE: Soil

CONSTITUENT	SITE DATE DEPTH (ft)	SP01-CONF 11/11/2002 2.00	SP03-CONF 11/11/2002 0.50
1,2,3,4,6,7,8-HpCDD	mg/kg	512.441	374,9 022.3
1,2,3,4,6,7,8-HpCDF	mg/kg	37.652	7643.630 J
1,2,3,4,7,8,9-HpCDF	mg/kg	5.173	375.402
1,2,3,4,7,8-HxCDD	mg/kg	7.07	391.053
1,2,3,4,7,8-HxCDF	mg/kg	3.521	218.175
1,2,3,6,7,8-HxCDD	mg/kg	23.704	1408.725 J
1,2,3,6,7,8-HxCDF	mg/kg	3.649	240.996
1,2,3,7,8,9-HxCDD	mg/kg	19.769	629.067 J
1,2,3,7,8,9-HxCDF	mg/kg	2.50	37.2
1,2,3,7,8-PeCDD	mg/kg	2.84	131.163
1,2,3,7,8-PeCDF	mg/kg	0.312 J	38.798
2,3,4,6,7,8-HxCDF	mg/kg	5.439	411.566
2,3,4,7,8-PeCDF	mg/kg	0.716 J	31.252
2,3,7,8-TCDD	mg/kg	1.0	7.971
2,3,7,8-TCDF	mg/kg	1.0	9.837
OCDD	mg/kg	2596.665 J	220750.565 J
OCDF	mg/kg	277.968	23352.695 J
Total HpCDD	mg/kg	548.794	40342.652
Total HpCDF	mg/kg	298.535	21867.747
Total HxCDD	mg/kg	92.909	5196.397
Total HxCDF	mg/kg	115.652	6772.037

J = Value Approximate

The following qualifiers exist: G, P, Q, U, Expect NT = Not analyzed

TABLE 1b
SOIL VERIFICATION SAMPLING RESULTS
DIOXINS/FURANS (METHOD 8290)
SOIL STOCKPILE REMOVAL ACTION
EXXON NORTHWEST TERMINAL

PERIOD: From 11/04/2002 thru 11/15/2002 Inclusive
SAMPLE TYPE: Soil

CONSTITUENT	SITE	SP-1-CONF	SP-3-CONF
	DATE	11/11/2002	11/11/2002
	DEPTH (ft)	2.00	0.50
Total PeCDD	(ng/kg)	5.721	437.293
Total PeCDF	(ng/kg)	47.052	1,781.496
Total TCDD	(ng/kg)	5.U	40.279
Total TCDF	(ng/kg)	5.921	347.57
Total TEQ	(ng/kg)	16.36	1135.56

Landau Associates

The following qualifiers exist: C, F, G, J, U, T=Not analyzed

BZTO104(e)017108

TABLE 1:
SOIL VERIFICATION SAMPLING RESULTS
METALS (METHOD 6000/7000 SERIES)
SOIL STOCKPILE REMOVAL ACTION
TIME OIL NORTHWEST TERMINAL

PERIOD From 11/04/2002 thru 11/18/2002 Inclusive
SAMPLE TYPE Soil

CONSTITUENT	SITE DATE DEPTH (ft) RESULT TYPE	SP-1-CONF 11/11/2002 2.00 Primary	SP-2-CONF 11/11/2002 0.50 Primary	SP-3-CONF 11/11/2002 0.50 Primary	SP-3-CONF 11/11/2002 0.50 Duplicate 1	SP-4-CONF 11/11/2002 0.50 Primary	SP-5-RECONFIR 11/18/2002 3.00 Primary
Arsenic	(mg/kg)	1.92 J	1.85 U	9.76 J	2.8 J	2.35	1.79 U
Chromium	(mg/kg)	17.5 J	13.4 J	35.1 J	21.4 J	18.5 J	12.8
Copper	(mg/kg)	13.6	10.3	49.1	50.8	30.9	10.1
Lead	(mg/kg)	2.75	5.46	65.2	52.3	30.5	1.75 U
Nickel	(mg/kg)	13.7 J	14.8 J	17.2 J	15.5 J	17.9 J	15.1
Zinc	(mg/kg)	42 J	59.5 J	354 J	153 J	76.8 J	42.3

Landau Associates

The following qualifiers exist: CLP Q: U-Expect; NT=Not analyzed

BZTO104(e)017109

TABLE 1:
SOIL VERIFICATION SAMPLING RESULTS
METALS (METHOD 6000/7000 SERIES)
SOIL STOCKPILE REMOVAL ACTION
TIMPOL NORTHWEST TERMINAL

[illegible] Begin: [illegible] 2002 [illegible]
SAMPLE TYPE: Soil

CONSTITUENT	SITE DATE DEPTH (ft) RESULT Type	SP 6 CONF 11/16/2002 0.50 Primary	SP 7 CONF 11/16/2002 0.50 Primary
Arsenic	(mg/kg)	1.57 J	4.22
Chromium	(mg/kg)	12.8	28.2 J
Copper	(mg/kg)	10.7	45.3
Lead	(mg/kg)	1.83	92.9
Nickel	(mg/kg)	14.7	21.2
Zinc	(mg/kg)	44.9	197.3

Lindsay Associates

The following qualifiers exist: CLP Q: U: Experienced [illegible] not analyzed

TABLE 2a
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL (METHOD 8270)
IN SITU SOIL EXCAVATION REMOVAL ACTION
TIME OIL NORTHWEST TERMINAL

[illegible] From 10/01/2002 thru 10/22/2002 - Inclusive
SAMPLE TYPE Soil

CONSTITUENT	SITE	B-05-01	B-05-02	B-05-02A	B-05-01	B-05-01A	B-05-02
	DATE	10/01/2002	10/07/2002	10/08/2002	10/02/2002	10/03/2002	10/09/2002
	DEPTH (ft)	0.50	5.00	0.50	5.00	5.00	5.00
	RESULT TYPE	Primary	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	(ug/kg)	333 U	15500	333 U	7520	333 U	331 U

Analytical Associates

The following qualifiers are used: U = Not analyzed

TABLE [illegible]

SOIL VERIFICATION SAMPLING RESULTS

PENTACHLOROPHENOL (METHOD 8270)

PHASE II SOIL EXCAVATION REMOVAL ACTION

TIME OIL NORTHWEST TERMINAL

PERIOD: From [illegible] - Inclusive

SAMPLE TYPE: [illegible]

CONSTITUENT	SITE	B-05-03	B-10-01	B-10-02	B-10-03	B-15-01	B-15-02
	DATE	10-02-2002	10-03-2002	10-08-2002	10-10-2002	10-16-2002	10-16-2002
	DEPTH (ft)	5.00	10.00	10.00	10.00	15.00	15.00
	RESULT TYPE	Primary	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	ug/kg	328 U	327 U	333 U	955	5290	3740

Cascadia Associates

The following qualifiers have been [illegible] for this report:

TABLE 2A

SOIL VERIFICATION SAMPLING RESULTS

PENTACHLOROPHENOL (METHOD 8270)

IN SITU SOIL EXCAVATION REMOVAL ACTION

TIME OIL NORTHWEST TERMINAL

PERIOD: From 10/01/2002 thru 10/03/2002, Inclusive

SAMPLE TYPE: Soil

CONSTITUENT	SITE	B-15-03	SW-05-01	SW-05-02	SW-05-03	SW-05-04	SW-05-05
	DATE	10/10/2002	10/01/2002	10/01/2002	10/02/2002	10/03/2002	10/10/2002
	DEPTH (ft)	15.00	5.00	5.00	5.00	5.00	5.00
	RESULT TYPE	Primary	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	ug/kg	44700	333 U	333 U	331 U	1040 J	[illegible]

Landau Associates

The following qualifiers apply: [illegible]

TABLE 2a
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL (METHOD 8270)
IN SITU SOIL EXCAVATION REMOVAL ACTION
"TIME OIL NORTHWEST" TERMINAL

PERIOD: From 10-01-2002 thru 10-22-2002 - Per Issue
SAMPLE TYPE: Soil

CONSTITUENT	SITE	SW-05-05	SW-05-05A	SW-05-07	SW-05-08	SW-05-09	SW-10-01
	DATE	10-10-2002	10-21-2002	10-01-2002	10-01-2002	10-22-2002	10-07-2002
	DEPTH (ft)	5.00	5.00	5.00	5.00	5.00	10.00
	RESULT TYPE	Primary	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	ug/kg	4240	1740	333 U	333 U	333 U	333 U

BZTO104(e)017114

TABLE 3a
SOIL VERIFICATION SAMPLING RESULTS
PENTACHLOROPHENOL (METHOD 8270)
IN SITU SOIL EXCAVATION REMOVAL ACTION
LINE OIL NORTHWEST TERMINAL

PERIOD: From 10 01 2002 thru 10 31 2002 - Included
SAMPLE TYPE: [illegible]

CONSTITUENT	SITE	SW-10-02	SW-10-02	SW-10-02	SW-10-03	SW-10-04	SW-10-05
	DATE	10 03 2002	10 03 2002	10 07 2002	10 08 2002	10 07 2002	[illegible]
	DEPTH (ft)	10.00	10.00	10.00	10.00	10.00	[illegible]
	RESULT TYPE	Primary	Duplicate 1	Primary	Primary	Primary	Primary
Pentachlorophenol	ug/kg	333 U	333 U	333 U	333 U	[illegible]	333 U

The following qualifiers exist: [illegible] NT = Not analyzed

TABLE 2a

SOIL VERIFICATION SAMPLING RESULTS

PENTACHLOROPHENOL (METHOD 8270)

IN SITU SOIL EXCAVATION REMOVAL ACTION

EMLO LNORTHWEST TERMINAL

PERIOD: [illegible]

SAMPLE TYPE: Soil

CONSTITUENT	SITE	SW-10-05	SW-10-06	SW-10-06X	SW-10-07	SW-10-08	SW-10-09
	DATE	10-10-2002	10-10-2002	10-10-2002	10-22-2002	10-22-2002	10-11-2002
	DEPTH (ft)	10.00	10.00	10.00	10.00	10.00	10.00
	RESULT TYPE	Duplicate 1	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	(ug/kg)	333 U	3140	1450	333 U	333 U	[illegible]

Landau Associates

The following qualifiers exist: [illegible]

TABLE 2a

SOIL VERIFICATION SAMPLING RESULTS

PENTACHLOROPHENOL (METHOD 8270)

INSITU BOX EXCAVATION REMOVAL ACTION

TIME OIL NORTHWEST TERMINAL

REPORT [illegible]

SAMPLE TYPE [illegible]

CONSTITUENT	SITE	SW 15 01	SW 15 02	SW 15-03	SW-15-03A	SW-15-04	SW 15 04A
	DATE	10-08-2002	10-10-2002	10-10-2002	10-08-2002	10-08-2002	10-14-2002
	DEPTH (ft)	15.00	15.00	15.00	15.00	15.00	15.00
	RESULT TYPE	Primary	Primary	Primary	Primary	Primary	Primary
Pentachlorophenol	ug/kg	333 U	489	135000	7770	4260 U	[illegible]

Landau Associates

The following qualifiers [illegible] Report [illegible] included

TABLE 2a

SOIL VERIFICATION SAMPLING RESULTS

PENTACHLOROPHENOL (METHOD 8270)

IN SITU SOIL EXCAVATION REMOVAL ACTION

TIMLOC NORTHWEST TERMINAL

PERIOD: From 10/1/2002 thru 11/21/2002 Inclusive

SAMPLE TYPE: SO

	SITE	SW-15-05	SW-15-02
	DATE	10/22/2002	10/22/2002
CONSTITUENT	DEPTH (ft)	15.00	15.00
	RESULT TYPE	Primary	Primary
Pentachlorophenol	mg/kg	36300	40700

Laboratory Associates

NT=not analyzed

TABLE 2b

SOIL VERIFICATION SAMPLING RESULTS

DIOXINS FURANS (METHOD 8290)

PHASE I SOIL EXCAVATION REMOVAL ACTION

TAME OIL NORTHWEST TERMINAL

PERIOD: From 10/01/2002 thru 11/22/2002 Inclusive

SAMPLE TYPE: Soil

CONSTITUENT	SITE	B-12-02	B-15-01	SW-05-06A	SW-10-06	SW-15-02
	DATE	10-08-2002	10-16-2002	10-21-2002	10-22-2002	10-22-2002
	DEPTH (ft)	10.00	15.00	5.00	10.00	15.00
1,2,3,4,6,7,8-HpCDD	mg/kg	417.270 J	4185.265	14691.63	6.171	[illegible]
1,2,3,4,6,7,8-HpCDF	mg/kg	148.064	297.697	4530.895	2.5 U	412.717
1,2,3,4,7,8,9-HpCDF	mg/kg	10.542	20.134	142.75	2.5 U	21.969
1,2,3,4,7,8-HxCDD	mg/kg	4.603	2.5 U	18.303 J	2.5 U	2.5 U
1,2,3,4,7,8-HxCDF	mg/kg	6.328	11.727	58.68	2.5 U	17.764
1,2,3,6,7,8-HxCDD	mg/kg	26.265	70.055	479.732	2.5 U	64.132
1,2,3,6,7,8-HxCDF	mg/kg	4.634	7.115	34.783	2.5 U	7.527
1,2,3,7,8,9-HxCDD	mg/kg	9.036	7.157	46.192	2.5 U	6.965
1,2,3,7,8,9-HxCDF	mg/kg	2.5 U	4.66	12.993	2.5 U	5.572
1,2,3,7,8-PeCDD	mg/kg	2.5 U	2.5 U	2.762	2.5 U	2.5 U
1,2,3,7,8-PeCDF	mg/kg	2.5 U	3.956	13.674	2.5 U	4.041
2,3,4,6,7,8-HxCDF	mg/kg	8.772	13.436	65.587 J	2.5 U	13.319
2,3,4,7,8-PeCDF	mg/kg	2.5 U	2.644	10.087	2.5 U	3.437
2,3,7,8-TCDD	mg/kg	1 U	1 U	1 U	1 U	1 U
2,3,7,8-TCDF	mg/kg	1 U	1 U	2.564	1 U	1 U
OCDD	mg/kg	2370.51 J	16555.64 J	81565.762	51.857	16559.75
OCDF	mg/kg	446.494	829.114	10236.852	5 U	2740.037
Total HpCDD	mg/kg	1230.84	2595.472	18556.267	10.684	4225.334
Total HpCDF	mg/kg	595.485	1420.519	11847.158	2.831	2791.649
Total HxCDD	mg/kg	28.857	169.557	1193.243	0.353	203.210
Total HxCDF	mg/kg	230.496	488.149	2955.728	0.560	537.435

Landau Associates

The following qualifiers exist: U = Not Detected; J = Estimated; [illegible]

TABLE 20
SOIL VERIFICATION SAMPLING RESULTS
DIOXINS/FURANS (METHOD 8290)
IN SITU SOIL EXCAVATION REMOVAL ACTION
TMC GL NORTHWEST TERMINAL

PERIOD: From [illegible] 2002 to [illegible] 2002 - [illegible]
SAMPLE TYPE: Soil

CONSTITUENT	SITE DATE DEPTH (ft)	B-10-02 10.08.2002 13.00	B-15-01 10/16/2002 15.00	SW-05-06A 10-21-2002 5.00	SW-10-08 10.22.2002 10.00	SW-15-05 10.22.2002 15.00
Total PeCDD	(mg/kg)	1.62	1.525	8.344	2.5 U	2.9 U
Total [illegible]	(mg/kg)	27.169	58.788	307.446	2.5 U	73.02
Total TCDD	(mg/kg)	1 U	1 U	1 U	1 U	1 U
Total TCDF	(mg/kg)	0.771	2.93	19.79	1 U	2.136
Total TEQ	(mg/kg)	45.29	75.12	350.09	0.114	65.56

Notes: [illegible]

The following qualifiers exist: [illegible]

TABLE 3a

SOIL VERIFICATION SAMPLING RESULTS

PCBs (METHOD 8082)

FORMER CROSBY & OVERTON TANK AREA REMOVAL ACTION

TIME OIL NORTHWEST TERMINAL

PERIOD: From 08-23-2002 thru 09-20-2002 - Inclusive

SAMPLE TYPE: Soil

CONSTITUENT	SITE DATE DEPTH (ft) RESULT TYPE	COTA-001 08-23-2002 0.50 Primary	COTA-002 08-23-2002 1.00 Primary	COTA-003 08-23-2002 1.00 Primary	COTA-003A 09-16-2002 3.00 Primary	COTA-004 08-23-2002 1.00 Primary	COTA-004A 09-16-2002 1.00 Primary
Aroclor 1016	ug/kg	50 U	50 U	50 U	50 U	50 U	[illegible]
Aroclor 1221	ug/kg	50 U	50 U	50 U	50 U	50 U	[illegible]
Aroclor 1232	ug/kg	50 U	50 U	50 U	50 U	50 U	[illegible]
Aroclor 1242	ug/kg	50 U	50 U	50 U	50 U	50 U	[illegible]
Aroclor 1248	ug/kg	50 U	50 U	3150	50 U	830	[illegible]
Aroclor 1254	ug/kg	51.0	50 U	2560	50 U	489	[illegible]
Aroclor 1260	ug/kg	79.0	50 U	996	50 U	153	[illegible]
Total Compounds	ug/kg	130.00	0.00	6705.00	0.00	1,472.00	[illegible]

Data qualifier definitions

The following qualifiers exist: [illegible] not analyzed

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TABLE 3a

SOIL VERIFICATION SAMPLING RESULTS

PCBs (METHOD 8082)

FORMER CROSBY & OVERTON TANK AREA REMOVAL ACTION

TIME OIL NORTHWEST TERMINAL

PERIOD: From 06-23-2002 thru 09-20-2002 - inclusive

SAMPLE TYPE: Soil

CONSTITUENT	SITE DATE DEPTH (ft) RESULT TYPE	COTA-005 08-23-2002 1.00 Primary	COTA-005A 09-16-2002 1.50 Primary	COTA-006 08-23-2002 1.00 Primary	COTA-006 08-23-2002 1.00 Duplicate 1	COTA-006A 09-16-2002 1.50 Primary	COTA-006B 09-20-2002 2.00 Primary
Aroclor 1016	ug/kg	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor 1221	ug/kg	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor 1232	ug/kg	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor 1242	ug/kg	50 U	50 U	50 U	50 U	50 U	50 U
Aroclor 1248	ug/kg	205	50 U	1320	1440	50 U	50 U
Aroclor 1254	ug/kg	514	50 U	1150	1190	1190	[illegible]
Aroclor 1260	ug/kg	307	50 U	245	246	50 U	160
Sum of Constituents	ug/kg	1026.00	0.00	2715.00	2886.00	1190.00	160.00

Notes: Abbreviations

The following qualifiers were [illegible] in this report

TABLE 3b

SOIL VERIFICATION SAMPLING RESULTS

PAHs (METHOD 8270-SIM)

FORMER CROSBY & OVERTON TANK AREA REMOVAL ACTION

TMEC NORTHWEST TERMINAL

FERRO [illegible]

SAMPLE TYPE Soil

CONSTITUENT	SITE DATE DEPTH (ft) RESULT TYPE	COTA-001 08.23.2002 0.50 Primary	COTA-002 08.23.2002 1.00 Primary	COTA-003 08.23.2002 1.00 Primary	COTA-003A 09.16.2002 3.00 Primary	COTA-004 08.23.2002 1.00 Primary	COTA-004A 09.16.2002 2.00 Primary
Acenaphthene	ug/kg	6.67 UJ	6.67 UJ	74 J	NT	6.67 U	NT
Acenaphthylene	ug/kg	13.3	13.3	379	NT	67.3	NT
Anthracene	ug/kg	152	113	2330	NT	441	NT
Benzo(a)anthracene	ug/kg	54.0	61.3	1520	6.67 U	195	429
Benzo(a)pyrene	ug/kg	118	135	2130	6.67 U	227	215
Benzo(b)fluoranthene	ug/kg	164	175	2370	6.67 U	440	441
Benzo(ghi)perylene	ug/kg	104	93.3	1120	NT	156	NT
Benzo(k)fluoranthene	ug/kg	51.3	55.3	745	6.67 U	179	201
Chrysene	ug/kg	90.0	88	1720	6.67 U	193	653
Dibenzo(a,h)anthracene	ug/kg	20.7	20.7	242	6.67 U	42	[illegible]
Fluoranthene	ug/kg	150	137	4060	NT	339	NT
Fluorene	ug/kg	6.67 U	6.67 U	115	NT	13.3	NT
Indeno(1,2,3-cd)pyrene	ug/kg	56.0	70	861	6.67 U	131	254
Naphthalene	ug/kg	16.0	7.33	96	NT	13.3	NT
Phenanthrene	ug/kg	51.3	40.7	2570	NT	141	113
Pyrene	ug/kg	147	151	5630	NT	423	NT

Laboratory Qualifiers

The following qualifiers were [illegible]

BZTO104(e)017123

TABLE 3b
SOIL VERIFICATION SAMPLING RESULTS
PAHs (METHOD 8270-SIM)
FORMER CROSBY & OVERTON TANK AREA REMOVAL ACTION
TIMEOIL NORTHWEST TERMINAL

[illegible] From 08-23-2002 Thru 09-20-2002 - Inclusive
SAMPLE TYPE Soil

CONSTITUENT	SITE	COTA-005	COTA-005A	COTA-006	COTA-006	COTA-006A	COTA-006B
	DATE	08-23-2002	09-16-2002	08-23-2002	08-23-2002	09-16-2002	09-20-2002
	DEPTH (ft)	1.00	1.50	1.00	1.00	1.50	2.00
	RESULT TYPE	Primary	Primary	Primary	Duplicate 1	Primary	Primary
Acenaphthene	ug/kg	20 J	NT	491 J	215 J	NT	NT
Acenaphthylene	ug/kg	469	NT	578	811	NT	NT
Anthracene	ug/kg	961	NT	1600 J	2630 J	NT	NT
Benzo(a)anthracene	ug/kg	1233	6.67 U	3500 J	5220 J	2240	574
Benzo(a)pyrene	ug/kg	2300	6.67 U	5150 J	7470 J	2920	1120
Benzo(b)fluoranthene	ug/kg	2760	6.67 U	5870	7660	3930	1030
Benzo(ghi)perylene	ug/kg	3720	NT	5270	6750	NT	NT
Benzo(k)fluoranthene	ug/kg	748	6.67 U	1840	2360	940	369
Chrysene	ug/kg	1550	6.67 U	4170	5800	2660	725
Dibenzo(a,h)anthracene	ug/kg	241	6.67 U	355	471	440	176
Fluoranthene	ug/kg	3250	NT	11000 J	7530 J	NT	NT
Fluorene	ug/kg	26.7	NT	90 J	537 J	NT	NT
Indeno(1,2,3-cd)pyrene	ug/kg	994	7.33	3590	4730	2420	746
Naphthalene	ug/kg	47.2	NT	58.7 J	128 J	NT	NT
Phenanthrene	ug/kg	931	NT	4600 J	12100 J	NT	NT
Pyrene	ug/kg	4230	NT	10100	5730	NT	NT

Landau Associates

The following qualifiers were used: U = Not detected. J = Estimated.

TABLE 4
DECONTAMINATION VERIFICATION SAMPLING RESULTS
WAREHOUSE DEMOLITION AND MISCELLANEOUS ITEMS REMOVAL
TIME OIL NORTHWEST TERMINAL

Location	Date Collected	Sample Type	Location	Units	PCP (Method 8270)
PCPWH-001	8/20/2002	wipe	Former PCP Warehouse	ug/wipe	17.8
PCPWH-002	8/20/2002	wipe	Former PCP Warehouse	ug/wipe	5.25
PCPWH-008	9/10/2002	wipe	Former PCP Warehouse	ug/wipe	36.8
PCPWH-009	9/10/2002	wipe	Former PCP Warehouse	ug/wipe	15 U
PCPWH-010	9/10/2002	wipe	Former PCP Warehouse	ug/wipe	15 U
TANK38009	10/31/2002	wipe	Tank 38009	ug/wipe	333 U
PCPWH-003	8/20/2002	wood	Former PCP Warehouse	ug/kg	241 J
PCPWH-004	8/20/2002	wood	Former PCP Warehouse	ug/kg	126 J
PCPWH-011	9/10/2002	wood	Former PCP Warehouse	ug/kg	3690
PCPWH-012	9/10/2002	wood	Former PCP Warehouse	ug/kg	1780
PCPWH-005	8/20/2002	concrete	Former PCP Warehouse	ug/kg	3850
PCPWH-006	8/20/2002	concrete	Former PCP Warehouse	ug/kg	3650
PCPWH-007	8/20/2002	concrete	Concrete Wall	ug/kg	15 UJ
PCPWH-013	9/10/2002	concrete	Former PCP Warehouse	ug/kg	612
PCPWH-014	9/10/2002	concrete	Former PCP Warehouse	ug/kg	30 U
PCPWH-015	9/10/2002	concrete	Former PCP Warehouse	ug/kg	15 UJ
PCPWH-016	9/10/2002	concrete	Former PCP Warehouse	ug/kg	15 UJ
PCPWH-017	11/1/2002	concrete	Concrete Wall	ug/kg	333 U

U = Indicates compound was analyzed for, but was not detected at the reported sample detection limit.

UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

APPENDIX A

Verification Sampling Procedures

APPENDIX A
VERIFICATION SAMPLING PROCEDURES

Verification samples were collected from multiple types of sample media that included soil, wood, concrete and metal. This section describes the methods used in collection of analytical samples from each of the four types of sample media. All verification sampling was conducted by Landau Associates field representatives in accordance with the RAPs.

SOIL SAMPLING METHODS

Soil verification sampling was conducted by collecting soil from each of the sidewalls and base of the three tiers within the *in situ* soil excavation, beneath the footprint of the soil stockpile, and within the excavation located inside the former C&O tank area. Soil verification samples were collected from approximately 0 to 6 inches below the base of the excavation or composited over the full depth interval represented by a sidewall. Soil samples were collected using a decontaminated stainless steel spoon, hand auger, or excavator bucket and placed into laboratory supplied sample containers. Decontamination procedures for sampling equipment followed the procedures outlined in the sampling and analysis plan for the Phase III remedial investigation (RI) work plan (Landau Associates 2001c). All samples from the *in situ* soil excavation and stockpile were analyzed for PCP using EPA Method 8270C and were submitted to Specialty Analytical. In addition to PCP, selected verification samples were analyzed for metals by 6010B/7000 at Specialty Analytical and dioxin/furan compounds by Columbia Analytical Services in Houston, Texas. Quality assurance/quality control (QA/QC) procedures used during the collection and analysis of the samples are provided in the QA project plan (Landau Associates 2001).

WOOD SAMPLING METHODS

Verification samples from wood framing within the former PCP warehouse were collected using a decontaminated wood auger bit powered by a cordless power drill. Wood shavings were collected into laboratory supplied sample containers and submitted to Specialty Analytical for PCP analysis using EPA Method 8270C. Decontamination and QA/QC procedures for sample collection followed those outlined in the Phase III RI work plan.

CONCRETE SAMPLING METHODS

Verification concrete samples of the flooring within the former PCP warehouse and concrete walls located south of the warehouse and adjacent to the stockpile were collected using a rotohammer with a decontaminated drilling bit to pulverize the concrete. The concrete powder was collected into

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laboratory-supplied sample containers and submitted to Specialty Analytical for PCP by EPA Method 8270C. Decontamination and QA/QC procedures for sample collection followed those outlined in the Phase III RI work plan.

METAL SAMPLING METHODS

Verification metal wipe samples were collected from the interior metal walls of the former PCP warehouse and interior of Tank 38009 by wiping laboratory-provided cheesecloth over a one square foot section of the metal surface. The cloth was then placed into a laboratory-supplied container and submitted to Specialty Analytical for PCP by EPA Method 8270C.

APPENDIX B

Disposal Permits

APPENDIX C

Disposal Documentation – Warehouse, Crosby & Overton Tank Area Soil, Miscellaneous

APPENDIX D

Soil Transportation/Disposal Summary – Soil Stockpile and *In Situ* Soil Excavation

APPENDIX D

SOIL TRANSPORTATION/DISPOSAL SUMMARY – SOIL STOCKPILE AND *IN SITU* SOIL EXCAVATION

This appendix includes a summary of the transportation records for the removal of soil from the Phase I soil stockpile area and Phase II former PCP mixing area warehouse excavation. The summary includes the load date when each shipment left the terminal, United States and Canadian Manifest record numbers per load, trucking company and vehicle licenses numbers for each transported shipment, amount of soil transported per truck load, and the port of entry to Canada for each shipment. The amount of soil shipped per truck load was determined by weighing the truck before and after loading of soil at an onsite temporary scale and recording the weights on the summary and manifest records. Original manifest records are being stored at the Time Oil Co. Environmental Services office in Seattle, Washington.

SUMMARY OF SOIL TRANSPORTATION
TIME OIL CO. - PORTLAND, OR

3-Jan-03

ORD009597543

Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
3-Sep-02	NW-001	27.812	Z & R	WAR000012393	M043	WAR00011981
3-Sep-02	NW-002	27.448	Z & R	WAR000012393	M043	WAR00011981
3-Sep-02	NW-003	27.536	Z & R	WAR000012393	M043	WAR00011981
3-Sep-02	NW-004	27.602	Z & R	WAR000012393	M043	WAR00011981
3-Sep-02	NW-005	27.679	Z & R	WAR000012393	M043	WAR00011981
3-Sep-02	NW-006	27.657	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-007	27.503	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-008	27.183	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-009	27.547	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-010	27.470	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-011	27.602	Z & R	WAR000012393	M043	WAR00011981
4-Sep-02	NW-012	27.756	Z & R	WAR000012393	M043	WAR00011981
5-Sep-02	NW-013	28.352	Westcan	WAR0000111973	M043	WAR00011981
5-Sep-02	NW-014	27.966	Westcan	WAR0000111973	M043	WAR00011981
6-Sep-02	NW-015	28.142	Westcan	WAR0000111973	M043	WAR00011981
6-Sep-02	NW-016	27.282	Westcan	WAR0000111973	M043	WAR00011981
6-Sep-02	NW-017	27.988	LA	WAR000012385	M043	WAR00011981
6-Sep-02	NW-018	27.657	LA	WAR000012385	M043	WAR00011981
6-Sep-02	NW-019	27.845	LA	WAR000012385	M043	WAR00011981
7-Sep-02	NW-020	27.558	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-021	27.492	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-022	28.131	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-023	27.547	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-024	27.525	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-025	27.944	Z & R	WAR000012393	M043	WAR00011981
7-Sep-02	NW-026	28.958	Westcan	WAR0000111973	M043	WAR00011981
8-Sep-02	NW-027	27.613	Z & R	WAR000012393	M043	WAR00011981
8-Sep-02	NW-028	27.360	Z & R	WAR000012393	M043	WAR00011981
8-Sep-02	NW-029	27.734	Z & R	WAR000012393	M043	WAR00011981
8-Sep-02	NW-030	27.282	Z & R	WAR000012393	M043	WAR00011981
8-Sep-02	NW-031	27.900	Z & R	WAR000012393	M043	WAR00011981
8-Sep-02	NW-032	27.569	Z & R	WAR000012393	M043	WAR00011981
9-Sep-02	NW-033	28.241	Westcan	WAR0000111973	M043	WAR00011981
9-Sep-02	NW-034	27.812	Westcan	WAR0000111973	M043	WAR00011981
9-Sep-02	NW-035	27.878	Westcan	WAR0000111973	M043	WAR00011981
10-Sep-02	NW-036	27.900	Z & R	WAR000012393	M043	WAR00011981
10-Sep-02	NW-037	27.613	Z & R	WAR000012393	M043	WAR00011981
10-Sep-02	NW-038	27.657	Z & R	WAR000012393	M043	WAR00011981
10-Sep-02	NW-039	27.823	Z & R	WAR000012393	M043	WAR00011981
10-Sep-02	NW-040	27.679	Z & R	WAR000012393	M043	WAR00011981
10-Sep-02	NW-041	27.657	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-042	27.602	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-043	27.679	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-044	26.886	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-045	27.448	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-046	27.756	Z & R	WAR000012393	M043	WAR00011981
11-Sep-02	NW-047	27.503	Z & R	WAR000012393	M043	WAR00011981
12-Sep-02	NW-048	27.812	LA Trans	WAR000012385	M043	WAR00011981
12-Sep-02	NW-049	27.602	LA Trans	WAR000012385	M043	WAR00011981

SUMMARY OF SOIL TRANSPORTATION
TIME OIL CO. - PORTLAND, OR

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Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
13-Sep-02	NW-050	28.065	Z & R	WAR000012393	M043	WAR00011981
14-Sep-02	NW-050	28.093	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-051	27.503	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-052	27.745	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-053	27.591	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-054	27.613	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-055	27.977	Z & R	WAR000012393	M043	WAR00011981
13-Sep-02	NW-056	28.330	Westcan	WAR0000111973	M043	WAR00011981
14-Sep-02	NW-057	27.602	Westcan	WAR0000111973	M043	WAR00011981
14-Sep-02	NW-058	27.734	Z & R	WAR000012393	M043	WAR00011981
14-Sep-02	NW-059	28.065	Z & R	WAR000012393	M043	WAR00011981
14-Sep-02	NW-061	27.712	Z & R	WAR000012393	M043	WAR00011981
14-Sep-02	NW-062	26.952	Z & R	WAR000012393	M043	WAR00011981
14-Sep-02	NW-063	27.558	Z & R	WAR000012393	M043	WAR00011981
16-Sep-02	NW-064	27.525	Westcan	WAR0000111973	M043	WAR00011981
17-Sep-02	NW-065	27.382	Westcan	WAR0000111973	M043	WAR00011981
17-Sep-02	NW-066	27.503	Z & R	WAR000012393	M043	WAR00011981
17-Sep-02	NW-067	28.076	Z & R	WAR000012393	M043	WAR00011981
17-Sep-02	NW-068	28.473	Westcan	WAR0000111973	M043	WAR00011981
17-Sep-02	NW-069	28.054	LA Trans	WAR000012385	M043	WAR00011981
18-Sep-02	NW-070	27.205	Z & R	WAR000012393	M043	WAR00011981
18-Sep-02	NW-071	27.767	Z & R	WAR000012393	M043	WAR00011981
18-Sep-02	NW-072	27.856	Z & R	WAR000012393	M043	WAR00011981
18-Sep-02	NW-073	27.834	Z & R	WAR000012393	M043	WAR00011981
18-Sep-02	NW-074	27.911	Z & R	WAR000012393	M043	WAR00011981
18-Sep-02	NW-075	26.974	Westcan	WAR0000111973	M043	WAR00011981
18-Sep-02	NW-076	27.602	Westcan	WAR0000111973	M043	WAR00011981
18-Sep-02	NW-077	26.522	Westcan	WAR0000111973	M043	WAR00011981
18-Sep-02	NW-078	27.459	Z & R	WAR000012393	M043	WAR00011981
20-Sep-02	NW-079	28.164	Westcan	WAR0000111973	M043	WAR00011981
21-Sep-02	NW-080	27.789	Z & R	WAR000012393	M043	WAR00011981
21-Sep-02	NW-081	27.701	Z & R	WAR000012393	M043	WAR00011981
21-Sep-02	NW-082	27.933	Z & R	WAR000012393	M043	WAR00011981
21-Sep-02	NW-083	27.360	Z & R	WAR000012393	M043	WAR00011981
21-Sep-02	NW-084	27.922	Z & R	WAR000012393	M043	WAR00011981
21-Sep-02	NW-085	27.812	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-086	27.823	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-087	27.282	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-088	27.624	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-089	27.778	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-090	27.437	Z & R	WAR000012393	M043	WAR00011981
22-Sep-02	NW-091	27.712	Z & R	WAR000012393	M043	WAR00011981
23-Sep-02	NW-092	27.558	LA Trans	WAR000012385	M043	WAR00011981
23-Sep-02	NW-093	27.271	LA Trans	WAR000012385	M043	WAR00011981
24-Sep-02	NW-094	27.624	Westcan	WAR0000111973	M043	WAR00011981
24-Sep-02	NW-095	27.514	Westcan	WAR0000111973	M043	WAR00011981
24-Sep-02	NW-096	27.106	Westcan	WAR0000111973	M043	WAR00011981
25-Sep-02	NW-097	27.602	Z & R	WAR000012393	M043	WAR00011981
25-Sep-02	NW-098	27.756	Z & R	WAR000012393	M043	WAR00011981

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Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
25-Sep-02	NW-099	27.966	Z & R	WAR000012393	M043	WAR00011981
25-Sep-02	NW-100	27.690	Westcan	WAR0000111973	M043	WAR00011981
25-Sep-02	NW-101	27.988	Z & R	WAR000012393	M043	WAR00011981
25-Sep-02	NW-102	27.591	Z & R	WAR000012393	M043	WAR00011981
25-Sep-02	NW-103	27.657	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-104	27.823	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-105	27.723	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-106	27.327	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-107	26.610	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-108	27.801	Z & R	WAR000012393	M043	WAR00011981
26-Sep-02	NW-109	27.701	Z & R	WAR000012393	M043	WAR00011981
27-Sep-02	NW-110	26.764	Westcan	WAR0000111973	M043	WAR00011981
27-Sep-02	NW-111	27.249	Westcan	WAR0000111973	M043	WAR00011981
27-Sep-02	NW-112	27.734	Westcan	WAR0000111973	M043	WAR00011981
27-Sep-02	NW-113	28.197	Westcan	WAR0000111973	M043	WAR00011981
27-Sep-02	NW-114	27.437	Westcan	WAR0000111973	M043	WAR00011981
27-Sep-02	NW-115	28.748	Westcan	WAR0000111973	M043	WAR00011981
28-Sep-02	NW-116	27.734	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-117	27.878	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-118	27.801	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-119	27.635	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-120	27.569	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-121	27.933	Z & R	WAR000012393	M043	WAR00011981
28-Sep-02	NW-122	27.459	Westcan	WAR0000111973	M043	WAR00011981
30-Sep-02	NW-123	27.778	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-124	30.005	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-125	27.018	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-126	27.613	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-127	27.734	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-128	27.470	Z & R	WAR000012393	M043	WAR00011981
30-Sep-02	NW-129	27.613	LA Trans	WAR000012385	M043	WAR00011981
2-Oct-02	NW-130	27.514	Westcan	WAR0000111973	M043	WAR00011981
3-Oct-02	NW-131	27.514	Z & R	WAR000012393	M043	WAR00011981
3-Oct-02	NW-132	27.690	Z & R	WAR000012393	M043	WAR00011981
3-Oct-02	NW-133	27.591	Z & R	WAR000012393	M043	WAR00011981
3-Oct-02	NW-134	27.845	Z & R	WAR000012393	M043	WAR00011981
3-Oct-02	NW-135	27.723	Z & R	WAR000012393	M043	WAR00011981
3-Oct-02	NW-136	27.977	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-137	27.701	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-138	27.867	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-139	27.778	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-140	27.393	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-141	27.723	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-142	27.867	Z & R	WAR000012393	M043	WAR00011981
4-Oct-02	NW-143	27.756	Westcan	WAR0000111973	M043	WAR00011981
4-Oct-02	NW-144	27.238	Westcan	WAR0000111973	M043	WAR00011981
4-Oct-02	NW-145	27.657	Westcan	WAR0000111973	M043	WAR00011981
4-Oct-02	NW-146	27.734	Westcan	WAR0000111973	M043	WAR00011981
4-Oct-02	NW-147	27.646	LA Trans	WAR000012385	M043	WAR00011981

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Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
5-Oct-02	NW-148	27.767	Westcan	WAR0000111973	M043	WAR00011981
7-Oct-02	NW-149	27.867	Westcan	WAR0000111973	M043	WAR00011981
7-Oct-02	NW-150	27.624	Z & R	WAR000012393	M043	WAR00011981
7-Oct-02	NW-151	28.032	Z & R	WAR000012393	M043	WAR00011981
7-Oct-02	NW-152	27.624	Z & R	WAR000012393	M043	WAR00011981
7-Oct-02	NW-153	27.911	Z & R	WAR000012393	M043	WAR00011981
7-Oct-02	NW-154	27.536	Z & R	WAR000012393	M043	WAR00011981
7-Oct-02	NW-155	27.789	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-156	28.429	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-157	27.558	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-158	27.789	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-159	27.646	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-160	27.657	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-161	27.635	Z & R	WAR000012393	M043	WAR00011981
8-Oct-02	NW-162	27.756	Westcan	WAR0000111973	M043	WAR00011981
8-Oct-02	NW-163	28.076	LA Trans	WAR000012385	M043	WAR00011981
11-Oct-02	NW-164	26.819	Westcan	WAR0000111973	M043	WAR00011981
11-Oct-02	NW-165	27.900	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-166	27.679	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-167	27.745	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-168	30.104	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-169	27.701	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-170	27.657	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-171	28.109	Z & R	WAR000012393	M043	WAR00011981
11-Oct-02	NW-172	27.679	Westcan	WAR0000111973	M043	WAR00011981
11-Oct-02	NW-173	27.536	Westcan	WAR0000111973	M043	WAR00011981
11-Oct-02	NW-174	27.999	Z & R	WAR000012393	M043	WAR00011981
12-Oct-02	NW-175	27.955	Z & R	WAR000012393	M043	WAR00011981
12-Oct-02	NW-176	27.801	Z & R	WAR000012393	M043	WAR00011981
12-Oct-02	NW-177	27.470	Z & R	WAR000012393	M043	WAR00011981
12-Oct-02	NW-178	27.845	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-179	27.900	Westcan	WAR0000111973	M043	WAR00011981
14-Oct-02	NW-180	27.624	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-181	27.955	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-182	27.690	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-183	27.834	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-184	27.900	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-185	27.834	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-186	27.459	Z & R	WAR000012393	M043	WAR00011981
14-Oct-02	NW-187	27.282	LA Trans	WAR000012385	M043	WAR00011981
16-Oct-02	NW-188	27.845	Z & R	WAR000012393	M043	WAR00011981
16-Oct-02	NW-189	27.789	Z & R	WAR000012393	M043	WAR00011981
16-Oct-02	NW-190	27.734	Z & R	WAR000012393	M043	WAR00011981
16-Oct-02	NW-191	27.415	Z & R	WAR000012393	M043	WAR00011981
16-Oct-02	NW-192	27.646	Z & R	WAR000012393	M043	WAR00011981
16-Oct-02	NW-193	27.646	Z & R	WAR000012393	M043	WAR00011981
17-Oct-02	NW-194	27.360	Westcan	WAR0000111973	M043	WAR00011981
17-Oct-02	NW-195	27.657	Westcan	WAR0000111973	M043	WAR00011981
19-Oct-02	NW-196	27.955	Z & R	WAR000012393	M043	WAR00011981

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TIME OIL CO. - PORTLAND, OR

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Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
19-Oct-02	NW-197	27.514	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-198	27.867	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-199	27.602	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-200	27.845	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-201	28.098	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-202	27.668	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-203	27.812	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-204	27.249	Westcan	WAR0000111973	M043	WAR00011981
19-Oct-02	NW-205	27.944	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-206	27.745	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-207	27.602	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-208	27.646	Z & R	WAR000012393	M043	WAR00011981
19-Oct-02	NW-209	27.029	Westcan	WAR0000111973	M043	WAR00011981
21-Oct-02	NW-210	27.492	Westcan	WAR0000111973	M043	WAR00011981
21-Oct-02	NW-211	27.514	Westcan	WAR0000111973	M043	WAR00011981
21-Oct-02	NW-212	28.131	LA Trans	WAR000012385	M043	WAR00011981
21-Oct-02	NW-213	27.668	Z & R	WAR000012393	M043	WAR00011981
21-Oct-02	NW-214	27.789	Z & R	WAR000012393	M043	WAR00011981
22-Oct-02	NW-215	18.310	Kleysen	WAR000012443	M043	WAR00011981
22-Oct-02	NW-216	17.593	Kleysen	WAR000012443	M043	WAR00011981
23-Oct-02	NW-217	28.109	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-218	27.834	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-219	28.043	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-220	27.723	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-221	27.767	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-222	27.922	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-223	27.668	Z & R	WAR000012393	M043	WAR00011981
23-Oct-02	NW-224	27.580	Westcan	WAR0000111973	M043	WAR00011981
23-Oct-02	NW-225	17.896	Kleysen	WAR000012443	M043	WAR00011981
23-Oct-02	NW-226	17.896	Kleysen	WAR000012443	M043	WAR00011981
24-Oct-02	NW-227	27.569	Z & R	WAR000012393	M043	WAR00011981
24-Oct-02	NW-228	27.679	Z & R	WAR000012393	M043	WAR00011981
24-Oct-02	NW-229	27.767	Z & R	WAR000012393	M043	WAR00011981
24-Oct-02	NW-230	27.613	Z & R	WAR000012393	M043	WAR00011981
24-Oct-02	NW-231	27.216	Z & R	WAR000012393	M043	WAR00011981
24-Oct-02	NW-232	27.073	Westcan	WAR0000111973	M043	WAR00011981
24-Oct-02	NW-233	27.591	Westcan	WAR0000111973	M043	WAR00011981
24-Oct-02	NW-234	27.073	LA Trans	WAR000012385	M043	WAR00011981
25-Oct-02	NW-235	18.442	Kleysen	WAR000012443	M043	WAR00011981
25-Oct-02	NW-236	18.442	Kleysen	WAR000012443	M043	WAR00011981
27-Oct-02	NW-237	28.396	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-238	28.374	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-239	28.109	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-240	28.605	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-241	27.668	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-242	28.848	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-243	28.098	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-244	28.627	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-245	27.183	Westcan	WAR0000111973	M043	WAR00011981

SUMMARY OF SOIL TRANSPORTATION
TIME OIL CO. - PORTLAND, OR

3-Jan-03

ORD009597543

Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
27-Oct-02	NW-246	18.084	Kleysen	WAR000012443	M043	WAR00011981
27-Oct-02	NW-247	18.084	Kleysen	WAR000012443	M043	WAR00011981
27-Oct-02	NW-248	27.999	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-249	28.120	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-250	27.415	Z & R	WAR000012393	M043	WAR00011981
27-Oct-02	NW-251	27.712	Z & R	WAR000012393	M043	WAR00011981
28-Oct-02	NW-252	28.297	Westcan	WAR0000111973	M043	WAR00011981
28-Oct-02	NW-253	27.216	Westcan	WAR0000111973	M043	WAR00011981
29-Oct-02	NW-254	18.519	Kleysen	WAR000012443	M043	WAR00011981
29-Oct-02	NW-255	18.519	Kleysen	WAR000012443	M043	WAR00011981
29-Oct-02	NW-256	27.194	Westcan	WAR0000111973	M043	WAR00011981
29-Oct-02	NW-257	27.745	Westcan	WAR0000111973	M043	WAR00011981
29-Oct-02	NW-258	27.062	Westcan	WAR0000111973	M043	WAR00011981
30-Oct-02	NW-259	27.547	Z & R	WAR000012393	M043	WAR00011981
30-Oct-02	NW-260	27.911	Z & R	WAR000012393	M043	WAR00011981
30-Oct-02	NW-261	17.929	Kleysen	WAR000012443	M043	WAR00011981
30-Oct-02	NW-262	17.929	Kleysen	WAR000012443	M043	WAR00011981
30-Oct-02	NW-263	27.701	LA Trans	WAR000012385	M043	WAR00011981
31-Oct-02	NW-264	28.120	Z & R	WAR000012393	M043	WAR00011981
31-Oct-02	NW-265	27.977	Z & R	WAR000012393	M043	WAR00011981
31-Oct-02	NW-266	27.569	Z & R	WAR000012393	M043	WAR00011981
31-Oct-02	NW-267	27.668	Z & R	WAR000012393	M043	WAR00011981
31-Oct-02	NW-268	27.878	Z & R	WAR000012393	M043	WAR00011981
31-Oct-02	NW-269	28.098	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-270	18.227	Kleysen	WAR000012443	M043	WAR00011981
1-Nov-02	NW-271	18.227	Kleysen	WAR000012443	M043	WAR00011981
1-Nov-02	NW-272	27.569	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-273	27.536	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-274	27.756	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-275	27.205	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-276	27.580	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-277	27.558	Z & R	WAR000012393	M043	WAR00011981
1-Nov-02	NW-278	27.437	LA Trans	WAR000012385	M043	WAR00011981
4-Nov-02	NW-279	27.778	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-280	27.878	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-281	27.150	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-282	27.514	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-283	27.955	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-284	27.955	Z & R	WAR000012393	M043	WAR00011981
4-Nov-02	NW-285	28.021	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-286	27.988	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-287	27.999	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-288	27.801	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-289	27.371	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-290	27.778	Z & R	WAR000012393	M043	WAR00011981
5-Nov-02	NW-291	17.995	Kleysen	WAR000012443	M043	WAR00011981
5-Nov-02	NW-292	27.437	Westcan	WAR0000111973	M043	WAR00011981
5-Nov-02	NW-293	17.995	Kleysen	WAR000012443	M043	WAR00011981
5-Nov-02	NW-294	27.889	Westcan	WAR0000111973	M043	WAR00011981

SUMMARY OF SOIL TRANSPORTATION
TIME OIL CO. - PORTLAND, OR

3-Jan-03

ORD009597543

Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
6-Nov-02	NW-295	18.018	Kleysen	WAR000012443	M043	WAR00011981
6-Nov-02	NW-296	18.018	Kleysen	WAR000012443	M043	WAR00011981
7-Nov-02	NW-297	26.489	Z & R	WAR000012393	M043	WAR00011981
7-Nov-02	NW-298	27.514	Z & R	WAR000012393	M043	WAR00011981
7-Nov-02	NW-299	26.368	Westcan	WAR0000111973	M043	WAR00011981
8-Nov-02	NW-300	17.433	Kleysen	WAR000012443	M043	WAR00011981
8-Nov-02	NW-301	17.433	Kleysen	WAR000012443	M043	WAR00011981
8-Nov-02	NW-302	27.216	LA Trans	WAR000012385	M043	WAR00011981
8-Nov-02	NW-303	28.440	Z & R	WAR000012393	M043	WAR00011981
8-Nov-02	NW-304	28.462	Z & R	WAR000012393	M043	WAR00011981
8-Nov-02	NW-305	27.712	Z & R	WAR000012393	M043	WAR00011981
8-Nov-02	NW-306	27.988	Z & R	WAR000012393	M043	WAR00011981
8-Nov-02	NW-307	28.043	Z & R	WAR000012393	M043	WAR00011981
8-Nov-02	NW-308	27.018	Westcan	WAR0000111973	M043	WAR00011981
8-Nov-02	NW-309	26.246	Westcan	WAR0000111973	M043	WAR00011981
8-Nov-02	NW-310	26.224	Westcan	WAR0000111973	M043	WAR00011981
9-Nov-02	NW-311	27.867	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-312	27.977	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-313	27.349	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-314	27.602	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-315	28.396	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-316	18.304	Kleysen	WAR000012443	M043	WAR00011981
9-Nov-02	NW-317	18.304	Kleysen	WAR000012443	M043	WAR00011981
9-Nov-02	NW-318	27.106	Z & R	WAR000012393	M043	WAR00011981
9-Nov-02	NW-319	27.371	Z & R	WAR000012393	M043	WAR00011981
11-Nov-02	NW-320	18.447	Kleysen	WAR000012443	M043	WAR00011981
11-Nov-02	NW-321	18.447	Kleysen	WAR000012443	M043	WAR00011981
12-Nov-02	NW-322	27.889	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-323	28.197	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-324	27.823	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-325	27.845	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-326	28.363	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-327	27.382	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-328	27.657	Z&R	WAR000012393	M043	WAR00011981
12-Nov-02	NW-329	27.525	Westcan	WAR0000111973	M043	WAR00011981
12-Nov-02	NW-330	18.442	Kleysen	WAR000012443	M043	WAR00011981
12-Nov-02	NW-331	18.442	Kleysen	WAR000012443	M043	WAR00011981
13-Nov-02	NW-332	27.404	LA Trans	WAR000012385	M043	WAR00011981
14-Nov-02	NW-333	18.618	Kleysen	WAR000012443	M043	WAR00011981
14-Nov-02	NW-334	18.618	Kleysen	WAR000012443	M043	WAR00011981
14-Nov-02	NW-335	27.801	Z & R	WAR000012393	M043	WAR00011981
14-Nov-02	NW-336	27.470	Z & R	WAR000012393	M043	WAR00011981
14-Nov-02	NW-337	27.051	Z & R	WAR000012393	M043	WAR00011981
14-Nov-02	NW-338	27.690	Z & R	WAR000012393	M043	WAR00011981
14-Nov-02	NW-339	27.635	Z & R	WAR000012393	M043	WAR00011981
15-Nov-02	NW-340	27.602	Z & R	WAR000012393	M043	WAR00011981
15-Nov-02	NW-341	27.856	Z & R	WAR000012393	M043	WAR00011981
15-Nov-02	NW-342	18.740	Kleysen	WAR000012443	M043	WAR00011981
15-Nov-02	NW-343	27.646	LA Trans	WAR000012385	M043	WAR00011981

SUMMARY OF SOIL TRANSPORTATION
TIME OIL CO. - PORTLAND, OR

3-Jan-03

ORD009597543

Shipment Date	US EPA Manifest #	QUANTITY (Short Tons)	Transporter	Transporter EPA ID No.	Management Code	Designated Facility EPA ID Number
16-Nov-02	NW-344	28.087	Z & R	WAR000012393	M043	WAR00011981
16-Nov-02	NW-345	27.734	Z & R	WAR000012393	M043	WAR00011981
16-Nov-02	NW-346	28.109	Z & R	WAR000012393	M043	WAR00011981
16-Nov-02	NW-347	27.448	Z & R	WAR000012393	M043	WAR00011981
16-Nov-02	NW-348	27.878	Z & R	WAR000012393	M043	WAR00011981
16-Nov-02	NW-349	18.740	Kleysen	WAR000012443	M043	WAR00011981
17-Nov-02	NW-350	27.327	Z & R	WAR000012393	M043	WAR00011981
17-Nov-02	NW-351	27.723	Z & R	WAR000012393	M043	WAR00011981
17-Nov-02	NW-352	27.382	Z & R	WAR000012393	M043	WAR00011981
17-Nov-02	NW-353	27.646	Z & R	WAR000012393	M043	WAR00011981
17-Nov-02	NW-354	27.492	Z & R	WAR000012393	M043	WAR00011981
18-Nov-02	NW-355	27.801	Z & R	WAR000012393	M043	WAR00011981
18-Nov-02	NW-356	27.977	Z & R	WAR000012393	M043	WAR00011981
18-Nov-02	NW-357	19.313	Kleysen	WAR000012443	M043	WAR00011981
19-Nov-02	NW-358	19.313	Kleysen	WAR000012443	M043	WAR00011981
20-Nov-02	NW-359	27.602	Z & R	WAR000012393	M043	WAR00011981
20-Nov-02	NW-360	27.315	Z & R	WAR000012393	M043	WAR00011981
20-Nov-02	NW-361	25.188	Z & R	WAR000012393	M043	WAR00011981
TOTAL		9,695.619	Total Short Tons			

APPENDIX E

Data Validation Technical Memoranda

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager, Landau Associates

FROM: Denise Nieman and Stacy Pischer

DATE: January 14, 2003

RE: TIME OIL NORTHWEST TERMINAL
***IN SITU* AND WAREHOUSE DECONTAMINATION SAMPLING**
LABORATORY DATA QUALITY EVALUATION

This technical memorandum provides the results of a data quality evaluation for 34 soil, four concrete, two wood, and four wipe samples collected between September 10 through November 1, 2002. A data quality evaluation was performed for analyses of pentachlorophenol (PCP) by U.S. Environmental Protection Agency (EPA) Method 8270B Acid Fraction. All of the analyses were performed by Specialty Analytical Laboratory located in Tualatin, Oregon. This data quality evaluation covers data packages 0209057, 0210006, 0210016, 0210037, 0210053, 0210075, 0210088, 0210099, 0210102, 0210110, 0210140, 0211002, and 0210185. The data quality evaluation was performed in accordance with the quality assurance project plan (QAPP) contained in Appendix B of the *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon* (Landau Associates 2001), and with applicable portions of the U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Organic Data* (EPA 1994).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Method blank results
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates (including laboratory control samples)
- Quantitation limits
- Overall data quality and completeness.

Data validation qualifiers are added to sample results based on the evaluation of data quality. The absence of a data qualifier indicates that the datum is acceptable without qualification. Applicable data validation qualifiers are summarized in Table 1. The data quality evaluation is summarized below.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package. The laboratory received all samples in good condition and all analyses requested were performed.

HOLDING TIMES

For all analyses and all samples, the time between sample collection, extraction, and analysis was determined to be within method recommended holding times.

SURROGATE SPIKE RECOVERIES

Surrogate spike recoveries were within project-specified control limits with the following exceptions:

- Recovery values for surrogate 2,4,6-tribromophenol in concrete samples PCPWH-013, PCPWH-014, PCPWH-015, PCPWH-016, and PCPWH-017 were below the laboratory control limits, indicating a potential low bias. Recoveries of the surrogate and the target compound (PCP) may be low due to the pH associated with the concrete matrix of these samples. The PCP results for these samples were qualified as estimates (J, detects; UJ, nondetects), as indicated in Table 1.

- Recovery values for surrogate 2,4,6-tribromophenol for three non-concrete samples associated with data package 0209057 were above the laboratory control limits, indicating a potential high bias. Only detected results associated with these samples were qualified as estimates (J).

- Recovery values for surrogate 2,4,6-tribromophenol in samples B-15-3, SW-5-6A, SW-15-3, SW-15-3A, SW-15-5, and SW-15-20 were slightly below the laboratory control limits. The laboratory qualified the recovery results as being low due to required sample dilutions. No further qualification of the data was deemed necessary.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

A matrix spike (MS) and matrix spike duplicate (MSD) was performed with all the PCP analyses. Recovery values and relative percent difference (RPD) values were within project-specified and/or laboratory control limits with the following exceptions:

- Recovery values for PCP in the MS/MSD samples associated with data packages 0209057 and 0211002 were significantly below the laboratory control limits. The MS/MSDs were performed on concrete samples. As noted previously, the recovery of PCP may be effected by the pH of the concrete. All associated concrete sample results were qualified as estimates (J, detects; UJ nondetects).

- Recovery values for PCP in the MS/MSD samples associated with data package 0210037 was above the laboratory control limits. However, PCP was detected in only one associated project sample, SW-5-4. The PCP result for this sample was qualified as an estimate (J).

- The recovery value for PCP in the MS sample associated with data package 0210053 exceeded the laboratory control limit. However, because the recovery of PCP in the associated MSD and laboratory control sample were within control limits, no qualifiers were added to the data.

- The recovery values for PCP in the MS sample associated with data package 0210110 were above the laboratory control limits and below the laboratory control limits in the associated MSD sample. However, because the sample concentration associated with the MS/MSD samples was more than four times the spike concentration, no qualifiers were added to the data.

- The recovery values for PCP in the MSD samples associated with data packages 0210075 and 0210140 exceeded the upper laboratory control limit. However, because the recoveries of PCP in the associated MS samples and continuing calibration verification (or LCS) were within control limits, no qualifiers were added to the data.

LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample and/or continuing calibration verification was analyzed with each batch of samples. A laboratory control sample duplicate was also performed with the PCP analyses associated with data package 0210075. Laboratory control limits were met for each laboratory control sample and/or continuing calibration verification except as indicated in Table 1, and discussed below:

- The recovery value for PCP in one of the laboratory control samples associated with data package 0210075 exceeded the laboratory control limits, indicating a potential high bias. The recovery value for the duplicate LCS associated with this data package was within the laboratory control limits; however, the RPD between the LCS results exceeded the labortory control limit. PCP was detected in only one sample, SW-15-4, associated with these LCS'. This result was qualified as an estimate (J).

METHOD BLANKS

Method blanks were analyzed with each batch of samples. No contamination was detected in the method blanks. No qualification of the data was necessary.

FIELD DUPLICATE RESULTS

Three blind field duplicate sample pairs (SW-50-2/SW-10-2, SW-10-5/SW-10-5X, SW-15-5/SW-15-20) were collected. A project-specified control limit of 35 percent was used to evaluate

the RPDs between the duplicate samples. All RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits.

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through field duplicates, matrix spike duplicates, and laboratory control sample duplicates. Data accuracy was evaluated through laboratory control samples, surrogate spikes, and matrix spikes. Based on this data quality evaluation, all of the data were determined to be acceptable and no data were rejected.

The completeness for this set of data is 100 percent, which exceeds the project-specified goal of 90 percent.

REFERENCES

EPA. 1994. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency.

Landau Associates. 2001. *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon.* June 18.

TABLE 1
SUMMARY OF DATA QUALIFIERS
IN SITU REMEDIAL ACTION AND WAREHOUSE DECONTAMINATION SAMPLE RESULTS
SPECIALTY ANALYTICAL DATA PACKAGES 0209057, 0210006, 0210016, 0210037, 0210053, 0210075, 0210088, 0210099, 0210102, 0210110, 0210140, 0211002, and 0210185

Analyte	Qualifier	Sample Number	Reason
Pentachlorophenol	J (detect)	SW-15-4/	Potential high bias demonstrated by high laboratory control sample recovery
Pentachlorophenol	J (detects)	PCPWH-013	Low surrogate, MS, and MSD recoveries
	UJ (nondetect)	PCPWH-014	
		PCPWH-015	
		PCPWH-016	
		PCPWH-017	
Pentachlorophenol	J (detect)	PCPWH-008	High surrogate recoveries
		PCPWH-011	
		PCP-WH012	
Pentachlorophenol	J (detect	SW-5-4	High MS/MSD recoveries

J = The analyte is present in the sample; the reported concentration is an estimate.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager, Landau Associates

FROM: Denise Nieman and Stacy Pischer

DATE: January 30, 2003

RE: TIME OIL NORTHWEST TERMINAL STOCKPILE CONFIRMATION SAMPLING LABORATORY DATA QUALITY EVALUATION

This technical memorandum provides the results of a data quality evaluation for 27 soil confirmation samples collected within the footprint of the former soil stockpile area between October 1 through November 18, 2002 at the Time Oil Northwest Terminal in Portland, Oregon. A data quality evaluation was performed for analyses of pentachlorophenol (PCP) by U.S. Environmental Protection Agency (EPA) Method 8270B Acid Fraction, total metals by EPA Method 6010, and polychlorinated dibenzodioxins and dibenzofurans (dioxins/furans) by EPA Method 8290. The PCP and metals analyses were performed by Specialty Analytical Laboratory (Specialty) located in Tualatin, Oregon. The dioxins/furans analyses were performed by Columbia Analytical Services, Inc. (CAS) located in Houston, Texas. This data quality evaluation covers Specialty data packages 0210006, 0210016, 0210099, 0210102, 0211006, 0211031, 0211040, 0211050, 0211083, and 0211086; and CAS data package K2208851. The data quality evaluation was performed in accordance with the quality assurance project plan (QAPP) contained in Appendix B of the *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon* (Landau Associates 2001), and with applicable portions of the U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Organic Data* (EPA 1994).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Method blank results
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates (including laboratory control samples)
- Laboratory duplicates
- Quantitation limits

- Overall data quality and completeness.

Data validation qualifiers are added to sample results based on the evaluation of data quality. The absence of a data qualifier indicates that the datum is acceptable without qualification. Applicable data validation qualifiers are summarized in Table 1. The data quality evaluation is summarized below.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package. The laboratory received all samples in good condition and all analyses requested were performed.

HOLDING TIMES

For most analyses and samples, the time between sample collection, extraction, and analysis was determined to be within method recommended holding times. For the diluted dioxins/furans analysis of soil sample SP-3-CONF, the time between sample collection and extraction exceeded the recommended holding time by one day. Dioxin/furan congener results reported from this analysis were qualified as estimates (J), as indicated in Table 1.

SURROGATE SPIKE AND INTERNAL STANDARD RECOVERIES

Recoveries for all surrogate spikes were within laboratory control limits. Recovery of internal standard 13C-OCDD was slightly below the lower laboratory control limit during the initial, non-diluted analysis of sample SP-3-CONF. Qualification of the data was not necessary, however, because the associated OCDD result for sample SP-3-CONF is being reported from the diluted analysis. Recoveries of all other internals standards were within the laboratory control limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Matrix spike (MS) and matrix spike duplicate (MSD) samples were performed with the PCP and metals analyses. Recovery values and relative percent difference (RPD) values were within project-specified and/or laboratory control limits, except as indicated in Table 1, and as discussed below:

- Recovery values for PCP in the MS/MSD samples associated with data package 0211006 were below the lower laboratory control limit. However, because the matrix of the MS/MSD (i.e., concrete) was different than the matrix of the samples (i.e., soil) included in this data package, the results of the MS/MSD were not used to evaluate the quality of the data included in this data package and no qualifiers were added based on the MS/MSD results.

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- Recovery values for chromium, nickel, and zinc in the MS/MSD associated with data package 0211050 exceeded the laboratory control limits. Because the high recovery may likely be due to sample heterogeneity, only chromium, nickel, and zinc results reported for the associated MS/MSD parent sample (SP-1-CONF) were qualified as estimates (J).

LABORATORY DUPLICATE

Three laboratory duplicate samples were performed with the metals analyses. RPDs between the duplicate results were within laboratory control limits. No qualification of data was necessary.

LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample and/or continuing calibration verification was analyzed with each batch of samples. Laboratory control limits were met for each laboratory control sample and/or continuing calibration verification. No qualification of the data was necessary.

METHOD BLANKS

Method blanks were analyzed with each batch of samples. Contamination was not detected in the method blanks, except for the following:

- Barium was detected in the method blanks associated with data packages 0211083 and 0211086. However, because barium was not analyzed in the associated project samples, no qualification of the data was necessary.

- Several congeners were detected in the method blank associated with the diluted dioxins/furans analysis of sample SP-3-CONF. All of the associated congener results for sample SP-3-CONF were greater than 5 times the method blank concentration; therefore, qualification of the data was not necessary.

FIELD DUPLICATE RESULTS

One blind field duplicate sample pair (SP-3-CONF/SP-30-CONF) was collected and analyzed for PCP and metals. A project-specified control limit of 35 percent was used to evaluate the RPDs between the duplicate samples. RPDs for the duplicate sample pair submitted for analysis were within the project-specified control limits, except as indicated in Table 1, and as discussed below:

The RPD for arsenic, chromium, and zinc associated with data package 0211050 exceeded the project-specified control limits. The high RPDs between the results are likely due to sample heterogeneity and likely do not reflect overall precision for the respective analyses; therefore, the results for these compounds for only the duplicate sample pair were qualified as estimates (J).

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples.

OTHER

- For sample SP-1-CONF, the congener 1,2,3,7,8-PeCDF result was qualified by the laboratory as an estimated maximum possible concentration (EMPC). Based on this data quality evaluation , this result was qualified as a non-detect (U) at the reported concentration, as shown in Table 1.

- In accordance with Method 8290, confirmation analyses for detected concentrations of 2,3,7,8-TCDF for samples SP-1-CONF and SP-3-CONF were performed on a second, high resolution column (DB-225). Results form the second column for 2,3,7,8-TCDF should be reported and used in determining the TEQ value for 2,3,7,8-TCDF for samples SP-1-CONF and SP-3-CONF.

- The laboratory reported that the OCDD concentration for sample SP-1-CONF is greater than the upper end of the instrument linear calibration range. In accordance with Method 8290, a diluted analysis is not required and was not performed. Therefore, the OCDD result for sample SP-1-CONF was qualified as an estimate (J), as indicated in Table 1. For sample SP-1-CONF, the concentrations for OCDD reported in the initial analysis and the diluted analysis are both greater than the upper end of the instrument linear calibration range. In accordance with Method 8290, no further dilutions were performed. The OCDD result reported for the diluted analysis should be used and qualified as an estimate (J), as indicated in Table 1.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through field duplicates, matrix spike duplicates, and laboratory control sample duplicates. Data accuracy was evaluated through laboratory control samples, surrogate spikes, internal standards, and matrix spikes. Based on this data quality evaluation, all of the data were determined to be acceptable and no data were rejected.

The completeness for this set of data is 100 percent, which exceeds the project-specified goal of 90 percent.

REFERENCES

EPA. 1994. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency.

Landau Associates. 2001. *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon.* June 18.

TABLE 1
SUMMARY OF DATA QUALIFIERS
STOCKPILE CONFIRMATION SAMPLE RESULTS
SPECIALTY ANALYTICAL DATA PACKAGES
0211006, 0211031, 0211040, 0211050, 0211083, and 0211086 AND CAS DATA PACKAGE K2208851

Analyte	Qualifier	Sample Number	Reason
Chromium Nickel Zinc	J	SP-1-CONF	Potential high bias demonstrated by high matrix spike/matrix spike duplicate recoveries
Arsenic Chromium Zinc	J	SP-3-CONF SP-30-CONF	Low precision demonstrated by field duplicate samples
1,2,3,7,8-PeCDF	U	SP-1-CONF	Concentration reported by laboratory is estimated maximum possible concentration.
1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF	J	SP-3-CONF (Dilution)	Holding time exceeded by 1 day
OCDD	J	SP-1-CONF SP-3CONF (Dilution)	Concentration is above the instrument linear calibration range

J = The analyte is present in the sample; the reported concentration is an estimate.

APPENDIX F

Laboratory Data Reports

DEC 29 2003

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December 23, 2003

Mr. Kevin Murphy
Time Oil Co.
2737 Commodore Way
Seattle, WA 98199

RE: SCOPE AND BUDGET UPDATE - 2004
PHASE II RI/FS
TIME OIL NORTHWEST TERMINAL

Dear Kevin:

This letter presents Landau Associates' scope and budget update for continuation of the Phase II Remedial Investigation/Feasibility Study (RI/FS) tasks under our contract with Time Oil Co. for the Northwest Terminal project in Portland, Oregon. This letter provides the status of expenditures and budget coverage for the year 2003 and requests an increase to our existing budget for the year 2004 for future expected expenditures for planned Phase II activities not covered by previous authorizations. The status of each of the project tasks currently underway is provided below with a summary of foreseeable activities for each task over the next year. Lists of tasks completed since the previous authorization for this project (Time Oil Work Order No. 03-610-LANDAU2002A), which covers costs through December 31, 2003, were included with the monthly invoices.

This scope and budget update requests an additional budget amount of $137,400. As shown in Table 1, this amount covers costs not covered by previous authorizations for expected future tasks to be performed by Landau Associates during 2004. This value is significantly less than the value we provided to you in our meeting on September 23, 2003, because we were able to carry over more of the 2003 budget than originally anticipated. Also, with previous scope and budget update requests, we have typically included a 10 percent contingency to cover unforeseen additional tasks; however, because we did not use the majority of the contingency amount allocated for during 2003, we will not be requesting additional contingency budget for 2004. Also as shown on Table 1, Landau Associates' expenditures in 2004 are expected to be about $337,600. This amount includes $200,200 for budget brought forward from previous authorizations for tasks not conducted or completed in 2003, plus $26,000 previously allocated for contingency costs.

The costs estimated in this letter are based on Landau Associates' labor rates, which continue to include a discount to Time Oil in recognition of our longstanding business relationship. Our labor rates for 2004 were proposed to you in a letter, dated November 6, 2003. As described in the letter, for any

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sole source work provided to Landau Associates by Time Oil where expenditures (excluding subcontractor costs) exceed $400,000 within the calendar year, labor rates will be discounted an additional 3 percent. Where expenditures exceed $500,000, an additional 1 percent discount (for a total of 4 percent) will be provided. As in the past, this work will be provided on a time and materials basis under our existing contract.

The following sections provide a summary of the basis for the cost estimates for expected activities in 2004. Table 1 provides a summary of the additional budget requests. Table 2 summarizes tasks, project expenditures (through November 1, 2003), and authorizations by Time Oil to date. Additional scope items completed under verbal authorization from Time Oil for activities since the last scope and budget update are itemized with the monthly progress reports accompanying the invoices. Budget assumptions included in the estimation of costs herein are listed in Table 3.

2003 Expenditures and Future Activities

Approximately $2.43 million has been spent on the project through November 2003. As you verbally approved, the 10 percent contingency amount authorized in the previous change order ($30,290) was partially applied to additional scope items incurred by the project since January 2003. The remaining contingency budget will be brought forward into the 2004 budget.

Because we were able to achieve savings in some previously scoped and budgeted tasks in 2003 or because the tasks were not completed or conducted in 2003, we propose to bring forward previously authorized funds from certain tasks to cover the costs expected in 2004. To date, all of the tasks conducted in 2003 were completed at or below budget, and it is anticipated that this will also be the case for costs projected through the end of 2003. Through November 2003, approximately $245,000 remains in the 2003 budget. It is anticipated that approximately an additional amount of $21,000 will be spent through the end of 2003. The remaining budget will be transferred to costs expected to be incurred in 2004, as shown on Table 1.

A description of the scope of services expected for 2004 is provided below.

2004 Future Activities

The status of each of the project tasks currently underway with a summary of foreseeable activities for each task in 2004 is provided below. Tasks 110 (Groundwater Interim Action), 120 (ISCO Activities), 130 (Phase I/II Remedial Investigation), and 180 (Terminal Support) remain active. Planned activities for Task 170 (Remedial Action/Remedial Design), including soil removal actions for the Phase I soil stockpile, the former PCP mixing area, and the former Crosby & Overton area, were completed and documented in 2003. Tasks 140 (Risk Assessment) and 150 (Feasibility Study) did not accrue any costs

in 2003. Task 160 (GIS) only accrued costs related to the annual software maintenance fee. The status of each of the active project tasks and expected scope for new tasks is provided in the following sections.

Task 110 – Groundwater Interim Action

The groundwater interim action is currently ongoing with the continuous pumping of RW-2 for hydraulic capture of groundwater contamination in the lower zone, the continuous pumping of HRW-1 in for hydraulic capture in the upper zone when groundwater elevations allow, and continuous operation of the stormwater intercept system. At the end of November 2003, approximately $23,000 remained of the previously authorized budget for this task. Approximately $8,000 is projected to be spent by the end of 2003. The remaining budget ($15,000) will be brought forward to cover costs in 2004 for continuing operation of groundwater recovery and operation and maintenance of the groundwater interim action system. Also, because of the tendency for biofouling to occur in HRW-1, costs are included to redevelop HRW-1 and replace the pump once during 2004. To cover the remaining costs, a budget increase of $8,000 is required for groundwater interim action activities to be conducted by Landau Associates in 2004. This includes $5,000 to cover subcontractor costs for redevelopment of HRW-1. All other subcontractor costs are expected to be invoiced directly to Time Oil.

Task 120 – ISCO Activities

For the remainder of 2004, costs for this task will be spent completing a response to DEQ's comments on the ISCO pilot test report and preparing a plan for conducting full-scale implementation of the ISCO technology within the zone of groundwater fluctuation at the manifold locations and at locations within and downgradient of the former PCP mixing area. The plan will also include documentation of the replacement well installation conducted in September 2003. Through November 2003, approximately $96,200 remains in the budget for this task because full-scale implementation of ISCO technology was expected to be conducted in 2003. It is expected that approximately $9,000 of the remaining budget will be spent completing the tasks described above through the end of 2003.

In 2004, the following activities are planned:

- Three ISCO injection events within the source area and downgradient of the source area
- ISCO groundwater monitoring, including one pre-injection and two post-injection events
- Two soil sampling events, including one pre-injection and one post-injection
- Quarterly ISCO progress reports.

Approximately $87,200 will be brought forward from the 2003 budget to complete the tasks projected for 2004, including $8,800 that will be retained from the 2003 budget for SVE system implementation and

operation. As shown in Table 1, an additional budget of $17,600 is required to complete the ISCO activities to be conducted by Landau Associates in 2004. Analytical costs for conducting dioxin/furan analyses associated with soil and groundwater sampling during the ISCO events are also included in this amount. All other subcontractor and analytical costs are expected to be paid directly by Time Oil.

Task 130 – Phase II Remedial Investigation

Phase II remedial investigation activities expected to occur during 2003 include the following:

- Semiannual groundwater monitoring events
- Semiannual groundwater monitoring and interim action status reports, and
- Project management.

Brief descriptions of each of the ongoing activities under Task 130 are provided below.

Semiannual Groundwater Sampling Events. As shown in Table 1, a budget increase of $65,000 is required to complete the groundwater sampling and reporting to be conducted by Landau Associates during 2004. In addition, approximately $20,000 will be carried over from the 2003 budget. In the fall of 2003, five wells (4 shallow and 1 deep) were installed in and near the former PCP mixing area to replace wells abandoned during the soil removal action in this area and for use during ISCO injection events for groundwater monitoring. Additionally, the four wells on the east property were abandoned. The costs for the sampling events in 2004 are based on the expectation that the frequency of groundwater sampling events will be reduced to semiannually and the number of wells to be sampled during each event will be reduced. To achieve this, we are recommending that five shallow wells and two deep wells be removed from the routine sampling events at locations where an adequate record of historical groundwater data has been collected for evaluation of trends, in addition to the east property wells. With the addition of the five replacement wells and the abandonment of the east property wells, the overall monitoring program would be reduced by six wells (five shallow and 1 deep). Our recommendation and supporting information for modification of the groundwater monitoring program will be provided to Time Oil in a technical memorandum for submittal to DEQ for approval before the first 2004 sampling event.

Sampling of the new Phase III monitoring wells will be conducted in conjunction with the Phase II semiannual events; however, the costs to sample the Phase III wells and to process and validate the data will be separated from the Phase II costs and charged to the Phase III project (Landau Associates project number 231009) for cost allocation purposes. Reporting activities for all wells will be combined into the Phase II costs. As conducted in 2003, information contained in the semiannual groundwater monitoring report will include both data and evaluations from the semiannual groundwater monitoring data and from the interim action status evaluation at a cost savings to Time Oil.

Anticipated activities associated with the 2004 semiannual groundwater events include the following:

- Groundwater sampling/field activities for two sampling events
- Validation/processing of the analytical data
- Preparation of two groundwater monitoring and interim action status reports for submittal to client for review and to DEQ.

Project Management. Project management activities are ongoing and include: 1) preparation of quarterly progress reports for submittal to DEQ (in conjunction with Phase III RI reports); 2) meetings with Time Oil, DEQ, and Landau Associates staff; 3) communications with Time Oil and their counsel on various project activities and strategies; 4) planning/scheduling of project activities with internal staff and Time Oil; 5) monthly budget tracking; invoice preparation (including monthly status reports and project cost spreadsheet updates requested by Time Oil); 6) project filing; and (7) preparation of annual scope and budget update requests and documentation. We assume that the project manager and other key Landau Associates personnel will prepare for and attend six 2-hour meetings with Time Oil locally, and two 4-hour meetings with Time Oil and DEQ in Portland. Travel costs for room and subsistence in Portland are not included, under the assumption that Time Oil will pay these costs directly. Also, airfare between Seattle and Portland for meeting attendance is not included, under the assumption that carpooling of Landau Associates personnel with Time Oil personnel is possible. Variability in travel arrangements can likely be covered under the contingency budget.

Based on average monthly costs for this project in 2003 and expected decrease in overall project management costs for the project, a budget increase of $13,000 is requested for Landau Associates' project management costs from January through December 2004 (12 months). These costs, shown in Table 1, include project management for currently defined Phase II tasks in 2004 and are significantly reduced from the budget requested for 2003. Approximately, $15,000 will be carried over from the budget authorized in 2003 for project management activities. The required budget reflects the level of effort that has been necessary in the past to maintain project communications at the level required by Time Oil, to adjust the project schedule and work efforts to the relatively fluid nature of project requirements, to respond to requests for information from Time Oil and DEQ in an expedient manner, and to maintain project efficiency.

Task 140 - Risk Assessment

Significant risk assessment efforts will likely begin in 2004 following completion of the Phase III RI. Risk assessment activities in 2004 are expected to include: development and preparation of a terminal-wide risk assessment work plan for submittal to Time Oil and DEQ, and response to client and

DEQ comments on the work plan. Costs provided herein also include preparation of an updated constituents of potential concern (COPC)/constituent of potential ecological concern (CPEC) screening report, which will incorporate information obtained during the Phase III RI and possibly from the Portland Harbor Superfund Project for use in the terminal-wide risk assessment and implementation of the risk assessment. Completion of this activity within 2004 will be dependent on the actual completion schedule for the Phase III RI and client and DEQ review periods for the risk assessment work plan. This work was originally authorized in 2002, but was not conducted. As shown in Table 2, a budget of $63,000 will be brought forward from the 2002 and 2003 authorization for risk assessment work activities in 2004. An additional $3,600 is requested to cover risk assessment costs in 2004 due to billing rates and expenditure increases since 2002, when the budget was first authorized. Costs for conducting the risk assessment will be shared with the Phase III project at the terminal.

Task 150 - Feasibility Study

Future activities for a terminal-wide feasibility study are not expected to be conducted in 2004. Therefore, at this time, no budget is requested for FS support in 2004. However, if FS activities are expanded before the end of the year, we will request additional funds by separate letter or use contingency funds.

Task 160 - GIS

As in 2003, we will be required to purchase technical support from GIS\Solutions for the GIS\Key software for $3,280 per year per license. Similar to 2003, Landau Associates will split the costs with Time Oil for this support, at a reduced cost to Time Oil. Additional Landau Associates costs are added to cover sales tax (8.9 percent B&O tax required for software purchases and upgrades) and our standard handling charge (10 percent). As shown in Table 1, a budget of $2,200 is required to cover this cost.

Task 170 – Remedial Design/Remedial Action

The Phases I/II removal actions completion report was completed and submitted to DEQ in November 2003. The approval/comment letter from DEQ did not require a response. No additional budget is requested for this task for 2004.

Task 180 – Terminal Support

Landau Associates will continue to provide support in the oversight and operation of the onsite wastewater treatment and stormwater treatment systems at the Northwest Terminal. For 2004, this task will include: 1) evaluation of current operating conditions, 2) recommendation of necessary modifications to the system, 3) review and update of applicable permit requirements, compliance, and reporting, and 4) consultation with onsite Time Oil personnel on system operations. For this budget request, we have assumed that oversight of day-to-day operations and periodic sampling of discharge water from the treatment system will be performed by Time Oil personnel. A budget increase of $28,000 is requested for terminal support tasks to be conducted by Landau Associates in 2004. This amount includes $10,000 for purchase of hydrogen peroxide three times during 2004 for use in the onsite wastewater treatment system. Additional budget may be required if the scope of this task broadens within 2004.

BUDGET

A breakdown of budget for work expected in 2004 is provided in Table 1. These costs include Landau Associates' labor and associated nonlabor expenses. Except as noted in Table 1, subcontractor and laboratory expenses are expected to be invoiced directly to Time Oil, unless otherwise specified or authorized. Accrued project charges through week ending November 27, 2003 are provided in Table 2. Budget assumptions are included in Table 3.

As described above and shown on Table 1, the requested total budget increase for future work to be conducted by Landau Associates through December 2004 is $137,400. As described earlier, we are not requesting a 10 percent contingency amount this year. Total expenditures expected to be accrued in 2004 by Landau Associates, including budget brought forward from the 2003 authorization, are approximately $337,600. Total project expenditures, including subcontractor and laboratory expenses, are estimated at $646,600.

* * * * * * *

Time Oil continues to be a very important client to us. As always, it is a pleasure to work with you and Time Oil on this project and we thank you for the continuing opportunity. If you have any questions or comments regarding the information presented herein, please call us.

LANDAU ASSOCIATES, INC.
By:

Rebekah Brooks
Associate Hydrogeologist

And

Martin T. Powers, P.E.
Associate Engineer

RB/MTP/
Attachments

cc: Mike Tischuk, Beazer East

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TABLE 1
TIME OIL NORTHWEST TERMINAL - PHASE II RI/FS
BUDGET REQUEST - 2004

	Projected Expenditures - 2004			Carry Forward Budget from 2003 (b)	2004 Budget Requests
	Estimated Landau Costs	Estimated Subcontractor Costs (a)	Estimated Analytical Costs (a)		Landau Estimated Costs
Phase I/II RI/FS:					
Task 110: Groundwater Interim Action System Activities					
Redevelop HRW-1 and Replace Pump	$4,000	$5,000 (c)		$4,000	$5,000
Groundwater Recovery	$8,000		$5,000	$8,000	$0
Interim Action Progress Reporting	$6,000			$3,000	$3,000
Subtotal - Task 110	$18,000	$5,000	$5,000	$15,000	$8,000
Task 120: ISCO Activities					
ISCO Injection Events - Source Area (3 events)	$16,000	$100,000		$16,000	$0
ISCO Injection Events - Downgradient (3 events)	$16,000	$90,000		$16,000	$0
ISCO Groundwater Monitoring	$27,000		$12,000 (d)	$24,000	$8,000
SVE System Implementation & Operation	$8,800			$8,800	$0
Soil Sampling Events (2 events)	$17,000	$8,000	$10,000 (d)	$10,400	$9,600
ISCO Progress Reports	$12,000	$4,000		$12,000	$0
Subtotal - Task 120	$96,800	$202,000	$22,000	$87,200	$17,600
Task 130: Quarterly Groundwater Monitoring					
Groundwater Sampling Events (2 events) (e)	$40,000		$65,000	$10,000	$30,000
Groundwater Monitoring/Interim Action Semiannual Reports (2)(f)	$45,000			$10,000	$35,000
Project Management (12 months)	$28,000			$15,000	$13,000
Subtotal - Task 130	$113,000		$65,000	$35,000	$78,000
Task 140: Risk Assessment					
Risk Assessment Work Plan	$38,500			$36,500	$2,000
COPC/CPEC Screening Report	$28,100			$26,500	$1,600
Subtotal - Task 140	$66,600			$63,000	$3,600
Task 160: GIS					
Annual GIS\Key Software Maintenance Fee (g)	$2,200				$2,200
Subtotal - Task 160	$2,200			$0	$2,200
Task 180: Terminal Support (h)					
WWTP Compliance and Reporting	$12,000	$10,000 (c)	$8,000		$22,000
Stormwater Treatment Compliance and Reporting	$6,000	$10,000	$5,000		$6,000
Subtotal - Task 180	$18,000	$20,000	$13,000	$0	$28,000
Unused Contingency Budget				$26,000	
Phase I/II RI/FS Subtotal:	**$314,600**	**$227,000**	**$105,000**	**$200,200**	**$137,400**

TOTAL Estimated Landau Additional Budget for 2004 (Contingency not included)	**$137,400**
ESTIMATED TOTAL 2004 BUDGET REQUEST	**$137,400**
TOTAL Estimated Landau Expenditures for 2004 (i)	**$337,600**
TOTAL Estimated Project Expenditures for 2004 (i)(j)	**$846,600**

Notes:

(a) Assumes Time Oil will contract directly with subcontractors (e.g., drillers, remediation contractors (ISOTEC, etc.) and laboratories, except as indicated below under (c) and (d).

(b) Any additional unused budget at the end of 2003 will be brought forward into the 2004 budget.

(c) Similar to 2003, subcontractor costs for HRW-1 redevelopment, purchase of hydrogen peroxide for ISCO activities will be invoiced to Landau Associates. For these costs, a 10% handling charge is added to the estimated budget request.

(d) Costs for dioxin/furan analyses by Columbia Analytical Services laboratory will be invoiced to Landau Associates. In this case, a 10% handling charge is added to the estimated budget request.

(e) Does not include sampling of ISCO monitoring wells or wells installed as part of Phase III.

(f) Reports will be prepared in conjunction with Phase I/II reporting, but will be billed separately, for purposes of cost allocation.

(g) Annual software maintenance fee split between Time Oil and Landau Associates. Total cost includes sales tax (8.9% required for software upgrades) and handling charge (10%).

(h) Assumes Time Oil personnel will be responsible for daily O&M of onsite WWTP and groundwater interim action system and compliance monitoring.

(i) Includes budget brought forward from 2003 and estimated additional budget for 2004.

(j) Includes budget for Landau labor and expenses, subcontractors, and laboratories.

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TABLE 2
PROJECT BUDGET STATUS THROUGH NOVEMBER 2004
PHASE II RI
TIME OIL NORTHWEST TERMINAL

TASK NO.	Subtask No.	Task Description	TOTAL Authorized Budget	Total Expenditures Through Nov, 2004	Total Budget Remaining
110		GROUNDWATER INTERIM ACTION	$0	$0	$0
	111	Evaluation Report	$10,073	$10,073	($0)
	112	Well Installation	$32,266	$32,266	($0)
	113	Design and Construction	$38,949	$39,215	($266)
	114	Completion Report	$9,387	$9,387	($0)
	115	Startup Monitoring	$58,900	$42,491	$16,409
	116	Interim Action O&M	$26,700	$9,080	$17,620
	117	Interim Action Progress Reports	$16,700	$16,853	($153)
	118	Upper Zone Pilot Study/Remediation	$50,000	$60,232	($10,232)
110		**GROUNDWATER INTERIM ACTION**	**$242,975**	**$219,599**	**$23,376**
120		ISCO ACTIVITIES	$0	$0	$0
	121	ISCO Field Events	$55,600	$1,661	$53,939
	122	SVE System	$14,400	$5,591	$8,809
	123	Replacement Well Installation	$6,700	$4,587	$2,113
	124	ISCO Progress Reports	$18,900	$134	$18,766
	129	Out of Scope (Contingency)	$15,145	$2,585	$12,560
120		**ISCO ACTIVITIES**	**$110,745**	**$14,557**	**$96,188**
130		REMEDIAL INVESTIGATION	$0	$0	$0
	131	Quarterly Groundwater Events	$248,500	$229,081	$19,419
	132	Addt'l Sampling Events	$22,800	$15,237	$7,563
	133	GIS	$11,000	$10,977	$23
	134	Phase II RI Report	$9,470	$9,470	$0
	135	Project Management	$140,900	$121,933	$18,968
	139	Out of Scope (Contingency)	$57,390	$53,039	$4,351
130		**REMEDIAL INVESTIGATION**	**$490,060**	**$439,736**	**$50,324**
140		RISK ASSESSMENT	$0	$0	
	141	Sensitivity Analyses	$3,832	$3,832	($0)
	142	General Risk Support	$0	$0	$0
	143	Risk Assessment Work Plan	$36,500	$0	$36,500
	144	COPC/CPEC Screening/Report	$27,100	$531	$26,569
140		**RISK ASSESSMENT**	**$67,432**	**$4,363**	**$63,069**
150		FEASIBILITY STUDY	$0	$0	
	151	Soil Stockpile FS/RAP	$77,684	$77,684	($0)
	152	General FS Support	$440	$440	$0
150		**FEASIBILITY STUDY**	**$78,124**	**$78,124**	**$0**
160		GIS	$0	$0	
	161	GIS Scoping	$5,700	$4,065	$1,635
	162	GIS Database Construction	$25,600	$36,803	($11,203)
	163	System Integration and User Interface	$20,300	$19,836	$464
	164	Other GIS Data Source Investigation	$3,500	$2,464	$1,036
	165	Training and Technical Support Services	$26,700	$18,351	$8,349
	166	Other GIS Data Integration	$0	$0	$0
160		**GIS**	**$81,800**	**$81,519**	**$281**
170		REMEDIAL DESIGN/REMEDIAL ACTION	$0	$0	
	171	Phase I - Soil Stockpile	$80,700	$38,292	$42,408
	172	Stockpile/Excavation Completion Rpt	$30,000	$23,706	$6,294

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TABLE 2
PROJECT BUDGET STATUS THROUGH NOVEMBER 2004
PHASE II RI
TIME OIL NORTHWEST TERMINAL

TASK NO.	Subtask No.	Task Description	TOTAL Authorized Budget	Total Expenditures Through Nov, 2004	Total Budget Remaining
	179	Out of Scope (Contingency)	$63,550	$101,056	($37,506)
170		**REMEDIAL DESIGN/REMEDIAL ACTION**	**$174,250**	**$165,056**	**$9,194**
180		TERMINAL SUPPORT	$0	$0	
	181	Remediation System	$59,400	$62,174	($2,774)
	182	Sampling	$7,300	$2,421	$4,879
180		**TERMINAL SUPPORT**	**$66,700**	**$64,595**	**$2,105**
TOTAL PROJECT			**$2,696,145**	**$2,451,604**	**$244,541**

TABLE 3
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

General

1. Billing rates are those agreed upon between Time Oil and Landau Associates in our letter, dated November 6, 2003. All other underlying rates (equipment rental, etc.) are in year 2004 dollars.

2. Travel rates will assume travel for field activities originates from the Portland office. When travel from the Edmonds office is necessary to complete the task (e.g., transport of field equipment or sample bottles to site), travel rates are reduced, per Time Oil's contract requirements, and include 2 hours per round trip per person to the Northwest Terminal, Portland.

3. A handling charge of 10 percent is applied to subconsultant costs and a handling charge of 12 percent is applied to reimbursables.

4. Time Oil will subcontract directly with all subcontractor/subconsultants, with the exception of laboratory analyses for dioxins/furans, subcontractor costs for redevelopment of HRW-1, and purchase of hydrogen peroxide for the onsite wastewater treatment system.

5. Cost estimates do not include activities beyond December 31, 2004 for the Phase II RI/FS.

6. Cost estimates for 2004 cover activities for a 12-month period (January 2004 through December 2004). If the actual schedule exceeds this amount of time or initiation of project work is significantly delayed, costs may increase or costs may be carried over into a subsequent year.

7. Additional budget assumptions are included in the text of the scope and budget update letter.

Field Activities

1. The analytical laboratory will be Analytical Resources, Inc. (Seattle, WA) for quarterly groundwater samples, Columbia Analyticaly Services (Houston, TX) for dioxin/furan analyses, and Specialty Analytical Laboratory (Tualatin, OR) for all other types of sampling events, unless otherwise decided by Time Oil.

2. Utility locate services will be conducted by Locates Down Under (Portland, OR) at a cost of $55/hr with a 2- hour minimum. Costs include travel to/from terminal.

3. Land surveyor for location and elevation information for new monitoring wells will be ZTec Engineering (Portland, OR).

4. 10- to 12-hour field work days for Landau Associates' personnel.

5. Use of gas-operated equipment is permitted in all areas where field activities are planned.

TABLE 3
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

6. Level D health and safety protection is adequate at least 90 percent of the time during field activities, with upgrades to Level C occasionally necessary.

7. Time Oil will supply all 55-gallon drums and/or tanks needed to contain investigation-derived wastes. Drums are $45 each if not supplied by Time Oil.

8. Purge water will be collected into 55-gallon drums and transported to a temporary storage tank located onsite for subsequent treatment and disposal by the onsite wastewater treatment system, as appropriate.

9. Field costs do not include data evaluation.

Data Evaluation and Reporting

1. Data validation will be conducted by Landau Associates. Data validation reports will be provided to DEQ with submittal of the laboratory reports.

Groundwater Interim Action

1. Time Oil personnel will be responsible for daily O&M of the groundwater interim action system and compliance monitoring.

2. Landau Associates will be responsible for compliance data review and reporting to the appropriate agencies.

3. Discharge will be treated using Time Oil's onsite wastewater treatment system. Sampling of discharge will occur in accordance with the terminal's permit requirements.

Remedial Investigation

1. Two semiannual groundwater monitoring events will be conducted in 2004. Reporting for the groundwater events and for the groundwater interim action will be combined into a single report for each quarterly event. Reduction to semiannual events is contingent on approval by DEQ.

GIS

1. The annual software maintenance fee for GIS\Key is split between Time Oil and Landau Associates. The total cost to Time Oil includes sales tax (8.9% as required for software purchase and upgrades) and our handling charge (10%).
2.

TABLE 3
TIME OIL NORTHWEST TERMINAL
PHASE I/II RI/FS BUDGET ASSUMPTIONS

Terminal Support

1. Time Oil personnel will be responsible for daily O&M of onsite wastewater treatment system.

2. Time Oil will conduct the routine sampling required by the wastewater discharge permit and will directly pay the laboratory costs for these samples.

3. Landau Associates will be responsible for compliance data review and reporting to the appropriate agencies

LANDAU ASSOCIATES

February 10, 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the January 2003 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

Glenda Moon

For Rebekah Brooks, P.G.
Project Manager

RB/rgm
2/10/03 S:\WPROC\231\001\038\DEQ-Jan03 ltr doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
January 2003

SUMMARY OF WORK PERFORMED

- Prepared and submitted the December 2002 monthly report to DEQ.

- Continued implementation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 9.3 gpm. HRW-1 did not operate during January. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 3.7 gpm. A total of approximately 9.81 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 574,500 gallons treated in January 2003. Analytical results from a sample collected from the treatment system effluent on January 15, 2003, indicated a pentachlorophenol (PCP) concentration of 11.6 µg/L, well below the permitted discharge limit of 40 µg/L.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.

- Continued preparation of the ISCO pilot study report.

- Completed preparation of as-built drawings for storm drain modifications and the groundwater intercept system and provided to Time Oil for submittal to DEQ.

- Began installation of a spill control system in the wastewater treatment system building at the terminal.

- Completed validation of the 4th quarter 2002 groundwater data and began preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report.

- Completed preparation of the 3rd quarter 2002 groundwater monitoring and groundwater interim action status report and provided to client for review.

- Continued preparation of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report.*

- Incorporated client comments on the draft *East Property Remedial Action Completion Report* in preparation for submittal to DEQ. The report will document remedial activities in the east property investigation area and demonstrate compliance with cleanup standards. The Crosby & Overton soil removal will be documented in the completion report for the soil stockpile and in situ excavation removal action.

- Continued internal review of the well abandonment work plan for the east property monitoring wells.

- Continued client review of the draft technical memorandum for interim subsurface investigations in the Phase III study area, including the CPT investigation.

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RESULTS COLLECTED

- Fourth quarter 2002 groundwater results. The laboratory data and data validation report will be provided to DEQ with the *Fourth Quarter 2002 Groundwater Monitoring and Groundwater Interim Action Status Report.*

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- None.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and of the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Complete client review of the draft 3rd quarter 2002 groundwater monitoring and interim action status report and submit to DEQ.
- Complete data validation of 4th quarter 2002 groundwater data and begin preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report.
- Conduct 1st quarter 2003 groundwater monitoring event,
- Conduct internal and client reviews of the ISCO pilot study report and submit to DEQ.
- Continue preparation of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation.
- Complete installation of the spill control system in the wastewater treatment system building at the terminal.
- Prepare design for use of injection or extraction system in the former PCP mixing area.
- Submit the *East Property Remedial Action Completion Report* to DEQ.
- Complete well abandonment plan for the east property wells and submit to client for review.
- Complete client review of the Phase III CPT investigation technical memorandum and submit to DEQ.

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FEB 10 2003

PHONE 285-2400
CABLE ADDRESS TIMOIL
(FAX) 206-283-8036

SEATTLE
TACOMA
PORTLAND
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RENO
RICHMOND
LOS ANGELES

TIME
PRODUCTS TIME TESTED
TEN TO ONE IT'S TIME

TIME OIL CO.

2737 WEST COMMODORE WAY
P.O. BOX 24447

SEATTLE, WA 98199-1233
SEATTLE, WA 98124-0447

February 4, 2003

U.S. Environmental Protection Agency
Ariel Rios Building, Mail Code 2222A
1200 Pennsylvania Avenue, NW
Washington, DC 20460

ATTN: IMPORT-EXPORT PROGRAM

Dear Administrator:

In accordance with 40 CFR Subpart E, Exports of Hazardous Waste, Section 262.56, Annual Reports, the following Annual Report is submitted for the hazardous waste material exported to Canada during calendar year 2002 from the Time Oil Company, Seattle, Washington facility.

Facility Address:

Time Oil Company
2737 Commodore Way
Seattle, WA 98199-1257
EPA ID Number: WAD 009 591 207

Mailing Address:

Time Oil Company
2737 Commodore Way
Seattle, WA 98199-1257
ATTN: Scott B. Sloan

Type of waste: Hazardous waste solid, soil with pentachlorophenol (F027) NOS, Class 9, NA 3077, III, RQ (1 lb)

Waste name: Soil with pentachlorophenol

Description: Soil/clay/sand - 93%; Pentachlorophenol constituents - 1%; Plastic, H&S gear - 1%; Construction debris - 5%

Transporter: Z & R Trucking & Construction Contracting Co., Ltd.
23302 70A Avenue
Langley, BC V2Y2H9
WAR 000 012 393

Quantity: 111.554 tons

Frequency: 9/18/02

Initial Consignee: Hazco Environmental Services
5720 4th Street SE
Calgary, AB
T2H1K7

Mailing Address:
Hazco Environmental Services
13511 Vulcan Way
Richmond, BC, Canada
V6V1K4

Final Consignee: Sensor Environmental Services, LTD
Swan Hills Treatment Centre
NE 1/4 Sec.6-67-9 WSM, Swan Hills, AB

Mailing address:
Sensor Environmental Services, LTD
BAG 1400
Swan Hills, Alberta, Canada TOG 2C0

Efforts to reduce the volume and toxicity of the waste and the changes achieved during the year in comparison to previous years: None. This waste was generated as part of clean-up activities.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Sincerely,

Scott B. Sloan, R. G.
Environmental Project Manager

Cc: Bob Fisher – Beazer East

FIELD PILOT TEST REPORT

TIME OIL CO.
NORTHWEST TERMINAL SITE
10350 NORTH TIME OIL ROAD
PORTLAND, OREGON

MARCH 26, 2003

PREPARED FOR

TIME OIL CO.
2737 WEST COMMODORE WAY
SEATTLE, WASHINGTON 98199-1257

PREPARED BY

IN-SITU OXIDATIVE TECHNOLOGIES, INC.
5600 SOUTH QUEBEC ST., SUITE 320D
GREENWOOD VILLAGE, COLORADO 80111

ISOTEC PROJECT NO. 900057

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1.0 INTRODUCTION

In-Situ Oxidative Technologies, Inc. (ISOTEC) was retained by the Time Oil Co. to conduct an in-situ chemical oxidation field pilot test associated with soil and groundwater contamination at the Northwest Terminal site in Portland, Oregon (Figure 1). The contaminant of concern at the Northwest Terminal site is pentachlorophenol.

This injection program report contains details of ISOTEC's field activities associated with the injection of ISOTEC reagents. Reagents were injected in order to treat contaminants through the use of in-situ chemical oxidation. The field activities occurred during one injection event from September 17, 2002 to September 18, 2002.

1.1 FIELD PILOT TEST OBJECTIVES

The primary objective of the field pilot test was to evaluate the potential full-scale effectiveness of ISOTEC's in-situ chemical oxidation process to oxidize pentachlorophenol in the subsurface at the site. The specific objectives of the study are outlined below:

- Evaluate the effectiveness of the ISOTEC process to oxidize pentachlorophenol contamination in the subsurface;
- Evaluate the radial influence associated with the application of the ISOTEC reagents into the subsurface at the test site area,
- Determine the most effective injection approach for pentachlorophenol oxidation at the subject site for potential full-scale application;
- Evaluate the potential for the formation of undesired reaction by-products;
- Estimate PCP mass removal in the pilot test area.

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2.0 TECHNOLOGY OVERVIEW

The ISOTEC process is an in-situ remedial technology that destroys organic contamination using Fenton's reagent-based oxidation chemistry. Fenton's chemistry was first documented by H.J.H. Fenton in 1894. It is characterized by the combination of soluble iron with low concentrations of hydrogen peroxide to produce hydroxyl radicals ($OH^{\bullet}$). These hydroxyl radicals are very powerful and short-lived oxidizers. Similar to the reaction of other oxidizers, the hydroxyl radicals attack the carbon double bonds of the chlorinated hydrocarbon molecule. Under certain conditions reductive species can also be formed by Fenton's chemistry. This gives Fenton's reagent two separate pathways to attack a wide range of contaminants. The summary equation for Fenton's chemistry is shown below.

$$Fe^{+2} + H_2O_2 \rightarrow Fe^{+3} + OH^- + OH^{\bullet}$$

Where H_2O_2 is hydrogen peroxide, Fe^{+2} is ferrous iron, Fe^{+3} is ferric iron, $OH^{\bullet}$ is hydroxyl free radical and OH^- is hydroxide ion.

Iron is used to catalyze the reaction. Maintaining iron in solution is important for the process to be successful in an in-situ application. To eliminate the necessity of performing the reaction under low pH conditions, as is the case with traditional Fenton's chemistry, complexed iron is used in in-situ applications via the ISOTEC process. The hydrogen peroxide and dissolved iron solutions are injected through a site-specific delivery system providing sufficient distribution to selectively treat the area of concern. Reaction time is very fast, with oxidation capacity of the reagent being used up in a matter of a few days. Hydrogen peroxide breaks down into water and oxygen and the iron catalyst is oxidized and precipitates out of solution. It is important to note that the concentration of hydrogen peroxide is relatively dilute, generally less than 17%, which eliminates the potential for significant exothermic reactions that are associated with higher concentrations of hydrogen peroxide. Experience with this process using low hydrogen peroxide concentrations and complexed iron has resulted in less than a 25°F temperature increase in field applications.

ISOTEC's Fenton based oxidation process is effective on a wide range of contaminants including hard to-treat recalcitrant compounds such as chlorinated solvents, gasoline additives including MTBE and BTEX, petroleum hydrocarbons and pesticides. Hydroxyl radicals generated by the ISOTEC process will oxidize nearly all contaminants with carbon / carbon double bonds (i.e., DCE and PCE) and single bonded contaminants with extractable hydrogen (i.e., TCA).

The ISOTEC process consists of injecting stabilized hydrogen peroxide and complexed iron catalysts into contaminated aquifers or vadose zones. As compared to conventional Fenton's Reagent, which requires acidic conditions (pH $\leq$ 3), the ISOTEC process is effective at neutral (pH = 7) conditions. This is an important consideration in full-scale application since acidifying an aquifer is typically impractical. ISOTEC's oxidation method utilizes a site-specific delivery system(s) designed to treat organic contaminants

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within an area of concern. ISOTEC oxidants and catalysts generate hydroxyl radicals, which react with the organic contaminants within the subsurface producing innocuous by-products such as carbon dioxide and water (and chloride ions if chlorinated compounds are being treated).

The site-specific stoichiometry is typically estimated through a laboratory study, with preliminary treatment quantities calculated. Application is tested in the field during a pilot program to determine process efficiency and extent of treatment, which varies depending on the site's subsurface hydrogeology and the contaminant distribution and concentration. Based on results from the laboratory study and pilot program, design and implementation of a full-scale remedial treatment program is designed.

Safety is a priority with the ISOTEC process. ISOTEC has not had a health and safety incident in over six years of field application. Most negative effects noted with in-situ oxidation occur with aggressive oxidation reactions utilizing high concentration reagents under pressurized conditions. These conditions can create a significant temperature rise and an enormous amount of carbon dioxide and/or oxygen off-gas, which can mobilize vapors and contaminants within the subsurface. ISOTEC does not utilize this approach. Reagents utilized by ISOTEC are stabilized and at low concentrations, with injection in a controlled manner to reduce the possibility of surface breakout or subsequent migration.

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3.0 ISOTEC FIELD PILOT TEST

ISOTEC's field pilot test was comprised of one field injection event to treat pentachlorophenol contaminated soil and groundwater at the site. During the injection event ISOTEC reagents were injected into the subsurface through direct push points.

Baseline soil and groundwater conditions were documented with samples collected by Landau Associates. Remediation progress was also documented with samples collected following the injection event.

Cascade Drilling, Inc. (Cascade Drilling), of Portland, Oregon, was contracted to install the temporary direct push injection points.

3.1 FIELD PILOT TEST PREPARATION ACTIVITIES

Prior to ISOTEC personnel arrival on-site to conduct the field pilot test, Landau Associates acquired the necessary approvals from the Oregon Department of Environmental Quality (DEQ) – Water Quality Division, arranged for the clearance of subsurface utilities, and oversaw the installation of four new on-site monitoring wells (OX-1S, OX-2S, OX-3S, and OX-4S). Landau Associates collected soil samples during the installation of OX-1S through OX-4S for laboratory analysis. Landau Associates also collected groundwater samples from monitoring wells OX-1S, OX-2S, OX-3S, OX-4S, PZ-1, LW-11S, and RW-1 to establish baseline conditions for the pilot test.

3.2 ISOTEC PROCESS FIELD METHODS

ISOTEC technicians prepared stabilized 17% hydrogen peroxide from 35% hydrogen peroxide. The 35% hydrogen peroxide was delivered to the test area and stored in Department of Transportation approved 55-gallon drums. The 35% hydrogen peroxide was transferred into 300-gallon polyethylene tanks with an electric drum pump. The technicians wore proper personal protective equipment and used appropriate safety procedures during the transfer. The 17% peroxide tanks were located and staged in the test area and outside the ISOTEC field truck. Iron catalyst was mixed in 200-gallon polyethylene tanks using on-site tap water, dry ISOTEC chemicals and an electric mixing motor with attached mixing blade. The iron catalyst tanks were located and staged inside the ISOTEC field truck. A schematic of the injection process is shown in Figure 2.

The injections were accomplished using air-operated diaphragm pumps, flow meters, polyvinyl chloride (PVC) flexible tubing and PVC wellhead assemblies. The wellheads, with pressure gauges and relief valves, were attached to the direct push injection points. The wellhead assemblies were attached with PVC tubing to an air-operated diaphragm pump and from the pump to either the peroxide, catalyst or water tanks with tubing. The peroxide, catalyst and water were injected through the PVC tubing using the pump. A water flush, pumping water through the equipment and down the direct push rod, was completed after each of the catalyst or peroxide injections.

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3.2.1 Direct Push Point Installation

ISOTEC reagents were injected using direct push points at specific locations to deliver reagents to the subsurface at the site. Cascade Drilling used a direct push rig to push ISOTEC injection screens attached to 1.5-inch diameter rods at nine (9) locations across the pilot test treatment area. The direct push injection locations are shown in Figure 3. ISOTEC attached a specially designed injection screen, each 3-feet in length, to the bottom of the direct push rods, allowing ISOTEC reagents to be delivered into the 3-foot screened interval. Specifically, the ISOTEC injection screen was driven to a depth of 19-19.5 feet below grade surface (bgs). The injection locations were spaced on 25-foot centers based on an estimated radius of influence (ROI) of 12.5 feet. The ROI was estimated based on the site specific lithology and contaminant concentrations. The screens were installed in order to deliver reagent to the saturated zone between the water table at approximately 16 feet bgs and a silt layer encountered at approximately 19 feet bgs.

3.2.2 ISCO Injection Event

The pilot test using ISOTEC's Fenton-based reagent was conducted at the Northwest Terminal site on September 17 and 18, 2002. Injection dates and quantities for the injection event are included in Table 1.

On September 17, 2002, ISOTEC personnel connected wellhead assemblies to direct push points IP-6 and IP-7, simultaneously, and injected a water flush followed by 100 gallons of stabilized 17% hydrogen peroxide (oxidizer). Following a water flush, 100 gallons of catalyst was injected into points IP-6 and IP-7. After an additional water flush, ISOTEC injected another 100 gallons of oxidizer, followed by a water flush, 100 gallons of catalyst, and a final water flush. Injection pressure at the wellheads of IP-6 and IP-7 ranged from 0 to 30 pounds per square inch (psi), while the injection rate ranged from 2 to 5 gallons per minute (gpm) during injection activities.

ISOTEC then connected wellhead injection assemblies to IP-8 and IP-9. Injection point IP-9 received a water flush, 100 gallons of oxidizer, a water flush, 100 gallons of catalyst, and a water flush. IP-9 then received an additional 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and a final water flush. Injection point IP-8, however, received only a 20-gallon initial water flush followed by 3 gallons of oxidizer before the wellhead pressure reached 60 psi and injection activities at IP-8 were terminated. The elevated injection pressure was most likely due to a change in the depth to the silt layer. The screen interval was placed across the silt rather than the more permeable sand. Cascade Drilling then installed injection point IP-10(8) as a replacement for IP-8. IP-10(8) received a water flush, 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and a water flush. This was followed with an additional 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and a final water flush. Injection pressures at IP-9 and IP-10(8) ranged from 0 to 35 psi with injection rates of 4.0 to 5.9 gpm.

On September 18, 2002, ISOTEC attached wellhead injection assemblies to IP-1 and IP-2 and injected an initial water flush, 100 gallons of oxidizer, a water flush, 100 gallons of catalyst, and a water flush. Each point then received an additional 100 gallons of oxidizer,

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a water flush, 100 gallons of catalyst and a final water flush. Pressures at injection points IP-1 and IP-2 ranged from 0 to 20 psi and injection rates ranged from 4.3 to 5.7 gpm.

Following the injection of IP-1 and IP-2, ISOTEC attached wellhead injection assemblies to IP-3 and IP-4. Injection points IP-3 and IP-4 received a water flush, 120 gallons of oxidizer, a water flush, 100 gallons of catalyst, and a final water flush. Both points then received an additional 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and a final water flush. Injection pressures at the wellheads of IP-3 and IP-4 ranged from 0 to 30 psi, while the injection rates ranged from 3.4 to 5.0 gpm during injection activities.

The final pilot test injection point was IP-5. After an initial water flush, ISOTEC injected 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and another water flush into IP-5. IP-5 then received an additional 100 gallons of oxidizer, a water flush, 100 gallons of catalyst and a final water flush. IP-5 showed injection pressures of 0 to 20 psi, with injection rates ranging from 5.5 to 6.7 gpm during injection activities.

3.3 ISOTEC Process Field Activities Summary

ISOTEC injected a total of 3,643 gallons of ISOTEC reagents through 9 injection point locations into the subsurface during the field pilot test. The field activities occurred on September 17, 2002 and September 18, 2002.

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4.0 MONITORING RESULTS

Groundwater and soil samples were collected by Landau Associates at two different times two evaluate effectiveness of the pilot test. Soil samples were collected from locations OX-1S, OX-2S, OX-3S and OX-4S (Figure 2), and groundwater samples were collected from monitoring wells RW-1, PZ-1, LW-11S, OX-1S, OX-2S, OX-3S and OX-4S prior to and following injection activities. Sample events and sample collection dates are as follows.

- Baseline June 24, 2002 (groundwater), June 14, 2002 (soil)
- Post Pilot Test Injection October 3, 2002 (groundwater), Oct. 8, 2002 (soil)

The groundwater and soil samples were analyzed for pentachlorophenol (PCP). The analytical data are presented in Tables 2 and 3. A summary of the soil and groundwater analytical data prepared by Landau is included in Appendix I.

Baseline groundwater samples were collected from seven monitoring wells prior to injection activities. The baseline groundwater samples showed an average PCP concentration of 8,500 micrograms per liter (µg/L). The concentrations ranged from 1,700 µg/L (RW-1) to 17,000 µg/L (OX-3S). Results of post-pilot test injection sampling showed an average PCP concentration of 3,120 µg/L, representing a reduction of 63%. Post-pilot test injection PCP concentrations ranged from 140 µg/L (RW-1) to 8,200 µg/L (OX-3S). The maximum PCP concentration reduction was observed in groundwater samples collected from monitoring well RW-1. The PCP concentration in RW-1 was reduced from 1,700 µg/L to 140 µg/L, a reduction of 92%. Baseline and post injection isoconcentration contour maps are included as Figures 3 and 4, respectively. A summary of the PCP concentrations in groundwater prior to and after the injection is provided in Table 2.

Soil samples were collected from four locations prior to and after the pilot test injection for comparison of PCP concentrations. Prior to the pilot test, the soil samples were collected with a split-spoon sampler from the borings created during the installation of monitoring wells OX-1S, OX-2S, OX-3S, and OX-4S. The average PCP concentration of the four baseline soil samples was 7,050 micrograms per kilogram (µg/kg). The concentrations ranged from 1,300 µg/kg in OX-4S to 11,000 µg/kg in OX-3S. The four post-pilot test soil samples were collected from locations within approximately 5 ft. laterally of OX-1S through OX-4S. The post-injection soil samples were collected with a direct push sampler from similar depths as the baseline samples. PCP concentrations ranged from 415 µg/kg to 37,700 µg/kg in these four samples. The average PCP concentration was 11,011 µg/kg. This represents an increase of 56% over the baseline average. The increase in average concentration is somewhat biased due to sample OX-2S, which increased from 9,900 ug/kg to 37,700 ug/kg between sample events. The average concentration of the remaining three samples, which all had concentration decreases, was 2,115 ug/kg. The maximum PCP concentration reduction was observed at sample location OX-3S. The PCP concentration was reduced from 11,000 µg/kg to 3,220 µg/kg,

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a reduction of 71%. A summary of the PCP concentrations in soil prior to and after the injection is provided in Table 3.

Total tetrachlorophenol concentrations in groundwater were also reduced during the pilot test. Table 4 shows analytical data for total dissolved tetrachlorophenol.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The primary objective of the field pilot test was to evaluate the potential full-scale effectiveness of ISOTEC's in-situ chemical oxidation process to oxidize pentachlorophenol in the subsurface at the site. The specific objectives of the test are outlined below:

- Evaluate the effectiveness of the ISOTEC process to oxidize pentachlorophenol contamination in the subsurface;
- Evaluate the radial effects associated with the application of the ISOTEC reagents into the subsurface at the test site area;
- Determine the most effective injection approach for pentachlorophenol oxidation at the subject site for potential full-scale application;
- Evaluate the potential for the formation of undesired reaction by-products;
- Estimate PCP mass removal in the pilot test area.

In order to evaluate these objectives, one injection event was completed over a two-day period. A total of 3,423 gallons of ISOTEC reagents were injected through 9 temporary injection points.

Effectiveness

Based on data collected during the pilot test, the ISOTEC process was successful in reducing PCP concentrations in both groundwater and soil. Average groundwater concentrations were reduced 63% in the 7 wells sampled. Soil concentrations were also reduced at three of the four sample locations. The average soil concentration was reduced 65% at these three sample locations. The fourth soil sample location, OX-2S, had a reported PCP concentration increase from 9,900 ug/kg to 37,700 ug/kg. The oxidation process cannot increase contaminant mass in the soil, therefore the observed concentration increase is most likely due to the inconsistent nature of soil sampling. There was most likely an area of higher PCP contamination in the vicinity of OX-2S, which was sampled post injection. This is somewhat consistent with the dissolved data observed at OX-2S, where the least reduction in dissolved PCP concentration was observed; from 2,300 ug/l to 1,600 ug/l, or 30%.

Radial Effects

Reductions in contaminant concentrations were observed in soil and groundwater at the maximum lateral distance sampled, approximately 33 feet. Reductions were significant, indicating that the radius of influence of an individual injection point was larger than the anticipated 12.5 feet. Reductions of dissolved concentrations greater than 70% were

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documented at distances within 17 feet, excluding OX-2S. The effective treatment ROI is estimated to be approximately 17-33 feet.

Injection Approach

The direct push injection screens worked well for reagent distribution and should be utilized during a full-scale remediation program. The ISOTEC reagents, catalyst 4460 and stabilized 17% hydrogen peroxide, were effective at reducing PCP concentrations and should also be used during a full-scale program. Reagent volumes used during the pilot test, approximately 400 gallons per injection location, were also effective and did not present any implementation obstacles, such as breakthrough to surface or high pressures, and should be used during full-scale. Full-scale direct push locations should be located on 50-foot centers, a 25-foot ROI, to conservatively and uniformly deliver reagents to the subsurface in the groundwater plume area. Injection locations in the soil source area may be placed with a smaller ROI to ensure mass reduction without numerous injection events. The full-scale remediation program should include a schedule of two or three injection events, with soil and groundwater progress sampling between events. The progress sampling will allow for the targeting of areas that require additional treatment during the next injection event, as seen with soil sample results at OX-2s.

Undesirable By-Products

Modified Fenton's is an oxidation process that breaks the double bonds of the phenol molecule. Unlike reduction processes, where a chlorine can be removed from pentachlorophenol to form tetrachlorophenol, the oxidation process should not form daughter products. This was shown to be true during the pilot test since both pentachlorophenol and tetrachlorophenol concentrations decreased in groundwater (Tables 3 and 4).

Mass Removal Estimate

A straight-forward and conservative method of estimating mass reduction is to estimate the treated soil volume and then estimate the PCP mass within this volume. A conservative treatment volume can be estimated by using a 12.5 ft. ROI around each injection point since the points were installed on this pattern. Vertically the treatment zone was approximately 3 feet thick. Therefore, the treatment volume was $\pi r^2 h$ or (3.14) x ($12.5'^2$) x (3') = 1,472 cubic feet. The soil mass in this volume is (1,472 ft^3) x (110 pounds/ft^3) = 161,920 pounds. The total soil mass treated by the 8 injection points is (8) x (161,920 pounds) = 1,295,360 pounds. The original PCP mass in this soil, using the average soil concentration excluding OX-2S, was (1,295,360 pounds) x (6.1 mg/1,000,000mg) = 7.9 pounds of PCP. The average PCP concentration was reduced 65% in the soil samples collected, again excluding OX-2S. Therefore, the mass was also reduced 65% or (7.9 pounds) x (0.65) = 5.13 pounds-PCP.

The mass in groundwater can be estimated in the same way. The volume of soil treated per point was 1,472 ft^3. If multiplied by the porosity, assumed to be 30%, this becomes the volume of water in the treatment volume, (1,472 ft^3) x (0.30) = 441.6 ft^3 of water.

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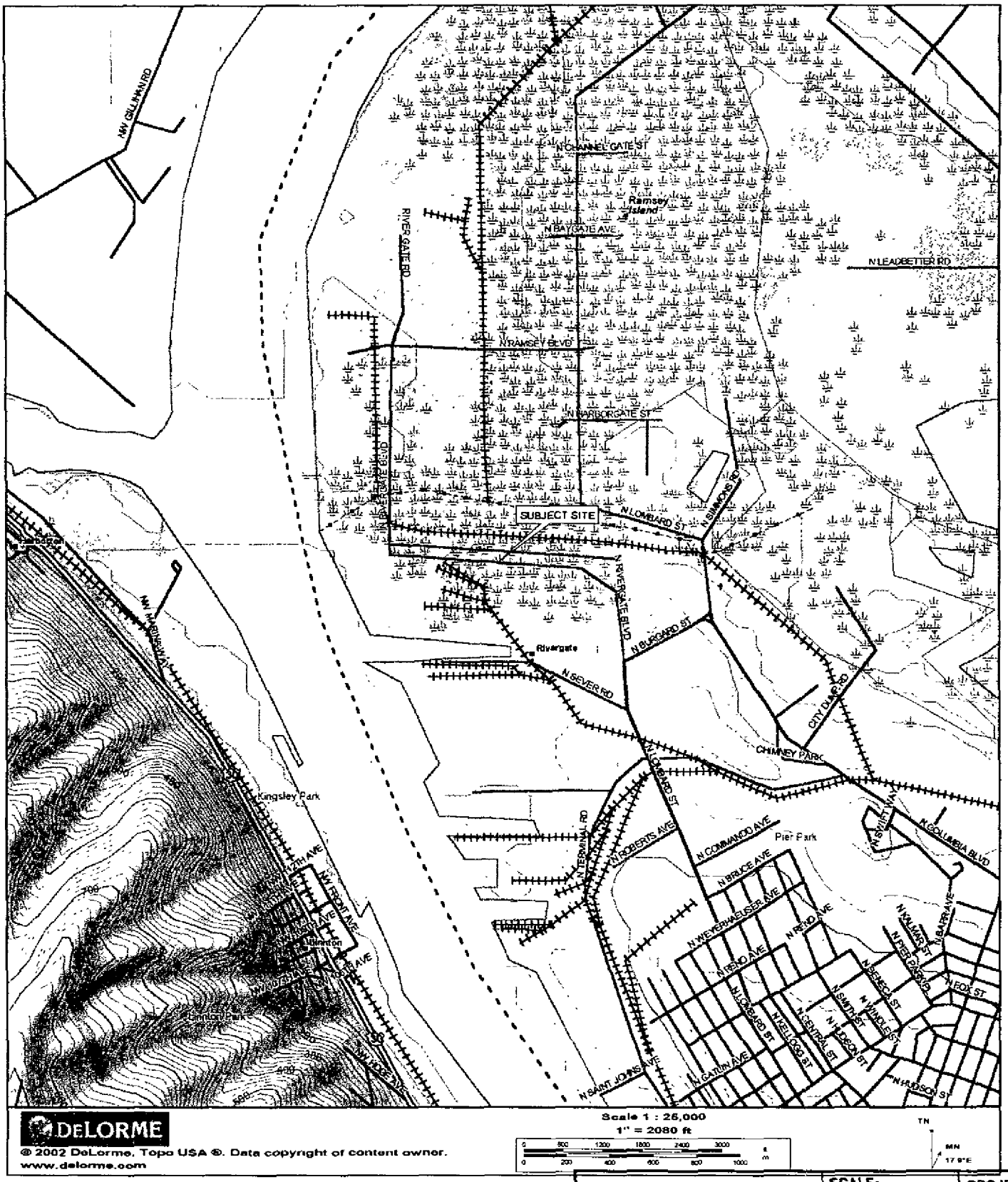
Converting this to mass using the density of water, 62.4 pounds/ ft^3, (441.6 ft^3) x (62.4 pounds/ ft^3) = 27,555 pounds of water. The total mass of water treated was (27,555 pounds) x (8 points) = 220,440 pounds of water. The original mass of PCP in water, using the average PCP concentration of the wells sampled was (220,440 pounds-water) x (8.5 mg-PCP/1,000,000 mg-water) = 1.87 pounds-PCP. The average PCP concentration was reduced 63% in the groundwater samples collected. Therefore, the mass was also reduced 63% or (1.87 pounds) x (0.63) = 1.17 pounds-PCP.

The estimated mass of PCP removed during the pilot test was approximately 5.13 pounds in soil and 1.17 pounds in groundwater or a total of 6.3 pounds.

FIGURES



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www.delorme.com

Scale 1 : 25,000

1" = 2080 ft

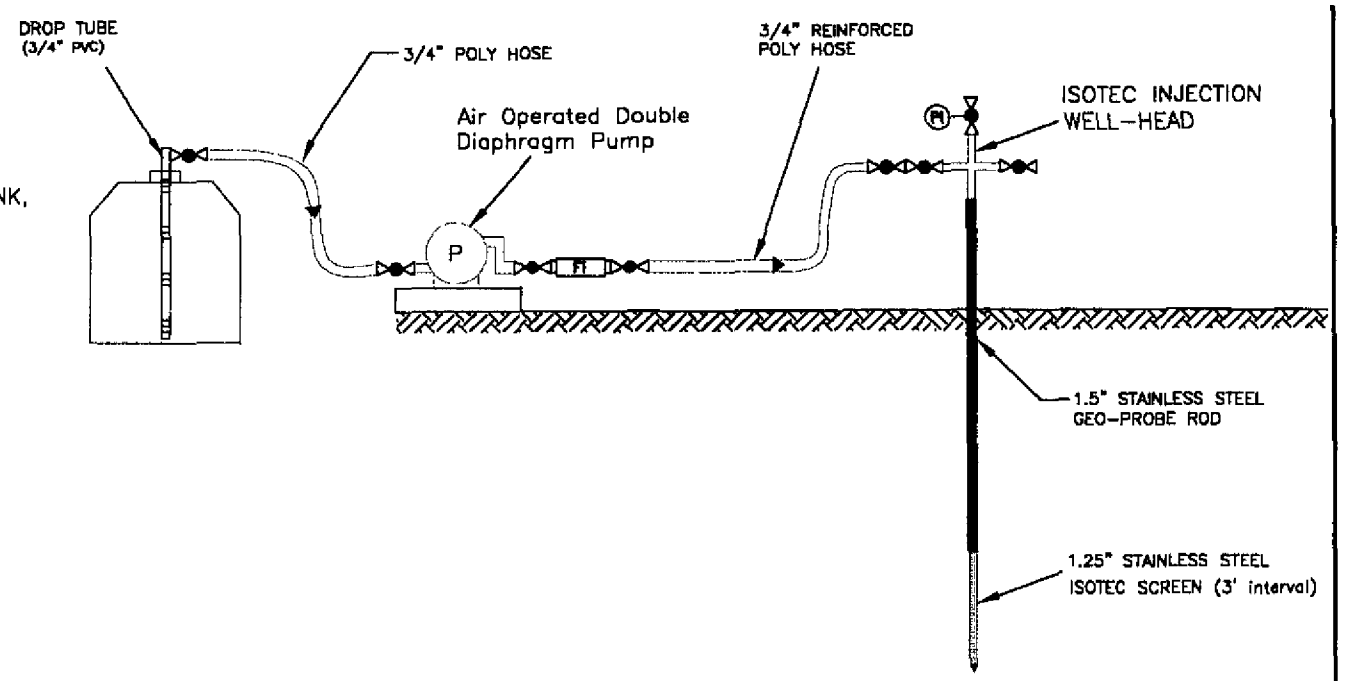
TN

MN 17.9°E

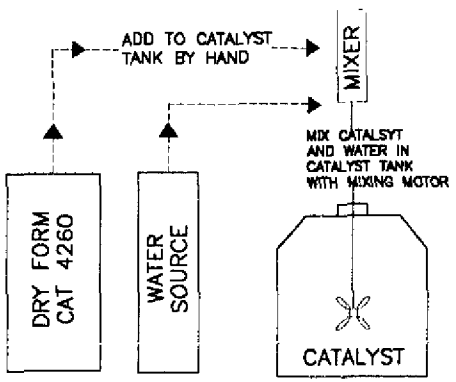
In-Situ Oxidative Technologies, Inc. 5600 South Quebec Street, Suite 320 D Englewood, Colorado 80111 Tel: (303) 843-9079	SCALE: NOT TO SCALE DATE: 5/20/02	PROJECT# 900057
	DRAWN BY: SCH CHECKED BY: CN	
Site Location Map **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 1

ISOTEC REAGENT INJECTION PROCEDURE

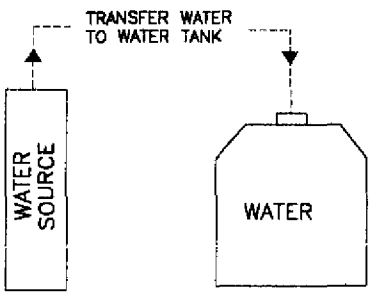
1.) DROP TUBE IS PLACED IN WATER TANK AND PUMP IS ACTIVATED.
2.) DROP TUBE THEN PLACED IN OXIDIZER TANK, CONTINUE INJECTIONS.
3.) WATER FLUSH IS INITIATED AT COMPLETION OF OXIDIZER INJECTIONS
4.) DROP TUBE IS MOVED TO CATALYST TANK, CONTINUE INJECTIONS
5.) FINAL WATER FLUSH IS COMPLETED



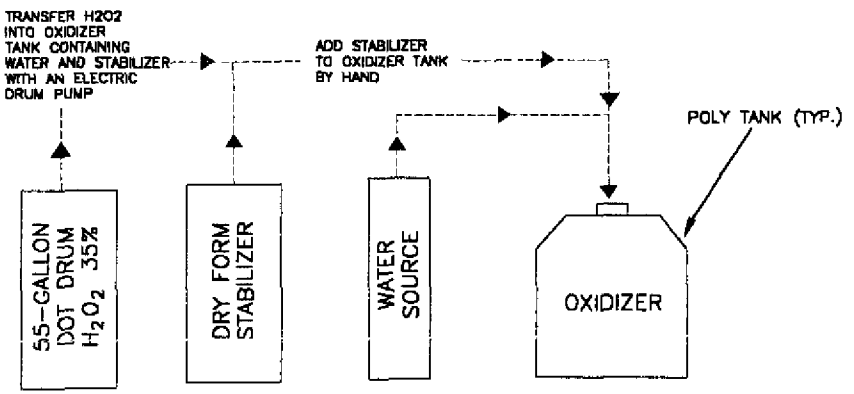
CATALYST TANK PROCEDURES



WATER TANK PROCEDURES



OXIDIZER TANK POCEDURES



LEGEND

FI — FLOW METER WITH TOTALIZER

3/4" BALL VALVE WITH CAM LOCK QUICK CONNECT

PI — 3/4" BALL VALVE WITH CAM LOCK QUICK CONNECT AND PRESSURE GAUGE

In-Situ Oxidative Technologies, Inc. 5200 DTC Parkway, Suite 150 Englewood, Colorado 80111 Tel: (303) 843-9700	SCALE: N.T.S. DATE: 3/17/03 DRAWN BY: TE CHECKED BY: SH	PROJECT# 900057
INJECTION METHOD SCHEMATIC **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 2

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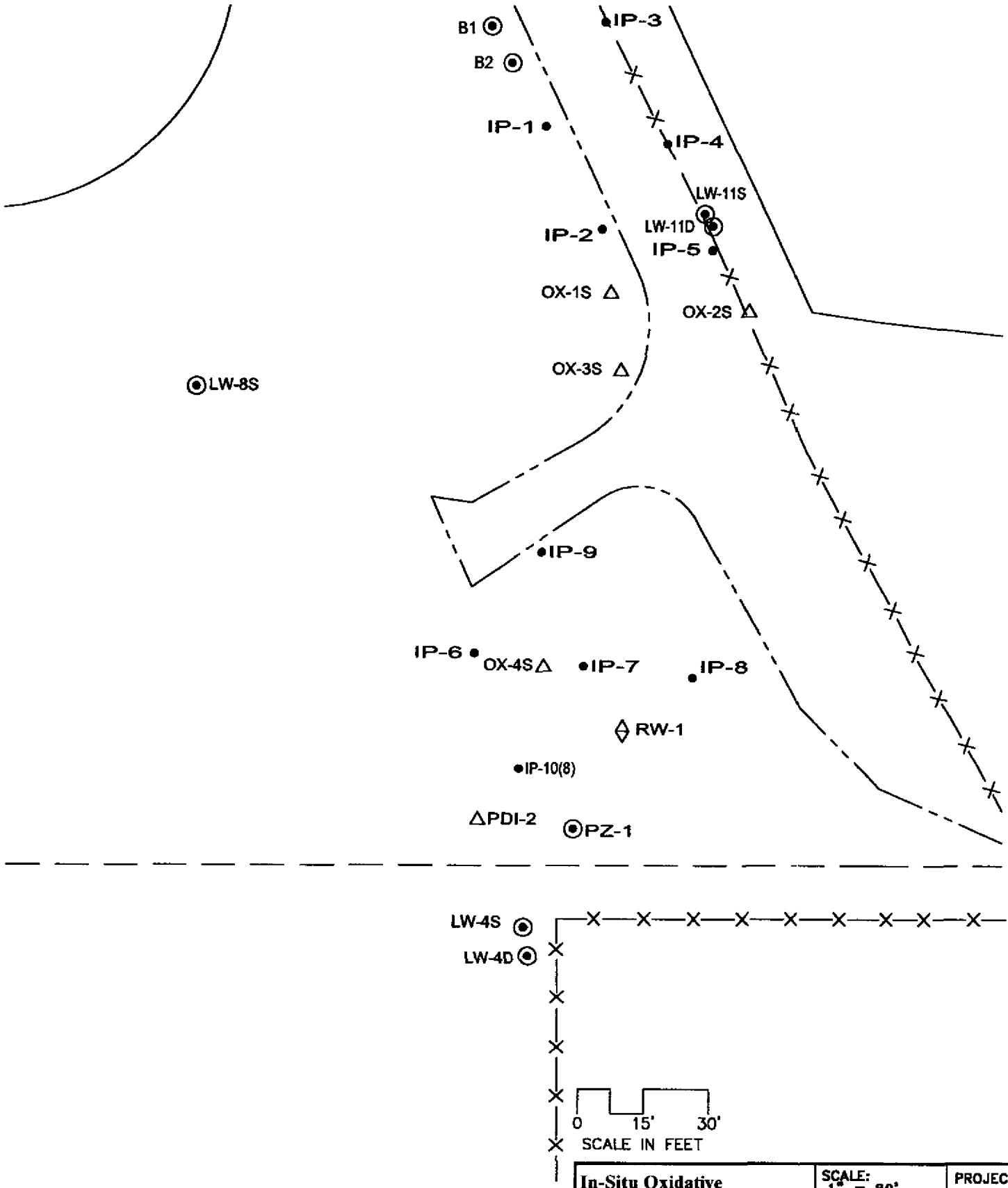
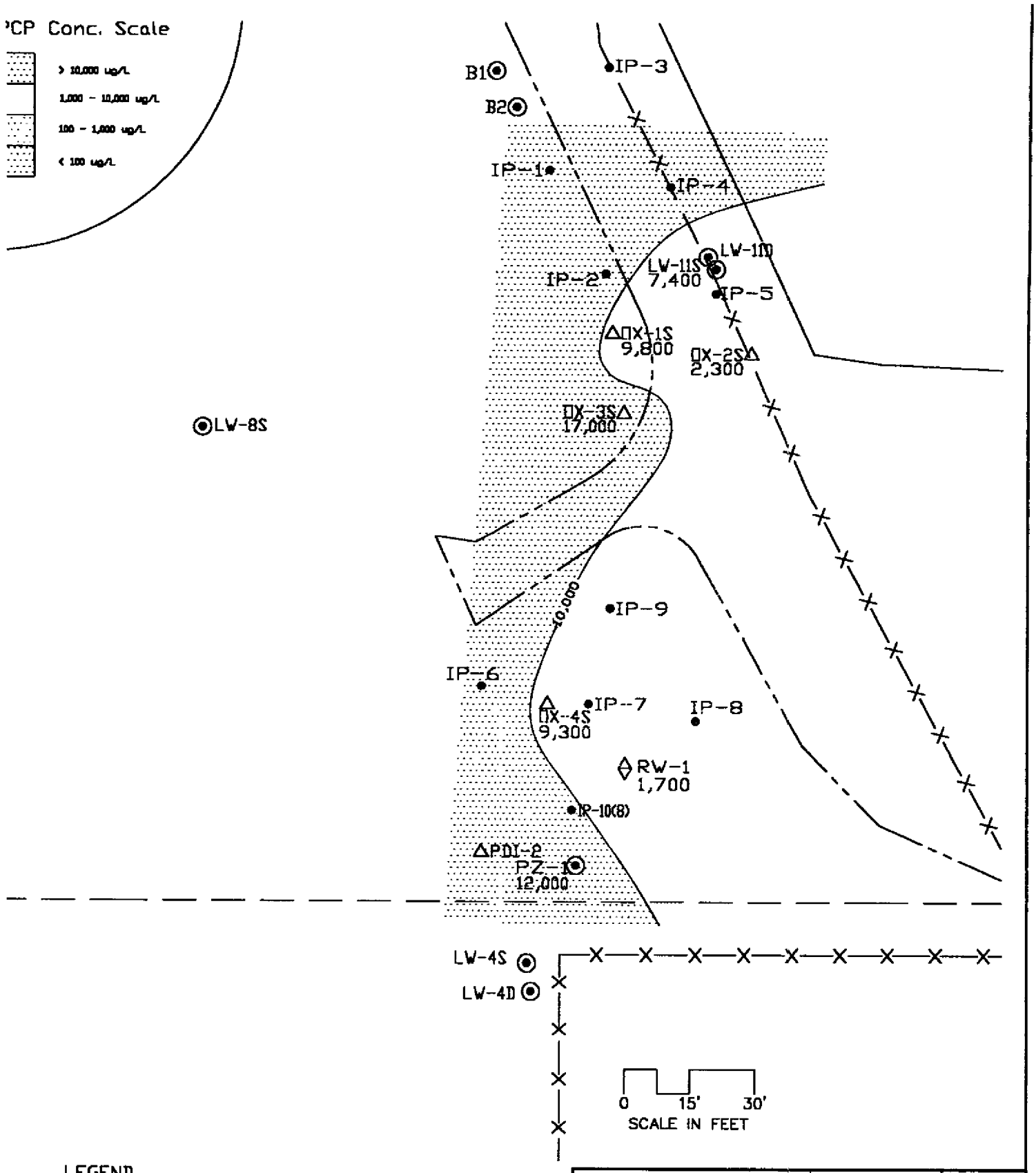


LEGEND

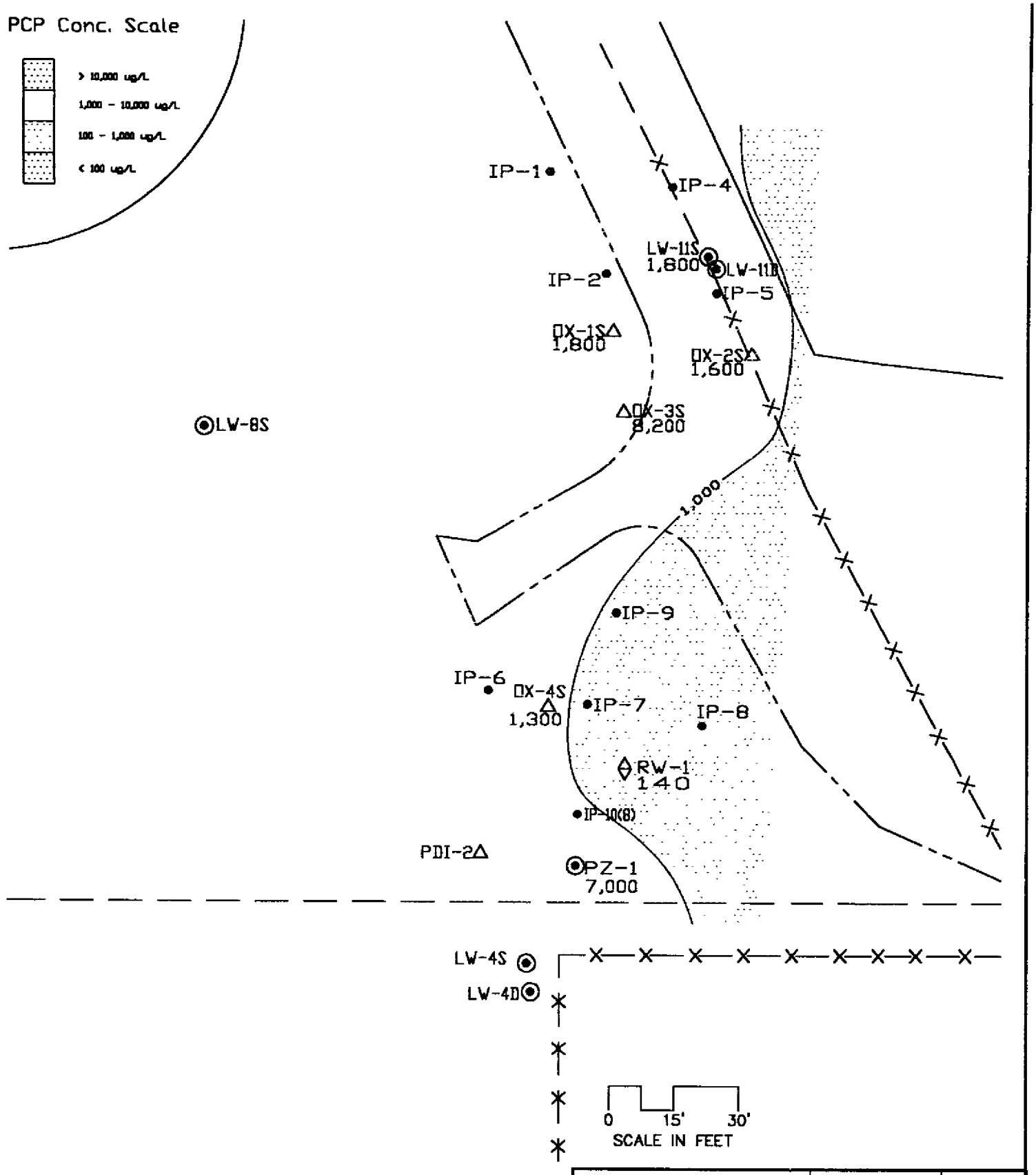
- △ Observation Well
- ◊ Recovery Well
- • Temporary Injection Point
- ⊙ Monitoring Well

N

In-Situ Oxidative Technologies, Inc. 5600 South Quebec Street, Suite 320 D Englewood, Colorado 80111 Tel: (303) 843-9079	SCALE: 1" = 30' DATE: 3/11/03 DRAWN BY: MLW CHECKED BY: TE	PROJECT# 900057
Direct Push Injection Location Map **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 3



In-Situ Oxidative Technologies, Inc. 5600 South Quebec Street, Suite 320 D Englewood, Colorado 80111 Tel: (303) 843-9079	SCALE: 1" = 30' DATE: 3/11/03 DRAWN BY: MLW CHECKED BY: TE	PROJECT# 900057
Baseline Isoconcentration Map ***Dissolved PCP*** **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 4



LEGEND

- △ Observation Well
- ◊ Recovery Well
- • Temporary Injection Point
- ⊙ Monitoring Well
- 1,200 PCP Concentration (ug/L)
- Isoconcentration Contour

N

In-Situ Oxidative Technologies, Inc. 5600 South Quebec Street, Suite 320 D Englewood, Colorado 80111 Tel: (303) 843-9079	SCALE: 1" = 30' DATE: 3/13/03 DRAWN BY: MLW CHECKED BY: TE	PROJECT# 900057
Post Injection Isoconcentration Map Dissolved PCP **Time Oil Company** **Northwest Terminal Site** **Portland, Oregon**		FIGURE# 5

TABLES

Table 1
Field Pilot Study
Injection Data

Time Oil - NW Terminal Site
Portland, Oregon

	September 17, 2002			September 18, 2002			
	ISOTEC Reagent			ISOTEC Reagent			
Injection Point/Well	H_2O_2 (gallons)	Catalyst	Field Observations (psi, gpm, surfacing, etc.)	H_2O_2 (gallons)	Catalyst	Field Observations (psi, gpm, surfacing, etc.)	Injection Point Totals
IP-1				200	200	0-10 psi/5.1 gpm	400
IP-2				200	200	0-10 psi/5 0 gpm	400
IP-3				220	200	10-20 psi/4.8 gpm	420
IP-4				220	200	10-25 psi/3.5 gpm	420
IP-5				200	200	5-15 psi/5.9 gpm	400
IP-6	200	200	0-10 psi/2.8 gpm				400
IP-7	200	200	10-20 psi/2 6 gpm				400
IP-8	3	0	Wellpressure at 50-60 psi Unable to inject				3
IP-9	200	200	0-25 psi/4.0 gpm				400
IP-10(8)	200	200	10-30 psi/5 0 gpm				400
Totals	803	800		1040	1000		3643
Daily Total	1603			2040			
						Total Catalyst	1800
						Total H_2O_2	1843

Table 2
Dissolved PCP Concentrations (ug/L)
With Percentage Reductions

Time Oil - NW Terminal Site
Portland, Oregon

Monitoring Well	Distance From Closest Injection Point	Baseline (ug/L)	Post Injection (ug/L)	Baseline vs Post Injection (% Reduction)
RW-1	17 ft.	1,700	140	92%
PZ-1	38 ft.	12,000	7,000	42%
LW-11S	9 ft.	7,400	1,800	76%
OX-1S	12 ft.	9,800	1,800	82%
OX-2S	16 ft.	2,300	1,600	30%
OX-3S	33 ft.	17,000	8,200	52%
OX-4S	9 ft.	9,300	1,300	86%
Average All Wells		**8,500**	**3,120**	**63%**

Table 3
PCP Concentrations in Soil (ug/kg)
With Percentage Reductions

Time Oil - NW Terminal Site
Portland, Oregon

Sample Location	Distance From Closest Injection Point	Baseline (ug/kg)	Post Injection (ug/kg)	Baseline vs Post Injection (% Reduction)
OX-1S	12 ft.	6,000	2,710	55%
OX-2S	16 ft.	9,900	37,700	-281%
OX-3S	33 ft.	11,000	3,220	71%
OX-4S	9 ft.	1,300	415	68%
Average All Samples		7,050	11,011	-56%
Average w/o OX-2S		6,100	2,115	65%

Table 4
Dissolved Total Tetrachlorophenol Concentrations (ug/L)
With Percentage Reductions

Time Oil - NW Terminal Site
Portland, Oregon

Monitoring Well	Distance From Closest Injection Point	Baseline (ug/L)	Post Injection (ug/L)	Baseline vs Post Injection (% Reduction)
RW-1	17 ft.	249	300	-20%
PZ-1	38 ft.	581.0	482.0	17%
LW-11S	9 ft.	353.8	162.9	54%
OX-1S	12 ft.	2,700	430	84%
OX-2S	16 ft.	196.4	139.8	29%
OX-3S	33 ft.	1,521	869.3	43%
OX-4S	9 ft.	818.6	137.1	83%
Average All Wells		917	360	61%

ANALYTICAL DATA SUMMARY

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-1S	OX-1S	OX-1S	OX-2S	OX-2S	OX-5S OX-2S (Dup)	OX-3S
Laboratory Identification:	EM65A	0209126-01	EW07C	EM65B	EW07D	EW07G	EM65C
Date Collected:	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	10/3/02	6/24/02
CHLORINATED PHENOLS (µg/L)							
EPA Method SW8040							
Pentachlorophenol	9800	NA	1800	2300	1600	1500	17000
2,4,6-Trichlorophenol	4 4	NA	7.9	0.80	0.54	0.49	5 0
2,3,6-Trichlorophenol	1 6	NA	1.4	0.30	0.59	0.61	1.6
2,4,5-Trichlorophenol	7 0 Y	NA	17 Y	0.69 U	1.3 Y	1.4 Y	35
2,3,4-Trichlorophenol	0.75 Y	NA	0.86 Y	0.26 U	0.51 Y	0 45	0.78
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	1400	NA	420	190	130	120	1500
2,3,4,5-Tetrachlorophenol	1300 U	NA	10	6.4	9.8	10	21
CHLORINATED PHENOLS (µg/L)							
EPA Method SW8270B							
Pentachlorophenol	NA	1870	NA	NA	NA	NA	NA
VOLATILES (µg/L)							
EPA Method SW8260							
Chloromethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Bromomethane	1.0 U	NA	3 0 U	3 0 U	1.0 U	3.0 U	25 U
Vinyl Chloride	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Chloroethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Methylene Chloride	2.0 U	NA	6.0 U	6.0 U	2 0 U	6 0 U	60 U
Acetone	19	NA	1300	16	240	260	120 U
Carbon Disulfide	1.0 U	NA	3 0 U	3 0 U	1.0 U	3.0 U	25 U
1,1-Dichloroethene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1-Dichloroethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
trans-1,2-Dichloroethene	1.0 U	NA	3.0 U	3 0 U	1.0 U	3.0 U	25 U
cis-1,2-Dichloroethene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Chloroform	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,2-Dichloroethane	1 0 U	NA	3 0 U	3 0 U	1.0 U	3.0 U	25 U
2-Butanone	6 8 Y	NA	120	15 U	25	25	120 U
1,1,1-Trichloroethane	1.0 U	NA	3 0 U	3 0 U	1.0 U	3.0 U	25 U
Carbon Tetrachloride	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Vinyl Acetate	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
Bromodichloromethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,2-Dichloropropane	1.0 U	NA	3.0 U	3.0 U	1 0 U	3.0 U	25 U
cis-1,3-Dichloropropene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3 0 U	25 U
Trichloroethene	1.0 U	NA	3 0 U	3 0 U	1.0 U	3.0 U	25 U
Dibromochloromethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1,2-Trichloroethane	1 0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U

BZTO104(e)017198

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-3S	OX-4S	OX-4S	OX-4S	PZ-1	PZ-1	LW11S
Laboratory Identification:	EW07E	EM65D	0209126-03	EW07F	EM65E	EW07B	EM65F
Date Collected:	10/3/02	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	6/24/02
CHLORINATED PHENOLS (µg/L)							
EPA Method SW8040							
Pentachlorophenol	8200	9300	NA	1300	12000	7000	7400
2,4,6-Trichlorophenol	4.8	1.5	NA	2.7	3.1	3.0	1.2
2,3,6-Trichlorophenol	1.8	1.8	NA	1.3	0.67	1.5	0.42
2,4,5-Trichlorophenol	15 Y	4.1 Y	NA	5.7 Y	11 Y	14 Y	5.4
2,3,4-Trichlorophenol	0.60 Y	0.26 U	NA	0.54 Y	0.44 Y	0.60 Y	0.26 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	860	810	NA	130	510	390	350
2,3,4,5-Tetrachlorophenol	9.3	8.6	NA	7.1	71	92	3.8
CHLORINATED PHENOLS (µg/L)							
EPA Method SW8270B							
Pentachlorophenol	NA	NA	1350	NA	NA	NA	NA
VOLATILES (µg/L)							
EPA Method SW8260							
Chloromethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Bromomethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Vinyl Chloride	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Chloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Methylene Chloride	10 U	50 U	NA	10 U	100 U	20 U	2.0 U
Acetone	64	120 U	NA	110	250 U	930	5.0 U
Carbon Disulfide	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1-Dichloroethene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1-Dichloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
trans-1,2-Dichloroethene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
cis-1,2-Dichloroethene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Chloroform	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,2-Dichloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
2-Butanone	25 U	120 U	NA	25 U	250 U	82	5.0 U
1,1,1-Trichloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Carbon Tetrachloride	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Vinyl Acetate	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
Bromodichloromethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,2-Dichloropropane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
cis-1,3-Dichloropropene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Trichloroethene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Dibromochloromethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1,2-Trichloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	LW11S	LW11S	RW1	RW1
Laboratory Identification:	0209126-02	EW07	EM65G	EW07A
Date Collected.	9/19/02	10/3/02	6/24/02	10/3/02
CHLORINATED PHENOLS (µg/L)				
EPA Method SW8040				
Pentachlorophenol	NA	1800	1700	140
2,4,6-Trichlorophenol	NA	1.1	1.2	2.0
2,3,6-Trichlorophenol	NA	0.44	0.25 U	0.65
2,4,5-Trichlorophenol	NA	1.8 Y	5.9 Y	95 Y
2,3,4-Trichlorophenol	NA	0.39 Y	0.25 U	0.39 Y
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA	160	210	170
2,3,4,5-Tetrachlorophenol	NA	2.9	39	130
CHLORINATED PHENOLS (µg/L)				
EPA Method SW8270B				
Pentachlorophenol	2620	NA	NA	NA
VOLATILES (µg/L)				
EPA Method SW8260				
Chloromethane	NA	2.0 U	3.0 U	1.0 U
Bromomethane	NA	2.0 U	3.0 U	1.0 U
Vinyl Chloride	NA	2.0 U	3.0 U	1.0 U
Chloroethane	NA	2.0 U	3.0 U	1.0 U
Methylene Chloride	NA	4.0 U	6.0 U	2.0 U
Acetone	NA	280	50 U	71
Carbon Disulfide	NA	2.0 U	3.0 U	1.0 U
1,1-Dichloroethene	NA	2.0 U	3.0 U	1.0 U
1,1-Dichloroethane	NA	2.0 U	3.0 U	1.0 U
trans-1,2-Dichloroethene	NA	2.0 U	3.0 U	1.0 U
cis-1,2-Dichloroethene	NA	2.0 U	3.0 U	1.0 U
Chloroform	NA	2.0 U	3.0 U	1.0 U
1,2-Dichloroethane	NA	2.0 U	3.0 U	1.0 U
2-Butanone	NA	19	15 U	7.4
1,1,1-Trichloroethane	NA	2.0 U	3.0 U	1.0 U
Carbon Tetrachloride	NA	2.0 U	3.0 U	1.0 U
Vinyl Acetate	NA	10 U	15 U	5.0 U
Bromodichloromethane	NA	2.0 U	3.0 U	1.0 U
1,2-Dichloropropane	NA	2.0 U	3.0 U	1.0 U
cis-1,3-Dichloropropene	NA	2.0 U	3.0 U	1.0 U
Trichloroethene	NA	2.0 U	3.0 U	1.0 U
Dibromochloromethane	NA	2.0 U	3.0 U	1.0 U
1,1,2-Trichloroethane	NA	2.0 U	3.0 U	1.0 U

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification	OX-1S	OX-1S	OX-1S	OX-2S	OX-2S	OX-5S OX-2S (Dup)	OX-3S
Laboratory Identification:	EM65A	0209126-01	EW07C	EM65B	EW07D	EW07G	EM65C
Date Collected:	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	10/3/02	6/24/02
Benzene	320	NA	160	3.0 U	2.6	3.0 U	66
trans-1,3-Dichloropropene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Bromoform	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
2-Hexanone	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
Tetrachloroethene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1,2,2-Tetrachloroethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Toluene	29	NA	17	6.7	4.4	4.7	63
Chlorobenzene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Ethylbenzene	180	NA	130	43	38	42	280
Styrene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Trichlorofluoromethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1,2-Trichloro-1,2,2-trifluoroethane	2.0 U	NA	6.0 U	6.0 U	2.0 U	6.0 U	50 U
m,p-Xylene	740	NA	370	72	53	58	820
o-Xylene	280	NA	150	79	70	77	370
1,2-Dichlorobenzene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,3-Dichlorobenzene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,4-Dichlorobenzene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Acrolein	50 U	NA	150 U	150 U	50 U	150 U	1200 U
Methyl Iodide	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Bromoethane	2.0 U	NA	6.0 U	6.0 U	2.0 U	6.0 U	50 U
Acrylonitrile	4.7 Y	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1-Dichloropropene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Dibromomethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,1,1,2-Tetrachloroethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,2-Dibromo-3-chloropropane	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
1,2,3-Trichloropropane	3.0 U	NA	9.0 U	9.0 U	3.0 U	9.0 U	75 U
trans-1,4-Dichloro-2-butene	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
1,3,5-Trimethylbenzene	160	NA	93	46	39	28	160
1,2,4-Trimethylbenzene	460	NA	300	190	250	190	520
Hexachlorobutadiene	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
Ethylene Dibromide	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Bromochloromethane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
2,2-Dichloropropane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
1,3-Dichloropropane	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
Isopropylbenzene	140	NA	42	18	26	20	67
n-Propylbenzene	1.0 U	NA	57	28	40	30	83
Bromobenzene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
2-Chlorotoluene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U

BZTO104(e)017201

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-3S	OX-4S	OX-4S	OX-4S	PZ-1	PZ-1	LW11S
Laboratory Identification:	EW07E	EM65D	0209126-03	EW07F	EM65E	EW07B	EM65F
Date Collected:	10/3/02	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	6/24/02
Benzene	120	25 U	NA	21	50 U	10 U	12
trans-1,3-Dichloropropene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Bromoform	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
2-Hexanone	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
Tetrachloroethene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1,2,2-Tetrachloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Toluene	71	71	NA	46	80	14	10
Chlorobenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Ethylbenzene	260	440	NA	410	470	130	56
Styrene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Trichlorofluoromethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1,2-Trichloro-1,2,2-trifluoroethane	10 U	50 U	NA	10 U	100 U	20 U	2.0 U
m,p-Xylene	740	1300	NA	1000	1000	320	100
o-Xylene	300	500	NA	540	710	190	94
1,2-Dichlorobenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,3-Dichlorobenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,4-Dichlorobenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Acrolein	250 U	1200 U	NA	250 U	2500 U	500 U	50 U
Methyl Iodide	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Bromoethane	10 U	50 U	NA	10 U	100 U	20 U	2.0 U
Acrylonitrile	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1-Dichloropropene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Dibromomethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,1,1,2-Tetrachloroethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,2-Dibromo-3-chloropropane	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
1,2,3-Trichloropropane	15 U	75 U	NA	15 U	150 U	30 U	3.0 U
trans-1,4-Dichloro-2-butene	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
1,3,5-Trimethylbenzene	180	220	NA	230	290	61	35
1,2,4-Trimethylbenzene	560	590	NA	640	870	360	150
Hexachlorobutadiene	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
Ethylene Dibromide	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Bromochloromethane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
2,2-Dichloropropane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
1,3-Dichloropropane	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
Isopropylbenzene	78	86	NA	110	120	18	16
n-Propylbenzene	110	110	NA	150	170	57	24
Bromobenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
2-Chlorotoluene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U

BZTO104(e)017202

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	LW11S	LW11S	RW1	RW1
Laboratory Identification:	0209126-02	EW07	EM65G	EW07A
Date Collected:	9/19/02	10/3/02	6/24/02	10/3/02
Benzene	NA	4.7	3.0 U	1.9
trans-1,3-Dichloropropene	NA	2.0 U	3.0 U	1.0 U
Bromoform	NA	2.0 U	3.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	NA	10 U	15 U	5.0 U
2-Hexanone	NA	10 U	15 U	5.0 U
Tetrachloroethene	NA	2.0 U	3.0 U	1.0 U
1,1,2,2-Tetrachloroethane	NA	2.0 U	3.0 U	1.0 U
Toluene	NA	5.0	16	4.4
Chlorobenzene	NA	2.0 U	3.0 U	1.0 U
Ethylbenzene	NA	41	140	51
Styrene	NA	2.0 U	3.0 U	1.0 U
Trichlorofluoromethane	NA	2.0 U	3.0 U	1.0 U
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	4.0 U	6.0 U	2.0 U
m,p-Xylene	NA	69	310	60
o-Xylene	NA	67	220	79
1,2-Dichlorobenzene	NA	2.0 U	3.0 U	1.0 U
1,3-Dichlorobenzene	NA	2.0 U	3.0 U	1.0 U
1,4-Dichlorobenzene	NA	2.0 U	3.0 U	1.0 U
Acrolein	NA	100 U	150 U	50 U
Methyl Iodide	NA	2.0 U	3.0 U	1.0 U
Bromoethane	NA	4.0 U	6.0 U	2.0 U
Acrylonitrile	NA	2.0 U	3.0 U	1.0 U
1,1-Dichloropropene	NA	2.0 U	3.0 U	1.0 U
Dibromomethane	NA	2.0 U	3.0 U	1.0 U
1,1,1,2-Tetrachloroethane	NA	2.0 U	3.0 U	1.0 U
1,2-Dibromo-3-chloropropane	NA	10 U	15 U	5.0 U
1,2,3-Trichloropropane	NA	6.0 U	9.0 U	3.0 U
trans-1,4-Dichloro-2-butene	NA	10 U	15 U	5.0 U
1,3,5-Trimethylbenzene	NA	27	100	25
1,2,4-Trimethylbenzene	NA	120	370	160
Hexachlorobutadiene	NA	10 U	15 U	5.0 U
Ethylene Dibromide	NA	2.0 U	3.0 U	1.0 U
Bromochloromethane	NA	2.0 U	3.0 U	1.0 U
2,2-Dichloropropane	NA	2.0 U	3.0 U	1.0 U
1,3-Dichloropropane	NA	2.0 U	3.0 U	1.0 U
Isopropylbenzene	NA	14	42	28
n-Propylbenzene	NA	22	63	38
Bromobenzene	NA	2.0 U	3.0 U	1.0 U
2-Chlorotoluene	NA	2.0 U	3.0 U	1.0 U

BZTO104(e)017203

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-1S	OX-1S	OX-1S	OX-2S	OX-2S	OX-5S OX-2S (Dup)	OX-3S
Laboratory Identification	EM65A	0209126-01	EW07C	EM65B	EW07D	EW07G	EM65C
Date Collected:	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	10/3/02	6/24/02
4-Chlorotoluene	1.0 U	NA	3.0 U	3.0 U	1.0 U	3.0 U	25 U
tert-Butylbenzene	100	NA	3.0 U	3.0 U	1.8 Y	3.0 U	25 U
sec-Butylbenzene	1.0 U	NA	7.2	3.0 U	11	7.8	25 U
4-Isopropyltoluene	29	NA	7.6	5.2	8.2	6.0	25 U
n-Butylbenzene	28 Y	NA	7.5 Y	5.8 Y	9.8 Y	7.6 Y	25 U
1,2,4-Trichlorobenzene	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
Naphthalene	83	NA	26	15 U	54	37	120 U
1,2,3-Trichlorobenzene	5.0 U	NA	15 U	15 U	5.0 U	15 U	120 U
PRIORITY POLLUTANT METALS (mg/L)							
Arsenic (7060A)	0.02	NA	NA	0.01	NA	NA	0.02
Chromium (6010B)	0.005 U	NA	NA	0.005 U	NA	NA	0.005 U
Copper (6010B)	0.002 U	NA	NA	0.002 U	NA	NA	0.002
Iron (6010B)	50.1	NA	NA	29.3	NA	NA	57
Lead (7421)	0.001 U	NA	NA	0.001 U	NA	NA	0.001 U
Nickel (6010B)	0.01 U	NA	NA	0.01 U	NA	NA	0.01 U
Zinc (6010B)	0.009	NA	NA	0.009	NA	NA	0.012
CONVENTIONALS (mg/L)							
Calcium (6010B)	32.4	NA	NA	33	NA	NA	40.2
Magnesium (6010B)	8.55	NA	NA	10.7	NA	NA	11
Potassium (6010B)	3.4	NA	NA	2.7	NA	NA	3.8
Sodium (6010B)	7.45	NA	NA	6.06	NA	NA	8.75
Alkalinity (SM2320)	160	NA	130	120	160	130	160
Carbonate (Alkalinity) (SM2320)	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bicarbonate (Alkalinity) (SM2320)	160	NA	130	120	160	130	160
Total Dissolved Solids (EPA 160.1)	240	NA	NA	220	NA	NA	270
Chemical Oxygen Demand (EPA 410.4)	98	NA	NA	76	NA	NA	140
Total Organic Carbon (EPA415.1)	20	NA	NA	20	NA	NA	29

BZTO104(e)017204

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NFEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-3S	OX-4S	OX-4S	OX-4S	PZ-1	PZ-1	LW11S
Laboratory Identification:	EW07E	EM65D	0209126-03	EW07F	EM65E	EW07B	EM65F
Date Collected:	10/3/02	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	6/24/02
4-Chlorotoluene	5.0 U	25 U	NA	5.0 U	50 U	10 U	1.0 U
tert-Butylbenzene	5.0 U	25 U	NA	5.0 U	50 U	10 U	2.8 J
sec-Butylbenzene	14	25 U	NA	23	50 U	10 U	7.4
4-Isopropyltoluene	15	25 U	NA	24	50 U	10 U	6.0
n-Butylbenzene	17 Y	25 U	NA	32 Y	50 U	10 Y	5.0 U
1,2,4-Trichlorobenzene	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
Naphthalene	49	120 U	NA	70	250 U	50 U	17
1,2,3-Trichlorobenzene	25 U	120 U	NA	25 U	250 U	50 U	5.0 U
PRIORITY POLLUTANT METALS (mg/L)							
Arsenic (7060A)	NA	0.021	NA	NA	0.005	NA	0.006
Chromium (6010B)	NA	0.005 U	NA	NA	0.035	NA	0.005 U
Copper (6010B)	NA	0.002 U	NA	NA	0.011	NA	0.002 U
Iron (6010B)	NA	52.7	NA	NA	6.31	NA	22
Lead (7421)	NA	0.001 U	NA	NA	0.001	NA	0.001 U
Nickel (6010B)	NA	0.01 U	NA	NA	0.04	NA	0.01 U
Zinc (6010B)	NA	0.008	NA	NA	0.087	NA	0.006 U
CONVENTIONALS (mg/L)							
Calcium (6010B)	NA	37.9	NA	NA	42.3	NA	NA
Magnesium (6010B)	NA	10.4	NA	NA	13.6	NA	NA
Potassium (6010B)	NA	3.6	NA	NA	3.3	NA	NA
Sodium (6010B)	NA	8.42	NA	NA	5.25	NA	NA
Alkalinity (SM2320)	150	160	NA	130	180	140	120
Carbonate (Alkalinity) (SM2320)	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bicarbonate (Alkalinity) (SM2320)	150	160	NA	130	180	140	120
Total Dissolved Solids (EPA 160.1)	NA	250	NA	NA	250	NA	NA
Chemical Oxygen Demand (EPA 410.4)	NA	110	NA	NA	110	NA	60
Total Organic Carbon (EPA415.1)	NA	25	NA	NA	20	NA	13

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	LW11S	LW11S	RW1	RW1
Laboratory Identification:	0209126-02	EW07	EM65G	EW07A
Date Collected:	9/19/02	10/3/02	8/24/02	10/3/02
4-Chlorotoluene	NA	2.0 U	3.0 U	1.0 U
tert-Butylbenzene	NA	2.0 U	3.0 U	2.0
sec-Butylbenzene	NA	6.6	3.0 U	10
4-Isopropyltoluene	NA	4.4	9.3	2.8
n-Butylbenzene	NA	5.3 Y	10 U	4.7
1,2,4-Trichlorobenzene	NA	10 U	15 U	5.0 U
Naphthalene	NA	12	19	18
1,2,3-Trichlorobenzene	NA	10 U	15 U	5.0 U
PRIORITY POLLUTANT METALS (mg/L)				
Arsenic (7060A)	NA	NA	0.006	NA
Chromium (6010B)	NA	NA	0.005 U	NA
Copper (6010B)	NA	NA	0.005	NA
Iron (6010B)	NA	NA	61.3	NA
Lead (7421)	NA	NA	0.001	NA
Nickel (6010B)	NA	NA	0.01 U	NA
Zinc (6010B)	NA	NA	0.016	NA
CONVENTIONALS (mg/L)				
Calcium (6010B)	NA	NA	NA	NA
Magnesium (6010B)	NA	NA	NA	NA
Potassium (6010B)	NA	NA	NA	NA
Sodium (6010B)	NA	NA	NA	NA
Alkalinity (SM2320)	NA	110	500	170
Carbonate (Alkalinity) (SM2320)	NA	1.0 U	1.0 U	1.0 U
Bicarbonate (Alkalinity) (SM2320)	NA	110	500	170
Total Dissolved Solids (EPA 160.1)	NA	NA	NA	NA
Chemical Oxygen Demand (EPA 410.4)	NA	NA	140	NA
Total Organic Carbon (EPA415.1)	NA	NA	47	NA

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-1S	OX-1S	OX-1S	OX-2S	OX-2S	OX-5S OX-2S (Dup)	OX-3S
Laboratory Identification:	EM65A	0209126-01	EW07C	EM65B	EW07D	EW07G	EM65C
Date Collected:	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	10/3/02	6/24/02
FIELD PARAMETERS							
pH (avg)	5.99		6.46	6.15	6.23	6.23	5.94
Temperature (° C) (avg)	14 3		16.4	15.5	17.5	17.5	14.4
Conductivity (mS/cm) (avg)	302		717	249	654	656	342
Dissolved oxygen (mg/L) (avg)	3.97		0.00	4 10	0.00	0.00	4 34
Turbidity (NTU)	0		60	0	24	25	0
RedOx	-1450		29 8	-843	40 7	40.7	-1480

BZTO104(e)017207

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	OX-3S	OX-4S	OX-4S	OX-4S	PZ-1	PZ-1	LW11S
Laboratory identification	EW07E	EM65D	0209126-03	EW07F	EM65E	EW07B	EM65F
Date Collected:	10/3/02	6/24/02	9/19/02	10/3/02	6/24/02	10/3/02	6/24/02
FIELD PARAMETERS							
pH (avg)	6.57	6.74		6.56	6.02	6.70	6.14
Temperature (° C) (avg)	16.6	14.5		17.0	15 3	16.0	15.6
Conductivity (mS/cm) (avg)	347	326		741	278	1218	205
Dissolved oxygen (mg/L) (avg)	0.00	4.42		0.00	5.09	0.00	4.17
Turbidity (NTU)	56	9		441	0	28	0
RedOx	213	-1345		20	-902	14 6	-1091

U = Indicates compound was analyzed for, but not detected at the given detection limit.
NA = Not analyzed

TABLE 1
ISCO GROUNDWATER ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:	LW11S	LW11S	RW1	RW1
Laboratory Identification:	0209126-02	EW07	EM65G	EW07A
Date Collected:	9/19/02	10/3/02	6/24/02	10/3/02
FIELD PARAMETERS				
pH (avg)		6 58	6.16	6 68
Temperature (° C) (avg)		15.8	15.6	16.5
Conductivity (mS/cm) (avg)		296	803	597
Dissolved oxygen (mg/L) (avg)		0 00	3.86	0.00
Turbidity (NTU)		53	43	62
RedOx		22.3	-1106	13.6

BZTO104(e)017209

TABLE 2
ISCO SOIL ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS	Baseline		Baseline		Baseline		Baseline		
Sample Identification	OX-1S	OX-1S	OX-2S	OX-2S	OX-3S	OX-3S	OX-4S	OX-4S	PZ-1
Depth:	15-16	14-17	15-16	14-17	15-16	14-18	15 5-16.5	14-18	13-16
Laboratory Identification:	EM10B	0210067-05A	EM10A	0210067-04A	EM10C	0210067-03A	EM10D	0210067-01A	0210067-06A
Date Collected:	6/14/02	10/8/02	6/14/02	10/8/02	6/14/02	10/8/02	6/17/02	10/8/02	10/8/02
CHLORINATED PHENOLS (µg/kg)									
EPA Method SW8040									
Pentachlorophenol	6000	NA	9900	NA	11000	NA	1300	NA	NA
2,4,6-Trichlorophenol	7 9 U	NA	7.9 U	NA	7.8 U	NA	7.9 U	NA	NA
2,3,6-Trichlorophenol	7.9 U	NA	7.9 U	NA	7.8 U	NA	7.9 U	NA	NA
2,4,5-Trichlorophenol	7.9 U	NA	7.9 U	NA	7.8 U	NA	7.9 U	NA	NA
2,3,4-Trichlorophenol	7.9 U	NA	8.8 Y	NA	7.8 U	NA	7.9 U	NA	NA
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	790	NA	470	NA	530	NA	53	NA	NA
2,3,4,5-Tetrachlorophenol	37	NA	31	NA	21	NA	10	NA	NA
CHLORINATED PHENOLS (µg/kg)									
EPA Method SW8270B									
2,3,4,6-Tetrachlorophenol	NA	522	NA	1990	NA	167 U	NA	167 U	167
2,4,5-Trichlorophenol	NA	333 U	NA	333 U	NA	333 U	NA	333 U	333
2,4,6-Trichlorophenol	NA	333 U	NA	333 U	NA	333 U	NA	333 U	333
2,4-Dichlorophenol	NA	200 U	NA	200 U	NA	200 U	NA	200 U	200
2,6-Dichlorophenol	NA	167 U	NA	167 U	NA	167 U	NA	167 U	167
2-Chlorophenol	NA	66.7 U	NA	66 7 U	NA	66.7 U	NA	66.7 U	66.7
4-Chloro-3-methylphenol	NA	133 U	NA	133	NA	133 U	NA	133 U	133
Pentachlorophenol	NA	2710	NA	37700	NA	3220	NA	415	1090
						6000	9900	11000	1300
						2710	37700	3220	415
					55%		-281%	71%	68%

U = Indicates compound was analyzed for, but not detected at the given detection limit.

NA = Not analyzed.

BZTO104(e)017210

TABLE 2
ISCO SOIL ANALYTICAL RESULTS
TIME OIL NORTHWEST TERMINAL

NEEDS QA AND DATA VALIDATION FLAGS

Sample Identification:		LW11S	RW1
Depth:		15-19	13-17
Laboratory Identification:		0210067-02A	0210067-07A
Date Collected:		10/8/02	10/8/02
CHLORINATED PHENOLS (µg/kg)			
EPA Method SW8040			
Pentachlorophenol		NA	NA
2,4,6-Trichlorophenol		NA	NA
2,3,6-Trichlorophenol		NA	NA
2,4,5-Trichlorophenol		NA	NA
2,3,4-Trichlorophenol		NA	NA
2,3,5,6- and 2,3,4,6-Tetrachlorophenol		NA	NA
2,3,4,5-Tetrachlorophenol		NA	NA
CHLORINATED PHENOLS (µg/kg)			
EPA Method SW8270B			
2,3,4,6-Tetrachlorophenol	U	543	167 U
2,4,5-Trichlorophenol	U	333 U	333 U
2,4,6-Trichlorophenol	U	333 U	333 U
2,4-Dichlorophenol	U	200 U	200 U
2,6-Dichlorophenol	U	167 U	167 U
2-Chlorophenol	U	66.7 U	66.7 U
4-Chloro-3-methylphenol	U	133	133 U
Pentachlorophenol		16700	333 U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2
4			S177C		T176O		U235I		V224S		W371J		Y336B		Z225N		Z960F		AH49A		AU36B		BC27M		BH96P		BR55J
5			4/1/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		2/16/00		5/23/00
6																											
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	0.25	U	**0.17**	J1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		1.0	U	**0.6**	J1	1.0	U	1.0
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**5.6**		5.0	U	5.0	U	5.0	U	5.0	U	5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.48**		0.25	U	0.25	U	**0.36**		**0.28**
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	**0.008**		**0.008**		0.05	U	0.05	U	**0.014**		**0.022**		**0.010**		**0.026**		**0.010**		**0.012**		**0.012**		**0.017**		**0.012**
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																						
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2	
4			CB68B		CL03J		CT67G		DE68K		DM30N		DW37C		ED23B		EM75K		ES04H		EY88D	
5			8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		11/11/02	
7	**CHLORINATED PHENOLS (µg/L)**																					
8	**EPA Method SW8040**																					
9	Pentachlorophenol	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.27	U	0.25	U
10	2,4,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																						
17	**SEMIVOLATILES (µg/L)**																					
18	**EPA Method SW8270**																					
19	Phenol	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.2	U
20	4-Methylphenol	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
21	Isophorone	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.2	U	3.3	U
23	Benzoic Acid	U	10	U	10	U	10	U	10	U	10	U	50	U	50	U	50	U	53	U	56	U
24	Naphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
25	2-Methylnaphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.6	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.6	U
28	Acenaphthene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
29	Dibenzofuran	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
30	Fluorene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
31	Pentachlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.6	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.0	U	4.3	U	4.4	U
33																						
34	**VOLATILES (µg/L)**																					
35	**EPA Method SW8260**																					
36	Acetone	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**7.2**		5.0	U	5.0	U	5	U	5	U
37	Carbon Disulfide	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
49	n-Propylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
52	4-Isopropyltoluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
54	Naphthalene	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																					
57	**Method OR-DEQ**																					
58	**TPH-Diesel**		0.25	U	0.25	U	0.25	U	NA		NA		NA		0.25	U	NA		NA		NA	
59	**TPH-D Motor Oil**		NA		0.50	U	NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																						
62	**PRIORITY POLLUTANT**																					
63	**METALS (mg/L)**																					
64	Arsenic (7060)		**0.015**		**0.006**		**0.006**		**0.005**		**0.010**		**0.009**		**0.011**		**0.010**		**0.013**		0.05	U
65	Chromium (6010)	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2
4			S177C		T176O		U235I		V224S		W371J		Y336B		Z225N		Z960F		AH49A		AU36B		BC27M		BH96P		BR55J
5			4/1/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		2/16/00		5/23/00
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	63	Zinc (6010)	0.004	U	0.004	U	**0.013**		0.004	U	0.004	U	**0.005**		0.004	U	**0.007**	J	**0.006**		**0.005**		0.006	U	**0.007**		**0.011**
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	**66.1**		**65.6**		**40.1**		**41.8**		NA		NA		NA		**38.8**		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	**45.2**		**47**		**14.4**		**13.5**		NA		NA		NA		**11.9**		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	**2.0**		**1.9**		**4.7**		**4.5**		NA		NA		NA		**4.5**		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	**18.8**		**19.6**		**11.5**		**9.59**		NA		NA		NA		**9.03**		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**370**		**380**	J2	**38**		**190**		NA		NA		NA		**170**		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**370**		**380**	J2	**38**		**190**		NA		NA		NA		**170**		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**420**	J2	**210**		**190**		**180**		**200**		**230**		**180**		**170**		**210**		**160**		**180**		**190**
80	74	Chloride (mg/L) (EPA 325.2)	**7.6**		**9.1**		**2.6**		**1.9**		**3.4**		**1.6**		**2.7**		**1.0**		**3.9**		**2.7**		**3.9**		**3.6**		**2.8**
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	**0.027**		**0.018**	J2	NA		NA		NA		**0.012**		NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.02	J	**0.028**	J2	**0.32**		0.010	UJ	NA		NA		NA		**0.019**		NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.019**		0.010	U	**0.35**		**0.018**	J2	NA		NA		NA		**0.031**		NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	2.5	U	2.5	U	2.5	U	2.5	U	NA		NA		NA		**3.8**		NA		NA		NA		NA		NA
85	79																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2	
4			CB68B		CL03J		CT67G		DE68K		DM30N		DW37C		ED23B		EM75K		ES04H		EY88D	
5			8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		11/11/02	
66	Copper (6010)	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	Lead (7421)	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.02	U
68	Nickel (6010)	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)		**0.011**		0.006	U	0.006	U	**0.009**		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
70																						
71	**MAJOR IONS AND CONVENTIONALS**																					
72	Calcium (mg/L) (6010)		NA		NA		**43.6**		**48.0**		**42.0**		**56.4**	J	**43.3**		NA		NA		NA	
73	Magnesium (mg/L) (6010)		NA		NA		**19.4**		**23.8**		**18.3**		**32.6**	J	**14.5**		NA		NA		NA	
74	Potassium (mg/L) (6010)		NA		NA		**3.4**		**3.4**		**3.9**		**2.4**		**5.2**		NA		NA		NA	
75	Sodium (mg/L) (6010)		NA		NA		**11.0**		**12.1**		**11.4**		**15.0**		**9.84**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA		NA		**200**		NA		NA		NA		**240**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		1.0	U	NA		NA		NA		**1.0**	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		**200**		NA		NA		NA		**240**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**220**		**240**		**260**		**260**		**270**		**280**		**240**		**190**		**210**		**360**	
80	Chloride (mg/L) (EPA 325.2)		**2.5**		**3.2**		**3.9**	J	**3.2**		**6.1**		**3.9**		**3.3**		**5.1**		**5.2**		**4.3**	
81	N-Nitrate (mg-N/L) (Calculated)		NA		NA		**0.81**		NA		NA		NA		**0.73**		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA		NA		0.010	J	NA		NA		NA		**0.021**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA		NA		**0.81**		NA		NA		NA		**0.75**	J	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA		NA		**4.1**		NA		NA		NA		**2.6**		NA		NA		NA	
85																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2
4			S177C		T176O		U235I		V224S		W371J		Y336B		Z225N		Z960F		AH49A		AU36B		BC27M		BH96P		BR55J
5			4/1/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		2/16/00		5/23/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.75		6.73		7.28		6.96		6.61		6.43		6.48		7.16		6.27		6.61		6.88		6.70		6.51
88	82	Temperature (° C) (avg)	13.4		16.3		13.9		14.4		13.0		15.5		12.9		13.3		14.1		15.0		12.6		13.4		16.1
89	83	Conductivity (um/hos)	769		675		297		385		494		643		234		357		253		285		305		653		665
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		1.44		1.50		3.24		3.13		1.53		2.93		1.98		1.09		0.67
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119	113																										
120																											
121																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2	
4			CB68B		CL03J		CT67G		DE68K		DM30N		DW37C		ED23B		EM75K		ES04H		EY88D	
5			8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		11/11/02	
86	**FIELD PARAMETERS**																					
87	pH (avg)		7.00		5.53		6.97		6.80		6.96		6.71		6.90		7.01		7.21		6.8	
88	Temperature (° C) (avg)		15.6		13.3		13.5		14.0		16.3		12.8		13.1		15.3		15.9		14.1	
89	Conductivity (um/hos)		346		319		315		611		608		384		362		272		272		595	
90	Dissolved oxygen (mg/L) (avg)		1.16		2.17		1.81		1.59		1.98		4.27		7.72		4.80		1.09		2.52	
91																						
92	**DIOXINS AND FURANS (ng/L)**																					
93	**Method 8290**																					
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2		B2
4			S177C		T176O		U235I		V224S		W371J		Y336B		Z225N		Z960F		AH49A		AU36B		BC27M		BH96P		BR55J
5			4/1/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		2/16/00		5/23/00
122	114	**PAHs (µg/L)**																									
123	115	**EPA Method SW8270 SIM**																									
124	116	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125	117	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126	118	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127	119	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128	120	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129	121	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130	122	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			B2		B2		B2		B2		B2		B2		B2		B2		B2		B2	
4			CB68B		CL03J		CT67G		DE68K		DM30N		DW37C		ED23B		EM75K		ES04H		EY88D	
5			8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		11/11/02	
122	**PAHs (µg/L)**																					
123	**EPA Method SW8270 SIM**																					
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2									Dup of G1A				Dup of G1A													
3			G1A		G1A		G1A		G1B		G1A		S		G1A		G1A		G1A		G1A		G1A		G1A	
4			S177E		T176H		U258C		U258A		V224T		V224L		W391G		Y313D		Z225C		Z960O		AH27J		AU45F	
5			4/2/97		7/15/97		10/23/97		10/23/97		1/29/98		1/29/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	66		170		25		21		99		96		0.16	J1	0.37		0.25	U	0.28		0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25		5.1		0.58		0.59		1.8	J2	1.3	J2	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.40		0.91	U	0.25	U	0.25	U	0.26		0.20	J1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.49	U	1.7	U	0.35	U	1.0	U	1.1		0.86		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	3.4		21		2.5		2.3		5.4		5.1		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.49		3.6		0.50		0.49		0.50		0.41		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	7.5		3.4	U	2.5	U	2.0	U	2.0	U	2.3		6.0		2.0	U	2.0	U	3.2		10	
20	14	4-Methylphenol	1.0	U	2.2		1.7	U	1.2	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	15		1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.7	U	1.2	U	1.2		1.1		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	5.2	U	3.8	U	3.0	U	3.3		11	J2	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	17	U	12	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	16	
24	18	Naphthalene	9.7		14		11		11		30	J2	23	J2	8.4	J2	9.0		1.6		2.4		15		6.4	
25	19	2-Methylnaphthalene	29		37		33		35		44	J2	30	J2	19	J2	25		7.2		14		23		16	
26	20	2,4,6-Trichlorophenol	5.0	U	9.6		8.6	U	6.2	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.6		8.6	U	6.2	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.7	U	1.2	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.7	U	1.2	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.7	U	1.2	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	65		180		34		37		4.3	J1	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.7	U	2.1		1.0	U	1.8		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.8		5.0	U	5.0	U	5.0	U	14		16	M
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	150	J	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	36		22	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2.7	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.2		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3		1.0	U
42	36	Ethylbenzene	31		49		74	J2	59	J2	28		32		34		42		3.1		1.0	U	81		7.4	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	51		74		160	J2	120	J2	74		89		74		93		5.7		2.0		120		24	
45	39	o-Xylene	3.4		5.2		10		8.3		4.1		4.1		1.0	U	2.5		1.0	U	1.0	U	5.6		1.0	U
46	40	1,3,5-Trimethylbenzene	36		58		120	J2	85	J2	59		60		38		52		3.2		4.2		35		20	
47	41	1,2,4-Trimethylbenzene	130		150		350	J2	250	J2	140		160		120		99		8.8		9.9		110		57	
48	42	Isopropylbenzene	180		200		310	J2	240	J2	130		140		200	E	180		170		170		190		96	
49	43	n-Propylbenzene	200		220		340	J2	270	J2	140		160		210	E	180		170		160		220		93	
50	44	tert-Butylbenzene	3.6		5.1	J2	6.9		5.7		3.6		4.0		5.3	M	6.9		4.6		4.1		3.9		3.7	
51	45	sec-Butylbenzene	18		25		33		27		14		17		24		30	J2	23		18		20		19	
52	46	4-Isopropyltoluene	2.8		3.6		9.2	J2	6.2	J2	4.8		5.6		4.0		6.5		1.0	U	1.0	U	2.9		1.3	
53	47	n-Butylbenzene	14	M	19		26		22		12		14		19		23		15		11		15		14	U
54	48	Naphthalene	20		32		73	J2	50	J2	22		78		36		41		5.2		5.3		28		18	
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	4.0		3.9		3.5		3.6		3.3		3.5		3.0		2.6		2.7		2.5		2.6		2.6	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	0.031		0.034		0.05	U	0.05	U	0.05	U	0.05	U	0.039		0.039		0.10		0.041		0.032		0.040	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.008	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																											
3		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A	
4		BC27E		BH96J		BR64I		CB85G		CL03E		CT55A		DE87L		DM30A		DW37F		ED23I		EM85J		ER93D		EZ03D	
5		12/7/99		2/17/00		5/24/00		8/30/00		11/8/00		2/13/01		6/6/01		8/13/01		11/28/01		2/26/02		6/26/02		08/26/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																										
8	**EPA Method SW8040**																										
9	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.26	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																											
17	**SEMIVOLATILES (µg/L)**																										
18	**EPA Method SW8270**																										
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.2	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.1	U	3.3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	50	U	50	U	50	U	52	U	54	U
24	Naphthalene	**3.0**		**6.7**		**3.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
25	2-Methylnaphthalene	**12**		**24**		**14**		**7.7**		**4.1**		**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.2	U	5.4	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.2	U	5.4	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.2	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	**1.7**		1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.0	U	4.2	U	4.3	U
33																											
34	**VOLATILES (µg/L)**																										
35	**EPA Method SW8260**																										
36	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U		R	5.0	U	**5.6**		5.0	U	5.0	U	**7.8**		5	U	5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	**9.0**		21	U	**21**		5.0	U	**6.2**		**13**		**6.4**		**7.5**		5.0	U	**11**	M	5	U
39	Benzene	1.0	U	**4.4**		**1.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	**2.3**		1.0	U	**1.9**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.3**		1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	**1.5**		1.0	U	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	**11**		**1.6**		**7.9**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	**14**		**17**		**11**		**3.8**		2.4	M	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	**66**		**140**		**95**		**100**		**140**		**120**		**150**		**130**		**200**		**140**		**170**		**140**		**150**	
49	n-Propylbenzene	**64**		**130**		**90**		**92**		**130**		**110**		**140**		**120**		**190**		**120**		**150**		**110**		**130**	
50	tert-Butylbenzene	**1.7**		**4.8**		**2.6**		**4.0**		**3.7**		**3.2**		**4.5**		**3.2**		**4.9**		**3.6**		**4.7**		**3.8**		**3.7**	
51	sec-Butylbenzene	**6.9**		**24**		**9.6**		**20**		**19**		**16**		**20**		**17**		**23**		**16**		**23**		**18**		**18**	
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**7.9**		1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	1.0	U	**17**		**6.2**	M	**14**	M	**12**		**10**		14	U	**11**		**14**	M	**12**		**13**	M	**11**	M	**11**	M
54	Naphthalene	5.0	U	**13**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
55																											
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	**Method OR-DEQ**																										
58	**TPH-Diesel**	**2.3**		**2.3**		**3.2**		**2.1**		**2.2**		**3.4**		**2.3**		**3.3**		**4.5**		**4.3**		**5.0**		**4.8**		**4.4**	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																											
62	**PRIORITY POLLUTANT**																										
63	**METALS (mg/L)**																										
64	Arsenic (7060)	**0.039**		**0.036**		**0.036**		**0.036**		**0.033**		**0.035**		**0.036**		**0.040**		**0.034**		**0.035**		**0.037**		**0.039**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	**0.005**		0.005	U	0.005	U	0.005	U	**0.013**		**0.005**		**0.005**		0.005	U	0.005	U	**0.008**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2									Dup of G1A				Dup of G1A													
3			G1A		G1A		G1A		G1B		G1A		S		G1A		G1A		G1A		G1A		G1A		G1A	
4			S177E		T176H		U258C		U258A		V224T		V224L		W391G		Y313D		Z225C		Z960O		AH27J		AU45F	
5			4/2/97		7/15/97		10/23/97		10/23/97		1/29/98		1/29/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99	
66	60	Copper (6010)	0.002	U	0.002	U	**0.002**		**0.003**		**0.004**		**0.004**		0.002	U	**0.004**		**0.004**		0.002	U	0.002	U	**0.009**	
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.02	U	0.02	U	**0.001**		**0.005**		**0.002**		0.001	U	**0.003**		**0.007**	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
69	63	Zinc (6010)	0.004	U	0.004	U	**0.024**		**0.024**		**0.008**		**0.010**		**0.005**	J2	**0.013**		**0.012**		**0.011**	J	0.009	U	**0.020**	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**59.1**		**51**		**53.5**		**53.0**		**46.7**		**46.4**		NA		NA		NA		**55.5**		NA		NA	
73	67	Magnesium (mg/L) (6010)	**21.6**		**19.1**		**17.9**		**17.6**		**15.8**		**15.7**		NA		NA		NA		**19.5**		NA		NA	
74	68	Potassium (mg/L) (6010)	**0.8**		**0.7**		**6.8**		**7.6**		**1.5**		**1.5**		NA		NA		NA		**1.0**		NA		NA	
75	69	Sodium (mg/L) (6010)	**11.5**		**10.5**		**15.2**		**15.4**		**10.4**		**10.2**		NA		NA		NA		**11.0**		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**260**		**230**		**210**		**210**		**250**		**210**		NA		NA		NA		**240**		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**260**		**230**		**210**		**210**		**250**		**210**		NA		NA		NA		**240**		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**300**	J2	**270**		**260**		**230**		**270**		**300**		**290**		**260**		**340**		**670**		**580**	
80	74	Chloride (mg/L) (EPA 325.2)	**13**		**14**		**14**		**13**		**13**		**12**		**12**		**11**		**12**		**12**		**9.1**		**11**	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	0.010	U	0.010	U	**0.022**	J2	**0.024**	J2	NA		NA		NA		**0.010**		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.036**	J	**0.042**	J2	**0.013**		**0.019**		**0.011**	J2	0.010	UJ	NA		NA		NA		**0.015**		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.024**		0.010	U	**0.020**		**0.020**		**0.033**	J2	**0.024**	J2	NA		NA		NA		**0.025**		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	3.7		NA		NA		NA		**4.7**		NA		NA	
85	79																									

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																											
3		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A	
4		BC27E		BH96J		BR64I		CB85G		CL03E		CT55A		DE87L		DM30A		DW37F		ED23I		EM85J		ER93D		EZ03D	
5		12/7/99		2/17/00		5/24/00		8/30/00		11/8/00		2/13/01		6/6/01		8/13/01		11/28/01		2/26/02		6/26/02		08/26/02		11/12/02	
66	Copper (6010)	**0.003**		0.002	U	0.002	U	**0.015**		**0.004**		0.002	U	**0.003**		**0.017**		**0.005**	J	**0.005**		**0.002**		**0.004**		**0.01**	
67	Lead (7421)	**0.001**		0.001	U	**0.001**		**0.004**		**0.003**		**0.002**		**0.001**		**0.008**		**0.004**		**0.002**		0.001	U	**0.003**		0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	0.01	U	**0.01**	
69	Zinc (6010)	0.008	U	0.006	U	0.006	U	**0.014**		**0.009**		**0.008**		**0.009**		**0.033**		**0.015**	J	**0.008**		**0.008**		**0.034**		**0.02**	
70																											
71	**MAJOR IONS AND CONVENTIONALS**																										
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		**65.6**		**60.3**		**67.9**		**56.9**	J	**62.8**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		**21.6**		**20.2**		**24.9**		**18.7**	J	**21.1**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		**1.8**		**3.4**		**2.4**		**3.6**		**3.2**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		**11.2**		**12.1**		**13.5**		**13.4**		**13.0**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		**310**		NA		NA		NA		**290**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		**310**		NA		NA		NA		**290**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**420**		**450**		**390**		**460**		**380**		**350**	J	**340**	J	**330**	J	**330**		**380**		**320**		**330**		**430**	
80	Chloride (mg/L) (EPA 325.2)	**9.3**		**18**		**8.4**		**6.7**		**8.2**		**8.8**		**8.2**		**10**		**3.3**		**26**		**5.1**		**5**		**4.8**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		**0.010**		NA		NA		NA		0.010	U	NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.074**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		**0.010**		NA		NA		NA		**0.057**	J	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		**4.7**		NA		NA		NA		**2.5**		NA		NA		NA	
85																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2									Dup of G1A				Dup of G1A													
3			G1A		G1A		G1A		G1B		G1A		S		G1A		G1A		G1A		G1A		G1A		G1A	
4			S177E		T176H		U258C		U258A		V224T		V224L		W391G		Y313D		Z225C		Z960O		AH27J		AU45F	
5			4/2/97		7/15/97		10/23/97		10/23/97		1/29/98		1/29/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.77		6.67		6.82		6.82		6.73		6.70		6.43		6.50		6.30		6.87		5.75		6.67	
88	82	Temperature (° C) (avg)	14.1		16.0		14.5		14.5		14.2		14.0		13.8		15.2		12.6		13.0		15.5		17.9	
89	83	Conductivity (um/hos)	625		585		496		496		473		480		444		680		127		559		825		850	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		NA		2.18		0.93		1.58		1.54		1.83		0.68	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120																										
121																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																											
3		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A	
4		BC27E		BH96J		BR64I		CB85G		CL03E		CT55A		DE87L		DM30A		DW37F		ED23I		EM85J		ER93D		EZ03D	
5		12/7/99		2/17/00		5/24/00		8/30/00		11/8/00		2/13/01		6/6/01		8/13/01		11/28/01		2/26/02		6/26/02		08/26/02		11/12/02	
86	**FIELD PARAMETERS**																										
87	pH (avg)	6.45		6.68		6.47		5.92		5.84		6.42		6.83		6.79		6.58		6.64		6.48		6.69		6.76	
88	Temperature (° C) (avg)	13.0		13.9		17.2		15.0		13.7		15.2		14.4		15.5		13.4		14.3		17.5		17.7		13.7	
89	Conductivity (um/hos)	742		828		796		799		679		645		651		614		586		578		592		513		665	
90	Dissolved oxygen (mg/L) (avg)	2.00		0.86		0.31		0.67		0.64		1.76		1.84		1.41		4.16		7.50		2.72		0.69		1.06	
91																											
92	**DIOXINS AND FURANS (ng/L)**																										
93	**Method 8290**																										
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																											
120																											
121																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2									Dup of G1A				Dup of G1A													
3			G1A		G1A		G1A		G1B		G1A		S		G1A		G1A		G1A		G1A		G1A		G1A	
4			S177E		T176H		U258C		U258A		V224T		V224L		W391G		Y313D		Z225C		Z960O		AH27J		AU45F	
5			4/2/97		7/15/97		10/23/97		10/23/97		1/29/98		1/29/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		**2.5**		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		**16**		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		**0.23**	M	NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		**0.16**	M	NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																											
3		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A		G1A	
4		BC27E		BH96J		BR64I		CB85G		CL03E		CT55A		DE87L		DM30A		DW37F		ED23I		EM85J		ER93D		EZ03D	
5		12/7/99		2/17/00		5/24/00		8/30/00		11/8/00		2/13/01		6/6/01		8/13/01		11/28/01		2/26/02		6/26/02		08/26/02		11/12/02	
122	**PAHs (µg/L)**																										
123	**EPA Method SW8270 SIM**																										
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4			S177J		T176Q		U235K		V224P		W371L		Y314J		Z225P		Z960D		AH49D		AU22I		BC27L		BH96S		BR64E	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/20/99		12/8/99		2/16/00		5/24/00	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	**0.15**	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.36**		0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	**2.8**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.1	U	**1.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	**44**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.36**		0.25	U	0.25	U	**0.28**		**0.31**		**0.28**		**0.30**		**0.38**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.011**		**0.012**		0.05	U	0.05	U	**0.010**		**0.008**		**0.008**		**0.009**		**0.006**		**0.010**		**0.010**		**0.012**		**0.006**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																					
3		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4		CB49H		CL03I		CT55E		DE68J		DM52A		DW48D		ED23D		EM85E		ES04E		EZ03L	
5		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02		08/28/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																				
8	**EPA Method SW8040**																				
9	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.33**		0.25	U	0.25	U	0.28	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																					
17	**SEMIVOLATILES (µg/L)**																				
18	**EPA Method SW8270**																				
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.2	U	2.2	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.3	U	3.3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	56	U	56	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.6	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.6	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.6	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.4	U	4.4	U
33																					
34	**VOLATILES (µg/L)**																				
35	**EPA Method SW8260**																				
36	Acetone	5.0	U	5.0	U		R	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
49	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	**Method OR-DEQ**																				
58	**TPH-Diesel**	**0.26**		**0.40**		**0.35**		NA		NA		NA		**0.41**		NA		NA		NA	
59	**TPH-D Motor Oil**	NA		0.50	U	NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																					
62	**PRIORITY POLLUTANT**																				
63	**METALS (mg/L)**																				
64	Arsenic (7060)	**0.004**		**0.008**		**0.008**		**0.010**		**0.010**		**0.008**		**0.012**		**0.005**		**0.008**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4			S177J		T176Q		U235K		V224P		W371L		Y314J		Z225P		Z960D		AH49D		AU22I		BC27L		BH96S		BR64E	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/20/99		12/8/99		2/16/00		5/24/00	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.004	U	0.004	U	**0.012**		0.004	U	**0.005**	J2	**0.008**		0.004	U	**0.017**	J	**0.004**		**0.005**		0.006	U	0.006	U	**0.008**	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	**63.6**		**63**		**61.6**		**57.8**		NA		NA		NA		**59.4**		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**43.1**		**43.9**		**39.7**		**37.1**		NA		NA		NA		**38.5**		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**2.4**		**2.1**		**2.5**		**2.2**		NA		NA		NA		**4.0**		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**17.7**		**17.7**		**18.1**		**17.1**		NA		NA		NA		**18.3**		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**350**		**360**	J2	**170**		**380**		NA		NA		NA		**350**		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**350**		**360**	J2	**170**		**380**		NA		NA		NA		**350**		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**410**	J2	**360**		**410**		**360**		**390**		**360**		**380**		**350**		**380**		**360**		**330**		**320**	
80	74	Chloride (mg/L) (EPA 325.2)	**7.3**		**7.0**		**9.0**		**8.0**		**8.2**		**7.7**		**8.1**		**8.0**		**6.9**		**6.3**		**7.2**		**7.7**		**5.6**	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	**0.028**		**0.027**	J2	NA		NA		NA		0.010	U	NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.022**	J	**0.019**	J2	**0.015**		**0.013**	J2	NA		NA		NA		**0.022**		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.015**		0.010	U	**0.043**		**0.040**	J2	NA		NA		NA		**0.016**		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	2.5	U	2.5	U	2.5	U	2.5	U	NA		NA		NA		**5.7**		NA		NA		NA		NA		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4		CB49H		CL03I		CT55E		DE68J		DM52A		DW48D		ED23D		EM85E		ES04E		EZ03L	
5		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02		08/28/02		11/12/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.002**		0.002	U	**0.003**		0.002	U
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.011**		**0.009**	
70																					
71	**MAJOR IONS AND CONVENTIONALS**																				
72	Calcium (mg/L) (6010)	NA		NA		**53.0**		**57.1**		**49.5**		**53.9**		**55.8**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		**31.3**		**33.2**		**30.0**		**28.8**		**31.7**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		**1.8**		**2.1**		**2.1**		**2.6**		**2.8**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		**14.5**		**15.2**		**14.8**		**14.9**		**15.9**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		**330**		NA		NA		NA		**370**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		**330**		NA		NA		NA		**370**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**380**		**340**		**370**		**370**		**350**		**350**		**340**		**290**		**330**		**360**	
80	Chloride (mg/L) (EPA 325.2)	**4.4**		**5.1**		**5.0**		**4.2**		**5.9**		**4.3**		**5.3**		**4.8**		**4.1**		**4.6**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		0.010	U	NA		NA		NA		**0.013**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		0.010	U	NA		NA		NA		**0.019**	J	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		**5.6**		NA		NA		NA		**3.5**		NA		NA		NA	
85																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4			S177J		T176Q		U235K		V224P		W371L		Y314J		Z225P		Z960D		AH49D		AU22I		BC27L		BH96S		BR64E	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/20/99		12/8/99		2/16/00		5/24/00	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.76		6.74		6.91		6.76		6.49		6.37		6.35		6.89		5.95		6.30		6.56		6.69		6.49	
88	82	Temperature (° C) (avg)	13.9		16.8		13.8		14.3		13.0		16.5		12.7		14.1		14.7		14.9		12.1		13.6		16.1	
89	83	Conductivity (um/hos)	721		650		551		646		663		756		399		683		565		587		631		657		637	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		0.73		0.77		2.50		2.54		1.96		2.18		2.42		1.12		0.90	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4		CB49H		CL03I		CT55E		DE68J		DM52A		DW48D		ED23D		EM85E		ES04E		EZ03L	
5		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02		08/28/02		11/12/02	
86	**FIELD PARAMETERS**																				
87	pH (avg)	6.71		5.46		6.27		6.72		6.91		6.61		6.62		6.58		6.93		6.61	
88	Temperature (° C) (avg)	14.7		12.8		13.9		13.7		15.7		13.4		13.8		15.3		15.5		14.1	
89	Conductivity (um/hos)	584		578		574		619		594		584		592		467		416		456	
90	Dissolved oxygen (mg/L) (avg)	1.10		1.02		0.62		1.12		1.30		3.69		6.76		3.17		1.32		1.19	
91																					
92	**DIOXINS AND FURANS (ng/L)**																				
93	**Method 8290**																				
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																					
120																					
121																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4			S177J		T176Q		U235K		V224P		W371L		Y314J		Z225P		Z960D		AH49D		AU22I		BC27L		BH96S		BR64E	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/20/99		12/8/99		2/16/00		5/24/00	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		J2		J2		J2		J2		J2		J2		J2		J2		J2		J2	
4		CB49H		CL03I		CT55E		DE68J		DM52A		DW48D		ED23D		EM85E		ES04E		EZ03L	
5		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02		08/28/02		11/12/02	
122	**PAHs (µg/L)**																				
123	**EPA Method SW8270 SIM**																				
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D
4			S167L		T176F		U235U		V208G		W371H		Y336H		Z225D		Z960H		AH27H		AU45K		BC21AC		BH75H		BR55F
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	**0.60**		0.25	U	0.25	U	0.25	U	0.25	U	**0.16**	J1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	15	Isophorone	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10
24	18	Naphthalene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
25	19	2-Methylnaphthalene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	22	Acenaphthene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	23	Dibenzofuran	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	24	Fluorene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	UJ	3.5	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		**6.5**		1.0	U	1.0	U	1.0
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.36**		0.25	U	0.25	U	0.25	U	**0.67**		0.25	U	0.25	U	0.25
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	**0.004**		**0.006**		0.05	U	0.05	U	**0.006**		**0.006**		**0.007**		**0.007**		**0.005**		**0.006**		**0.006**		**0.008**		**0.006**
65	59	Chromium (6010)	0.005	U	**0.007**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.007**		**0.006**		0.005	U	0.005

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																						
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D	
4			CB49B		CK77E		CT37C		DE68E		DM52D		DW48L		ED16I		EM75H		ER92D		EY88F	
5			8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
7	**CHLORINATED PHENOLS (µg/L)**																					
8	**EPA Method SW8040**																					
9	Pentachlorophenol	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.26**		**0.26**		0.25	U	0.27	U	0.25	U
10	2,4,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																						
17	**SEMIVOLATILES (µg/L)**																					
18	**EPA Method SW8270**																					
19	Phenol	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2	U
20	4-Methylphenol	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
21	Isophorone	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.2	U	3	U
23	Benzoic Acid	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	53	U	50	U
24	Naphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
25	2-Methylnaphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5	U
28	Acenaphthene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
29	Dibenzofuran	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
30	Fluorene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
31	Pentachlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.3	U	4	U
33																						
34	**VOLATILES (µg/L)**																					
35	**EPA Method SW8260**																					
36	Acetone	U	5.0	U	5.0	U	7.6	U	5.0	U	5.0	U	**20**		**6.9**		**6.4**		**16**		5	U
37	Carbon Disulfide	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
49	n-Propylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
52	4-Isopropyltoluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
54	Naphthalene	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																					
57	**Method OR-DEQ**																					
58	**TPH-Diesel**	U	0.25	U	0.25	U	**0.27**		NA		NA		NA		0.25	U	NA		NA		NA	
59	**TPH-D Motor Oil**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																						
62	**PRIORITY POLLUTANT**																					
63	**METALS (mg/L)**																					
64	Arsenic (7060)		**0.006**		**0.005**		**0.006**		**0.005**		**0.006**		**0.006**		**0.006**		**0.005**		**0.006**		0.05	U
65	Chromium (6010)	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D
4			S167L		T176F		U235U		V208G		W371H		Y336H		Z225D		Z960H		AH27H		AU45K		BC21AC		BH75H		BR55F
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00
66	60	Copper (6010)	0.002	U	**0.009**		**0.004**		**0.003**		0.002	U	0.004		0.002	U	0.002	U	0.002	U	**0.007**		**0.003**		**0.003**		0.002
67	61	Lead (7421)	0.001	U	**0.002**		0.02	U	0.02	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.003**		**0.001**		**0.002**		**0.001**
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	63	Zinc (6010)	0.004	U	**0.019**	J2	**0.021**		**0.010**		**0.008**	J2	**0.014**		**0.006**		**0.009**	J	0.007	U	**0.021**		**0.012**		**0.017**		**0.007**
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	**69.1**		**71.1**		**72.9**		**65.8**		NA		NA		NA		**63.4**		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	**40.5**		**42.6**		**43.1**		**37.0**		NA		NA		NA		**38.6**		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	**1.9**		**2.0**		**2.0**		**1.1**		NA		NA		NA		**1.5**		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	**15.3**		**16.4**		**16.3**		**15.9**		NA		NA		NA		**15.1**		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**360**		**350**		**360**		**370**		NA		NA		NA		**360**		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**360**		**350**		**360**		**370**		NA		NA		NA		**360**		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**400**	J2	**400**		**370**	J2	**310**		**350**		**310**		**340**		**340**		**360**		**360**		**360**		**350**
80	74	Chloride (mg/L) (EPA 325.2)	**3.2**	J	**3.0**		**3.5**		**3.3**		**3.9**		**2.0**		**2.8**		**3.6**		**1.6**		**3.2**		**3.7**		**3.5**		**10**
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.012**	J	0.010	U	**0.017**		**0.021**		NA		NA		NA		0.010	U	NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	0.010	U	NA		NA		NA		**0.020**		NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.012**	J	0.010	U	**0.017**		**0.021**		NA		NA		NA		**0.020**		NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	**3.4**	J	2.5	U	2.5	U	2.5	U	NA		NA		NA		**7.2**		NA		NA		NA		NA		NA
85	79																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D	
4			CB49B		CK77E		CT37C		DE68E		DM52D		DW48L		ED16I		EM75H		ER92D		EY88F	
5			8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
66	Copper (6010)	U	0.002	U	**0.002**	J2	0.002	U	0.002	U	0.002	U	0.003	U	**0.005**		0.002	U	**0.005**		**0.003**	
67	Lead (7421)		0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	**0.005**		**0.002**		0.02	U
68	Nickel (6010)	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)		**0.011**		**0.007**		**0.007**		0.006	U	0.006	U	**0.01**		**0.011**		**0.006**		**0.011**		**0.009**	
70																						
71	**MAJOR IONS AND CONVENTIONALS**																					
72	Calcium (mg/L) (6010)		NA		NA		**51.5**		**53.8**		**50.2**		**45.3**		**51.6**		NA		NA		NA	
73	Magnesium (mg/L) (6010)		NA		NA		**32.5**		**33.0**		**32.0**		**29.2**		**34.0**		NA		NA		NA	
74	Potassium (mg/L) (6010)		NA		NA		**1.1**		**1.3**		**1.4**		**1.3**		**1.8**		NA		NA		NA	
75	Sodium (mg/L) (6010)		NA		NA		**13.0**		**12.9**		**13.3**		**12.4**		**14.4**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA		NA		**300**		NA		NA		NA		**280**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		**300**		NA		NA		NA		**280**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**380**		**360**		**380**		**360**		**360**		**320**		**320**		**300**		**340**		**320**	
80	Chloride (mg/L) (EPA 325.2)		**3.2**		**3.2**		**3.0**		**3.2**		**3.1**		**2.6**		**3.0**		**1.6**		**2.6**		**2.7**	
81	N-Nitrate (mg-N/L) (Calculated)		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA		NA		0.010	U	NA		NA		NA		**0.010**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA		NA		0.010	UJ	NA		NA		NA		**0.017**		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA		NA		**11**		NA		NA		NA		**6.1**		NA		NA		NA	
85																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D
4			S167L		T176F		U235U		V208G		W371H		Y336H		Z225D		Z960H		AH27H		AU45K		BC21AC		BH75H		BR55F
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.91		6.99		7.14		6.94		6.64		6.61		6.45		6.97		6.05		6.90		6.36		6.88		6.65
88	82	Temperature (° C) (avg)	14.1		16.5		14.4		14.1		12.7		16.0		13.8		14.6		16.4		15.9		14.1		14.7		14.7
89	83	Conductivity (um/hos)	678		654		576		594		522		633		137		586		459		488		536		521		482
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		0.95		2.22		2.43		2.41		0.76		3.26		1.89		0.97
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120																											
121																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D	
4			CB49B		CK77E		CT37C		DE68E		DM52D		DW48L		ED16I		EM75H		ER92D		EY88F	
5			8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
86	**FIELD PARAMETERS**																					
87	pH (avg)		6.55		5.47		6.64		6.96		7.11		6.86		6.36		6.86		6.96		7.03	
88	Temperature (° C) (avg)		15.2		14.0		15.0		15.6		16.3		14.3		14.1		16.0		16.0		14.9	
89	Conductivity (um/hos)		553		481		476		484		503		467		445		451		389		495	
90	Dissolved oxygen (mg/L) (avg)		1.78		2.23		1.51		1.99		1.34		4.23		4.78		5.36		1.91		2.59	
91																						
92	**DIOXINS AND FURANS (ng/L)**																					
93	**Method 8290**																					
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D
4			S167L		T176F		U235U		V208G		W371H		Y336H		Z225D		Z960H		AH27H		AU45K		BC21AC		BH75H		BR55F
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D		LW1D	
4			CB49B		CK77E		CT37C		DE68E		DM52D		DW48L		ED16I		EM75H		ER92D		EY88F	
5			8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
122	**PAHs (µg/L)**																					
123	**EPA Method SW8270 SIM**																					
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D
4			S177F		T176V		U235S		V224M		W391H		Y336C		Z225H		Z960M		AH76I		AU36C		BC27B		BH96K		BR55I
5			4/2/97		7/16/97		10/23/97		1/29/98		5/20/98		8/18/98		11/13/98		2/18/99		5/19/99		9/21/99		12/7/99		2/18/00		5/23/00
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	**0.23**	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		1.0	U	1.0
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	**5.3**	J2	5.4	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	**4.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
40	34	Bromoform	1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	1.0
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.38**		**0.32**
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	**0.010**		**0.009**		0.05	U	0.05	U	**0.018**		**0.014**		**0.015**		**0.017**		**0.017**		**0.017**		**0.017**		**0.021**		**0.019**
65	59	Chromium (6010)	0.005	U	**0.164**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005

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GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
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TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																						
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D	
4			CB49E		CK77G		CT55C		DE68H		DM52C		DW48A		ED34F		EM85A		ES04B		EZ03A	
5			8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02		08/28/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																					
8	**EPA Method SW8040**																					
9	Pentachlorophenol	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**3.0**		**0.76**		0.25	U	0.29	U	0.25	U
10	2,4,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																						
17	**SEMIVOLATILES (µg/L)**																					
18	**EPA Method SW8270**																					
19	Phenol	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.3	U	2.2	U
20	4-Methylphenol	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
21	Isophorone	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.5	U	3.3	U
23	Benzoic Acid	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	58	U	54	U
24	Naphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
25	2-Methylnaphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.8	U	5.4	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.8	U	5.4	U
28	Acenaphthene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
29	Dibenzofuran	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
30	Fluorene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
31	Pentachlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**26**		5.0	U	5.8	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		4.0	U	4.0	U	4.7	U	4.3	U
33																						
34	**VOLATILES (µg/L)**																					
35	**EPA Method SW8260**																					
36	Acetone	U	5.0	U	**15**			R	**23**		**38**		**80**		**10**		**50**		**13**		5	U
37	Carbon Disulfide	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
49	n-Propylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
52	4-Isopropyltoluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
54	Naphthalene	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																					
57	**Method OR-DEQ**																					
58	**TPH-Diesel**		0.25	U	0.25	U	**0.28**		NA		NA		NA		NA		NA		NA		NA	
59	**TPH-D Motor Oil**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																						
62	**PRIORITY POLLUTANT**																					
63	**METALS (mg/L)**																					
64	Arsenic (7060)		**0.017**		**0.016**		**0.015**		**0.016**		**0.018**		**0.020**		**0.016**		**0.019**		**0.016**		0.05	U
65	Chromium (6010)	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.010**		0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D
4			S177F		T176V		U235S		V224M		W391H		Y336C		Z225H		Z960M		AH76I		AU36C		BC27B		BH96K		BR55I
5			4/2/97		7/16/97		10/23/97		1/29/98		5/20/98		8/18/98		11/13/98		2/18/99		5/19/99		9/21/99		12/7/99		2/18/00		5/23/00
66	60	Copper (6010)	**0.003**		**0.164**		0.002	U	**0.004**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002
67	61	Lead (7421)	0.001	U	**0.062**		0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
68	62	Nickel (6010)	0.01	U	**0.12**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	63	Zinc (6010)	**0.021**		**0.464**		**0.016**		**0.015**		**0.009**	J2	**0.011**		**0.007**		**0.012**	J	**0.009**		**0.012**		0.010	U	**0.011**		0.006
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	**54.4**		**82.6**		**58.7**		**61.3**		NA		NA		NA		**62.7**		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	**26.1**		**55.4**		**27.7**		**28.4**		NA		NA		NA		**29.0**		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	**3.4**		**11.5**		**3.9**		**3.7**		NA		NA		NA		**3.5**		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	**51.0**		**92.1**		**35.7**		**27.8**		NA		NA		NA		**17.8**		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**370**		**340**	J2	**340**		**360**		NA		NA		NA		**350**		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**370**		**340**	J2	**340**		**360**		NA		NA		NA		**350**		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**360**	J2	**350**		**360**		**380**		**340**		**330**		**380**		**340**		**340**		**360**		**360**		**360**
80	74	Chloride (mg/L) (EPA 325.2)	**4.8**		**4.3**		**4.9**		**3.9**		**4.7**		**3.1**		**3.5**		**5.3**		**3.5**		**3.4**		**4.5**		**4.3**		**4.4**
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.012**		0.010	U	**0.026**		**0.023**	J2	NA		NA		NA		0.010	U	NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.012**	J	**0.012**	J2	**0.014**		0.010	UJ	NA		NA		NA		**0.021**		NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.024**		0.010	U	**0.040**		**0.023**	J2	NA		NA		NA		**0.020**		NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	**12**	J	**4.3**		2.5	U	**2.6**		NA		NA		NA		**5.4**		NA		NA		NA		NA		NA
85	79																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D	
4			CB49E		CK77G		CT55C		DE68H		DM52C		DW48A		ED34F		EM85A		ES04B		EZ03A	
5			8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02		08/28/02		11/12/02	
66	Copper (6010)	U	0.002	U	**0.004**	J2	0.002	U	0.002	U	0.002	U	0.002	U	**0.004**		**0.002**		**0.003**		**0.002**	
67	Lead (7421)	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	0.001	U	0.001	U	0.02	U
68	Nickel (6010)	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	U	**0.015**		**0.017**		**0.007**		0.006	U	**0.012**		**0.013**		**0.008**		**0.008**		**0.014**		0.006	U
70																						
71	**MAJOR IONS AND CONVENTIONALS**																					
72	Calcium (mg/L) (6010)		NA		NA		**61.4**		**62.1**		**55.1**		**57.3**		**60.9**		NA		NA		NA	
73	Magnesium (mg/L) (6010)		NA		NA		**27.5**		**28.4**		**25.4**		**26.3**		**27.6**		NA		NA		NA	
74	Potassium (mg/L) (6010)		NA		NA		**3.2**		**3.5**		**3.4**		**3.2**		**3.9**		NA		NA		NA	
75	Sodium (mg/L) (6010)		NA		NA		**13.4**		**13.4**		**12.6**		**13.2**		**14.5**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA		NA		**330**		NA		NA		NA		**350**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		**330**		NA		NA		NA		**350**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**410**		**350**		**360**		**370**		**310**		**330**		**390**		**310**		**380**		**380**	
80	Chloride (mg/L) (EPA 325.2)		**3.5**		**6.9**		**3.3**		**6.2**		**4.5**		**3.4**		**3.7**		**3.4**		**3.4**		**3.5**	
81	N-Nitrate (mg-N/L) (Calculated)		NA		NA		**0.012**		NA		NA		NA		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA		NA		0.010	U	NA		NA		NA		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA		NA		**0.012**		NA		NA		NA		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA		NA		**6.5**		NA		NA		NA		**5.5**		NA		NA		NA	
85																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D
4			S177F		T176V		U235S		V224M		W391H		Y336C		Z225H		Z960M		AH76I		AU36C		BC27B		BH96K		BR55I
5			4/2/97		7/16/97		10/23/97		1/29/98		5/20/98		8/18/98		11/13/98		2/18/99		5/19/99		9/21/99		12/7/99		2/18/00		5/23/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.76		6.74		6.59		6.87		6.48		6.40		6.21		6.58		6.08		6.44		6.31		6.30		6.55
88	82	Temperature (° C) (avg)	12.7		16.2		13.4		16.5		13.3		14.2		13.3		12.4		13.9		15.5		12.2		12.3		16.0
89	83	Conductivity (um/hos)	706		646		627		668		504		673		159		695		635		588		657		667		627
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		2.21		1.60		2.22		2.47		1.99		2.10		2.44		2.05		1.49
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120																											
121																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D	
4			CB49E		CK77G		CT55C		DE68H		DM52C		DW48A		ED34F		EM85A		ES04B		EZ03A	
5			8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02		08/28/02		11/12/02	
86	**FIELD PARAMETERS**																					
87	pH (avg)		5.92		5.58		6.29		6.56		6.54		6.47		6.50		6.30		6.45		6.39	
88	Temperature (° C) (avg)		14.0		12.7		12.4		13.6		14.4		12.7		12.5		14.4		15.2		13.3	
89	Conductivity (um/hos)		629		624		638		655		628		628		617		629		595		664	
90	Dissolved oxygen (mg/L) (avg)		1.04		1.28		0.60		0.92		11.14		3.61		7.98		4.43		1.20		1.94	
91																						
92	**DIOXINS AND FURANS (ng/L)**																					
93	**Method 8290**																					
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D
4			S177F		T176V		U235S		V224M		W391H		Y336C		Z225H		Z960M		AH76I		AU36C		BC27B		BH96K		BR55I
5			4/2/97		7/16/97		10/23/97		1/29/98		5/20/98		8/18/98		11/13/98		2/18/99		5/19/99		9/21/99		12/7/99		2/18/00		5/23/00
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																						
2																						
3			LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D		LW3D	
4			CB49E		CK77G		CT55C		DE68H		DM52C		DW48A		ED34F		EM85A		ES04B		EZ03A	
5			8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02		08/28/02		11/12/02	
122	**PAHs (µg/L)**																					
123	**EPA Method SW8270 SIM**																					
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
2							Dup of LW4D										Dup of LW4D				Dup of LW4D			
3			LW4D		LW4D		LW40D		LW4D		LW4D		LW4D (a)		LW4D		LW40D		LW4D		LW40D		LW4D	
4			S167I		T176M		T176L		U235N		V232F		B802035-02		W391E		W391I		Y314E		Y314B		Z225J	
5			4/1/97		7/16/97		7/16/97		10/22/97		1/30/98		1/30/98		5/20/98		5/20/98		8/17/98		8/17/98		11/14/98	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	450		8200		7200		8700		14000		16500		4300		4400		3300		3300		2400	
10	4	2,4,6-Trichlorophenol	0.44		4.0		3.7		4.8		8.8		NA		5.3		5.4		6.3		6.5		20	J2
11	5	2,3,6-Trichlorophenol	0.29	U	1.8	U	1.8	U	0.73	U	0.25	U	NA		0.25	U	0.25	U	0.82	U	0.90	U	0.46	U
12	6	2,4,5-Trichlorophenol	11	U	39	U	30	U	76	U	39		NA		90		90		51	U	51	U	60	U
13	7	2,3,4-Trichlorophenol	0.28	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	20		880		770		600		940		746		240		250		270		280		210	J2
15	9	2,3,4,5-Tetrachlorophenol	6.1		29		26		19		20		NA		50	U	50	U	16		14		8.4	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	150		180		200		58		30		100	U	16		17		10		8.1		7.7	
20	14	4-Methylphenol	11		33		32		1.0	U	8.7		100	U	16		15		1.0	U	1.0	U	10	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.8		2.3		NA		1.0	U	1.0	U	1.1		1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	200	U	17	J2	18	J2	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	22		28	J2	47	J2	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	35		44		46		36		30		NA		16	J2	21	J2	18	J2	23	J2	28	
25	19	2-Methylnaphthalene	52		67		74		45		44		NA		24	J2	32	J2	42		49		57	
26	20	2,4,6-Trichlorophenol	5.0	U	8.0		9.4		7.5		9.3		100	U	7.3	J2	9.4	J2	5.0	U	5.0	U	18	J2
27	21	2,4,5-Trichlorophenol	14		43		49		69		78		100	U	57		60		7.4		6.7		69	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	390		10000		12000		18000		16000		13500		5300		5200		3100		2900		4600	
32	26	bis(2-Ethylhexyl)phthalate	10	UJ	1.0	U	1.0	U	2.0		1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	16		42		43		25		29		NA		17		17		11		9.2		12	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	12		12		5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	10		6.4		6.3		17		11		NA		5.4		5.4		10		9.6		5.7	
42	36	Ethylbenzene	140		190		190		180		130		NA		12		13		100		95		93	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	390		580		600		730		500		NA		450		450		320		320		340	
45	39	o-Xylene	77		140		140		150		100		NA		110		110		120		95		94	
46	40	1,3,5-Trimethylbenzene	170		190		180		330		140		NA		160		150		180		170		120	
47	41	1,2,4-Trimethylbenzene	580		630		720		1100	J2	560		NA		480		550		590		570		460	J2
48	42	Isopropylbenzene	110		120		120		140	J2	81		NA		7.5		7.4		100		85		54	
49	43	n-Propylbenzene	140		160		150		190		110		NA		7.6		7.3		120		110		78	
50	44	tert-Butylbenzene	1.0	U	1.0	U	4.1	J2	3.8		2.6		NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	15		20		18		18	J2	12		NA		1.0	U	1.0	U	22	J2	1.0	UJ	1.0	U
52	46	4-Isopropyltoluene	10		15		14		14	J2	10		NA		5.4		5.4		15		12		8.5	
53	47	n-Butylbenzene	14		20		18		17	J2	13		NA		4.4	U	4.2	U	21	J2	16	J2	12	J2
54	48	Naphthalene	54		87		84		92	J2	78		NA		41		41		50		48		28	
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	7.2		12		12		15		11		NA		7.2		6.8		6.5	J2	8.2	J2	4.6	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	0.024		0.025		0.025		0.05	U	0.05	U	NA		0.028		0.028		0.028		0.029		0.028	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
2		Dup of LW4D				Dup of LW4D						Dup of LW4D				Dup of LW4D								
3		LW40D		LW4D		LW40D		LW4D		LW4D		LW40D		LW4D		LW40D		LW4D		LW4D		LW4D		LW4D
4		Z225L		Z960P		Z960K		AH49H		AU45G		AU45I		BC21J		BC27P		BH96E		BR55D		CB68D		CL03G
5		11/14/98		2/17/99		2/17/99		5/18/99		9/22/99		9/22/99		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00
7	**CHLORINATED PHENOLS (µg/L)**																							
8	**EPA Method SW8040**																							
9	Pentachlorophenol	**2300**		**2300**		**2400**		**2.5**		**0.85**	J2	**0.58**	J2	**1.5**	J2	**3.4**	J2	**0.60**		**0.41**	J2	**0.30**		0.25
10	2,4,6-Trichlorophenol	**16**	J2	**9.6**	J	**13**	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
11	2,3,6-Trichlorophenol	0.47	U	1.2	U	1.1	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
12	2,4,5-Trichlorophenol	26	U	80	U	48	U	0.39	U	0.25	U	0.25	U	0.34	U	0.69	U	0.25	U	0.25	U	0.41	U	0.25
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**160**	J2	**130**		**140**		**0.26**		0.25	U	0.25	U	**1.4**	J2	**3.0**	J2	0.25	U	0.25	U	0.25	U	0.25
15	2,3,4,5-Tetrachlorophenol	**8.4**		**67**	J	**42**	J	**0.49**		0.25	U	0.25	U	0.25	U	**0.19**	J1	0.25	U	0.25	U	0.25	U	0.25
16																								
17	**SEMIVOLATILES (µg/L)**																							
18	**EPA Method SW8270**																							
19	Phenol	**7.6**		**23**		**25**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	**110**		2.0
20	4-Methylphenol	**9.4**		**7.5**		**7.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	**11**		10
24	Naphthalene	**28**		**23**		**25**		1.0	U	**27**	J2	**14**	J2	**19**		**19**		**24**		**10**		**11**		**5.4**
25	2-Methylnaphthalene	**58**		**64**		**65**		1.0	U	**41**	J2	**22**	J2	**30**		**30**		**30**		**18**		**18**		**11**
26	2,4,6-Trichlorophenol	**20**	J2	**12**		**11**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	2,4,5-Trichlorophenol	**66**		**59**		**55**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	Pentachlorophenol	**3800**		**4000**		**3700**		**6.5**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**8.9**		5.0
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**0.7**	J1	**0.7**	J1	1.0	U	1.0	U	1.0	U	2.8
33																								
34	**VOLATILES (µg/L)**																							
35	**EPA Method SW8260**																							
36	Acetone	**13**		**16**		**15**		**16**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	25	U	17
37	Carbon Disulfide	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0
38	2-Butanone	5.0	U	15	U	**7.4**		**8.2**		**28**		**32**		5.0	U	5.0	U	5.0	U	5.0	U	25	U	**14**
39	Benzene	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		5.0	U	1.0
40	Bromoform	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0
41	Toluene	**5.0**		**6.0**		**6.5**		**11**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.4**		5.0	U	1.0
42	Ethylbenzene	**80**		**52**		**62**		**220**		**39**		**38**		**21**		**21**		**18**		**22**		**39**		**1.3**
43	Styrene	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0
44	m,p-Xylene	**300**		**320**		**320**		**720**		**110**		**110**		**88**		**90**		**76**		**100**		**120**		**3.6**
45	o-Xylene	**78**		**84**		**95**		**130**		**5.4**		**4.5**		**20**		**20**		**8.1**		**11**		**13**		1.0
46	1,3,5-Trimethylbenzene	**99**		**170**		**140**		**160**		**70**		**70**		**94**		**96**		**90**		**70**		**50**		**12**
47	1,2,4-Trimethylbenzene	**590**	J2	**550**		**520**		**700**		**320**		**310**		**260**		**280**		**290**		**300**		**270**		**240**
48	Isopropylbenzene	**46**		**42**		**43**		**92**		**65**		**68**		**40**		**39**		**79**		**54**		**62**		**56**
49	n-Propylbenzene	**65**		**51**		**54**		**130**		**69**		**71**		**45**		**45**		**87**		**61**		**76**		**60**
50	tert-Butylbenzene	1.0	U	**3.0**		**2.9**		**4.3**		1.0	U	1.0	U	**2.0**		**2.0**		**4.2**		**2.6**		5.0	U	**2.9**
51	sec-Butylbenzene	1.0	U	**8.3**		**9.2**		**16**		**14**		**14**		**7.3**		**7.3**		**15**		**9.8**		**11**		**9.1**
52	4-Isopropyltoluene	**6.8**		**8.3**		**8.1**		**11**		**7.6**		**6.9**		**7.3**		**7.5**		**6.6**		**4.3**		**7.6**		1.0
53	n-Butylbenzene	**8.9**	J2	**9.7**		**10**		**16**		12	U	12	U	8.0	U	8.3	U	**14**		9.2	U	9.7	U	**7.0**
54	Naphthalene	**28**		**41**		**44**		**57**		**34**		**33**		**28**		**30**		**50**		**34**		**26**		**12**
55																								
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																							
57	**Method OR-DEQ**																							
58	**TPH-Diesel**	**4.6**		**6.9**		**7.3**		**5.0**		**4.2**	J2	**3.2**	J2	**3.1**		**2.9**		**3.8**		**2.8**		**3.3**		**5.4**
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.50
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61																								
62	**PRIORITY POLLUTANT**																							
63	**METALS (mg/L)**																							
64	Arsenic (7060)	**0.030**		**0.030**		**0.029**		**0.029**		**0.030**		**0.033**		**0.024**		**0.025**		**0.030**		**0.025**		**0.029**		**0.028**
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.007**		**0.008**		0.005	U	0.005	U	0.005	U	0.005

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL
2																		
3			LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D	
4			CT67D		DE87K		DM30D		DW29G		ED30H		EN00H		ER93L		EZ17F	
5			2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
7	**CHLORINATED PHENOLS (µg/L)**																	
8	**EPA Method SW8040**																	
9	Pentachlorophenol	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.3	U	0.25	U
10	2,4,6-Trichlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																		
17	**SEMIVOLATILES (µg/L)**																	
18	**EPA Method SW8270**																	
19	Phenol	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.4	U	2.3	U
20	4-Methylphenol	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
21	Isophorone	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.6	U	3.4	U
23	Benzoic Acid	U	10	U	10	U	10	U	30	U	50	U	50	U	60	U	57	U
24	Naphthalene		**2.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
25	2-Methylnaphthalene		**11**		**3.6**		**3.3**		**1.4**		**1.8**		**1.6**		1.2	U	1.1	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.7	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.7	U
28	Acenaphthene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
29	Dibenzofuran	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
30	Fluorene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
31	Pentachlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.7	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.8	U	4.5	U
33																		
34	**VOLATILES (µg/L)**																	
35	**EPA Method SW8260**																	
36	Acetone	U	5.0	U	**22**		**42**		**77**		**14**		20	U	**8.2**		9	U
37	Carbon Disulfide	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone		**26**		**14**		5.0	U	5.0	U	**14**		5.0	U	**13**	M	5	U
39	Benzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene		**1.3**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene		**3.0**		**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene		**14**		**13**		**3.4**		**1.4**		**2.4**		**1.1**		1	U	1	U
47	1,2,4-Trimethylbenzene		**120**		**84**		**49**		**7.2**		**48**		**9.5**		**15**		1	U
48	Isopropylbenzene		**58**		**31**		**14**		**3.9**		**14**		**5.0**		**5.7**		**4.2**	
49	n-Propylbenzene		**60**		**39**		**16**		**5.2**		**14**		**5.1**		**4.9**		**4.2**	
50	tert-Butylbenzene		**2.8**		**1.7**		**1.3**	M	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene		**9.8**		**7.4**		**4.1**		**1.6**		**2.8**		**1.7**		**1.8**		**1.3**	
52	4-Isopropyltoluene	U	1.0	U	**2.3**		1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene		**7.8**		**6.2**		**3.4**	M	1.7	U	**2.3**		1.6	U	**1.6**		**1.1**	M
54	Naphthalene		**8.9**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																	
57	**Method OR-DEQ**																	
58	**TPH-Diesel**		**4.4**		**3.5**		**3.4**		**1.8**		**4.0**		**2.8**		**3.2**		**2.4**	
59	**TPH-D Motor Oil**	U	NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA	
61																		
62	**PRIORITY POLLUTANT**																	
63	**METALS (mg/L)**																	
64	Arsenic (7060)		**0.03**		**0.028**		**0.032**		**0.022**		**0.040**		**0.027**		**0.028**		0.05	U
65	Chromium (6010)	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2							Dup of LW4D										Dup of LW4D				Dup of LW4D			
3			LW4D		LW4D		LW40D		LW4D		LW4D		LW4D (a)		LW4D		LW40D		LW4D		LW40D		LW4D	
4			S167I		T176M		T176L		U235N		V232F		B802035-02		W391E		W391I		Y314E		Y314B		Z225J	
5			4/1/97		7/16/97		7/16/97		10/22/97		1/30/98		1/30/98		5/20/98		5/20/98		8/17/98		8/17/98		11/14/98	
66	60	Copper (6010)	**0.003**		**0.004**		**0.003**		**0.002**		**0.005**		NA		**0.002**		**0.002**		**0.003**		**0.003**		0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.001	U	0.02	U	0.02	U	NA		0.001	U	0.001	U	**0.001**		**0.001**		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.004	U	**0.008**	J2	**0.005**	J2	**0.023**		**0.014**		NA		0.004	U	**0.010**	J2	**0.006**		**0.010**		**0.007**	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	**49.9**		**49.7**		**51**		**45.6**		**42.2**		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**21.9**		**21.7**		**22.3**		**19.4**		**17.7**		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**1.2**		**1.0**		**1.0**		**1.2**		**1.0**		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**10.9**		**10.4**		**10.6**		**10.1**		**9.60**		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**240**		**200**		**200**		**200**		**140**		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**240**		**200**		**200**		**200**		**140**		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**240**	J2	**340**	J2	**260**		**250**	J2	NA		**240**		**230**		**240**		**270**		**270**	
80	74	Chloride (mg/L) (EPA 325.2)	**19**	J	**15**		**15**		**16**		**15**		NA		**13**		**12**		**13**		**12**		**11**	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	0.010	U	**0.025**		0.010	UJ	NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.026**	J	**0.032**	J2	**0.025**	J2	**0.010**		**0.019**	J2	NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.019**	J	**0.01**		**0.01**		**0.035**		**0.010**	J2	NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**3.2**	J	2.5	U	**2.5**	U	2.5	U	2.5	U	NA		NA		NA		NA		NA		NA	
85	79																							

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
1																								
2		Dup of LW4D				Dup of LW4D						Dup of LW4D				Dup of LW4D								
3		LW40D		LW4D		LW40D		LW4D		LW4D		LW40D		LW4D		LW40D		LW4D		LW4D		LW4D		LW4D
4		Z225L		Z960P		Z960K		AH49H		AU45G		AU45I		BC21J		BC27P		BH96E		BR55D		CB68D		CL03G
5		11/14/98		2/17/99		2/17/99		5/18/99		9/22/99		9/22/99		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00
66	Copper (6010)	0.002	U	**0.005**		**0.005**		0.002	U	**0.004**		**0.003**		**0.011**		**0.012**		**0.007**		0.002	U	**0.002**		**0.004**
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.002**		**0.002**		**0.001**		0.001	U	0.001
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01
69	Zinc (6010)	**0.006**		**0.009**	J	**0.008**	J	**0.005**		**0.007**	J2	**0.016**	J2	0.020	U	0.021	U	**0.019**		**0.008**		**0.020**		**0.013**
70																								
71	**MAJOR IONS AND CONVENTIONALS**																							
72	Calcium (mg/L) (6010)	NA		**50.4**		**51.7**		NA		NA		NA		NA		NA		NA		NA		NA		NA
73	Magnesium (mg/L) (6010)	NA		**21.6**		**22.0**		NA		NA		NA		NA		NA		NA		NA		NA		NA
74	Potassium (mg/L) (6010)	NA		**0.7**	J	**0.9**	J	NA		NA		NA		NA		NA		NA		NA		NA		NA
75	Sodium (mg/L) (6010)	NA		**10.6**		**10.9**		NA		NA		NA		NA		NA		NA		NA		NA		NA
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		**210**		**210**		NA		NA		NA		NA		NA		NA		NA		NA		NA
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		**210**		**210**		NA		NA		NA		NA		NA		NA		NA		NA		NA
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**280**		**360**		**320**		**310**		**300**		**270**		**260**		**290**		**270**		**270**		**360**		**370**
80	Chloride (mg/L) (EPA 325.2)	**13**		**17**		**18**		**12**		**12**		**12**		**13**		**14**		**12**		**12**		**9.8**		**16**
81	N-Nitrate (mg-N/L) (Calculated)	NA		**0.010**		0.010	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		**0.015**	J	**0.023**	J	NA		NA		NA		NA		NA		NA		NA		NA		NA
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		**0.025**	J	**0.018**	J	NA		NA		NA		NA		NA		NA		NA		NA		NA
84	Sulfate (mg/L) (EPA 375.2)	NA		**6.1**	J	**8.8**	J	NA		NA		NA		NA		NA		NA		NA		NA		NA
85																								

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL
1																		
2																		
3			LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D	
4			CT67D		DE87K		DM30D		DW29G		ED30H		EN00H		ER93L		EZ17F	
5			2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
66	Copper (6010)		**0.005**		**0.003**		**0.004**		**0.003**		**0.004**		**0.003**		**0.004**		**0.004**	
67	Lead (7421)	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.002**		0.02	U
68	Nickel (6010)	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)		**0.016**		**0.011**		0.012		**0.011**		**0.010**	J	**0.009**		**0.009**		**0.011**	
70																		
71	**MAJOR IONS AND CONVENTIONALS**																	
72	Calcium (mg/L) (6010)		**71.3**		**74.5**		**81.3**		**57.1**		**67.1**		**65.9**		NA		NA	
73	Magnesium (mg/L) (6010)		**30.1**		**31.0**		**35.2**		**25.2**		**31.9**		**29.4**		NA		NA	
74	Potassium (mg/L) (6010)		**1.6**		**1.4**		**1.5**		**1.8**		**1.0**		**1.3**		NA		NA	
75	Sodium (mg/L) (6010)		**14.5**		**14.5**		**16.5**		**16.4**		**15.9**		**18.2**		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		**360**		NA		NA		NA		**430**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		**360**		NA		NA		NA		**430**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**430**		**460**	J	**430**	J	**350**		**400**		**360**		**430**		**390**	
80	Chloride (mg/L) (EPA 325.2)		**24**	J	**18**		**18**		**12**		**14**	J	**15**		**13**		**15**	
81	N-Nitrate (mg-N/L) (Calculated)		0.010	U	NA		NA		NA		**0.012**		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		**0.037**	J	NA		NA		NA		**0.012**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		**0.045**		NA		NA		NA		**0.024**		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		**8.6**		NA		NA		NA		**9.5**		NA		NA		NA	
85																		

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2							Dup of LW4D										Dup of LW4D				Dup of LW4D			
3			LW4D		LW4D		LW40D		LW4D		LW4D		LW4D (a)		LW4D		LW40D		LW4D		LW40D		LW4D	
4			S167I		T176M		T176L		U235N		V232F		B802035-02		W391E		W391I		Y314E		Y314B		Z225J	
5			4/1/97		7/16/97		7/16/97		10/22/97		1/30/98		1/30/98		5/20/98		5/20/98		8/17/98		8/17/98		11/14/98	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.65		6.67		6.67		6.94		6.84		6.84		6.51		6.51		6.49		6.48		6.39	
88	82	Temperature (° C) (avg)	12.9		15.1		14.9		13.6		13.5		13.5		13.3		13.3		18.1		18.3		13.5	
89	83	Conductivity (um/hos)	559		491		490		375		381		381		368		367		557		560		120	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		NA		1.74		1.74		1.00		1.00		1.44	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		0.0027	U	NA		NA		NA		0.0049	U	NA		0.0023	U
95	89	Total TCDF	NA		NA		NA		NA		0.0027	U	NA		NA		NA		0.0049	U	NA		0.0023	U
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		0.0029	U	NA		NA		NA		0.0063	U	NA		0.0045	U
97	91	Total TCDD	NA		NA		NA		NA		0.0029	U	NA		NA		NA		0.0063	U	NA		0.0045	U
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		0.0018	U	NA		NA		NA		0.0035	U	NA		**0.0012**	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		0.0019	U	NA		NA		NA		0.0050	U	NA		0.0034	U
100	94	Total PeCDF	NA		NA		NA		NA		0.0019	U	NA		NA		NA		0.0043	U	NA		**0.0012**	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		0.0052	U	NA		NA		NA		0.0071	U	NA		0.0072	U
102	96	Total PeCDD	NA		NA		NA		NA		0.0052	U	NA		NA		NA		**0.019**		NA		0.0072	U
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		0.0024	U	NA		NA		NA		0.0880	U	NA		0.0059	U
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		0.0026	U	NA		NA		NA		0.0390	U	NA		0.0020	U
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		0.0049	U	NA		NA		NA		0.0088	U	NA		0.0049	U
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		0.0052	U	NA		NA		NA		**0.066**		NA		0.0036	U
107	101	Total HxCDF	NA		NA		NA		NA		0.0110	U	NA		NA		NA		**0.210**		NA		0.0041	U
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		0.0032	U	NA		NA		NA		0.0140	U	NA		0.0056	U
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		0.0044	U	NA		NA		NA		0.0097	U	NA		0.0043	U
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		0.0031	U	NA		NA		NA		0.0048	U	NA		0.0040	U
111	105	Total HxCDD	NA		NA		NA		NA		0.0036	U	NA		NA		NA		**0.043**		NA		0.0046	U
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		0.0140	U	NA		NA		NA		0.0140	U	NA		0.0038	U
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		0.0030	U	NA		NA		NA		0.0062	U	NA		0.0022	U
114	108	Total HpCDF	NA		NA		NA		NA		0.0220	U	NA		NA		NA		**0.022**		NA		0.0030	U
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		**0.0240**		NA		NA		NA		**0.031**		NA		**0.0095**	
116	110	Total HpCDD	NA		NA		NA		NA		**0.0400**		NA		NA		NA		**0.045**		NA		**0.0160**	
117	111	OCDF	NA		NA		NA		NA		**0.0140**		NA		NA		NA		**0.032**		NA		**0.0088**	
118	112	OCDD	NA		NA		NA		NA		**0.1500**		NA		NA		NA		**0.300**		NA		**0.0720**	
119																								
120																								
121																								

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
2		Dup of LW4D				Dup of LW4D						Dup of LW4D				Dup of LW4D								
3		LW40D		LW4D		LW40D		LW4D		LW4D		LW40D		LW4D		LW40D		LW4D		LW4D		LW4D		LW4D
4		Z225L		Z960P		Z960K		AH49H		AU45G		AU45I		BC21J		BC27P		BH96E		BR55D		CB68D		CL03G
5		11/14/98		2/17/99		2/17/99		5/18/99		9/22/99		9/22/99		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00
86	**FIELD PARAMETERS**																							
87	pH (avg)	6.37		6.86		6.85		5.88		5.99		6.60		6.68		6.65		6.72		6.66		6.02		5.96
88	Temperature (° C) (avg)	13.3		13.3		13.2		14.7		18.8		16.3		12.8		12.9		16.4		16.5		14.4		13.3
89	Conductivity (um/hos)	120		500		500		462		491		359		436		424		548		437		526		656
90	Dissolved oxygen (mg/L) (avg)	1.80		2.39		2.57		2.40		1.35		1.42		1.76		1.86		0.12		1.00		1.39		0.31
91																								
92	**DIOXINS AND FURANS (ng/L)**																							
93	**Method 8290**																							
94	2,3,7,8-TCDF	NA		0.0017	U	NA		0.0011	U	0.0018	U	NA		0.00068	U	NA		0.0034	U	NA		NA		NA
95	Total TCDF	NA		0.0017	U	NA		0.0011	U	0.0018	U	NA		0.00068	U	NA		0.0034	U	NA		NA		NA
96	2,3,7,8-TCDD	NA		0.0043	U	NA		0.0016	U	0.0031	U	NA		0.00130	U	NA		0.0058	U	NA		NA		NA
97	Total TCDD	NA		0.0043	U	NA		0.0016	U	0.0031	U	NA		0.00130	U	NA		0.0058	U	NA		NA		NA
98	1,2,3,7,8-PeCDF	NA		0.0028	U	NA		0.0021	U	0.0031	U	NA		0.00120	U	NA		0.0025	U	NA		NA		NA
99	2,3,4,7,8-PeCDF	NA		0.0036	U	NA		0.0027	U	0.0032	U	NA		0.00088	U	NA		0.0033	U	NA		NA		NA
100	Total PeCDF	NA		0.0032	U	NA		0.0024	U	0.0032	U	NA		0.00110	U	NA		0.0029	U	NA		NA		NA
101	1,2,3,7,8-PeCDD	NA		0.0046	U	NA		0.0023	U	0.0048	U	NA		0.00094	U	NA		0.0051	U	NA		NA		NA
102	Total PeCDD	NA		0.0046	U	NA		0.0023	U	0.0048	U	NA		0.00094	U	NA		0.0051	U	NA		NA		NA
103	1,2,3,4,7,8-HxCDF	NA		**0.0013**		NA		0.0035	U	0.0024	U	NA		0.00150	U	NA		0.0031	U	NA		NA		NA
104	1,2,3,6,7,8-HxCDF	NA		0.0024	U	NA		**0.0014**		0.0019	U	NA		0.00150	U	NA		0.0029	U	NA		NA		NA
105	2,3,4,6,7,8-HxCDF	NA		0.0036	U	NA		**0.0032**		**0.0024**		NA		0.0025	U	NA		0.0034	U	NA		NA		NA
106	1,2,3,7,8,9-HxCDF	NA		0.0044	U	NA		0.0039	U	0.0021	U	NA		0.00170	U	NA		0.0036	U	NA		NA		NA
107	Total HxCDF	NA		**0.0013**		NA		**0.0046**		**0.0024**		NA		0.0025	U	NA		0.0033	U	NA		NA		NA
108	1,2,3,4,7,8-HxCDD	NA		0.0054	U	NA		0.0051	U	0.0039	U	NA		0.00150	U	NA		0.0050	U	NA		NA		NA
109	1,2,3,6,7,8-HxCDD	NA		0.0037	U	NA		0.0052	U	0.0035	U	NA		0.00170	U	NA		0.0037	U	NA		NA		NA
110	1,2,3,7,8,9-HxCDD	NA		0.0036	U	NA		0.0039	U	0.0025	U	NA		0.00150	U	NA		0.0034	U	NA		NA		NA
111	Total HxCDD	NA		0.0042	U	NA		0.0047	U	0.0033	U	NA		0.00160	U	NA		0.0040	U	NA		NA		NA
112	1,2,3,4,6,7,8-HpCDF	NA		0.0026	U	NA		0.0039	U	0.0022	U	NA		0.0015	U	NA		0.0024	U	NA		NA		NA
113	1,2,3,4,7,8,9-HpCDF	NA		0.0045	U	NA		**0.0036**	U	0.0060	U	NA		0.00200	U	NA		0.0065	U	NA		NA		NA
114	Total HpCDF	NA		0.0036	U	NA		**0.0051**		0.0041	U	NA		**0.0036**	J1	NA		0.0044	U	NA		NA		NA
115	1,2,3,4,6,7,8-HpCDD	NA		**0.0055**		NA		**0.0110**		**0.0044**		NA		**0.0090**	J1	NA		0.0059	U	NA		NA		NA
116	Total HpCDD	NA		**0.0055**		NA		**0.0160**		**0.0044**		NA		**0.0160**	J1	NA		0.0040	U	NA		NA		NA
117	OCDF	NA		**0.0100**		NA		**0.0100**		0.0042	U	NA		**0.0058**	J1	NA		0.0048	U	NA		NA		NA
118	OCDD	NA		0.0420	U	NA		**0.0770**		**0.0440**		NA		0.0660	U	NA		**0.044**	J1	NA		NA		NA
119																								
120																								
121																								

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL
1																		
2																		
3			LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D	
4			CT67D		DE87K		DM30D		DW29G		ED30H		EN00H		ER93L		EZ17F	
5			2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
86	**FIELD PARAMETERS**																	
87	pH (avg)		6.49		6.91		6.94		6.61		6.48		6.65		7.04		6.31	
88	Temperature (° C) (avg)		13.8		14.7		15.4		13.3		14.2		14.4		15.8		14	
89	Conductivity (um/hos)		673		778		757		592		705		624		613		564	
90	Dissolved oxygen (mg/L) (avg)		0.19		0.48		0.98		4.41		7.10		4.00		1.24		0.37	
91																		
92	**DIOXINS AND FURANS (ng/L)**																	
93	**Method 8290**																	
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA	
119																		
120																		
121																		

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2							Dup of LW4D										Dup of LW4D				Dup of LW4D			
3			LW4D		LW4D		LW40D		LW4D		LW4D		LW4D (a)		LW4D		LW40D		LW4D		LW40D		LW4D	
4			S167I		T176M		T176L		U235N		V232F		B802035-02		W391E		W391I		Y314E		Y314B		Z225J	
5			4/1/97		7/16/97		7/16/97		10/22/97		1/30/98		1/30/98		5/20/98		5/20/98		8/17/98		8/17/98		11/14/98	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
1																								
2		Dup of LW4D				Dup of LW4D						Dup of LW4D				Dup of LW4D								
3		LW40D		LW4D		LW40D		LW4D		LW4D		LW40D		LW4D		LW40D		LW4D		LW4D		LW4D		LW4D
4		Z225L		Z960P		Z960K		AH49H		AU45G		AU45I		BC21J		BC27P		BH96E		BR55D		CB68D		CL03G
5		11/14/98		2/17/99		2/17/99		5/18/99		9/22/99		9/22/99		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00
122	**PAHs (µg/L)**																							
123	**EPA Method SW8270 SIM**																							
124	Naphthalene	NA		**22**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125	2-Methylnaphthalene	NA		**60**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126	Acenaphthylene	NA		0.10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127	Acenaphthene	NA		**0.44**	M	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128	Fluorene	NA		0.10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129	Anthracene	NA		0.10	U	NA		NA		NA		NA				NA		NA		NA		NA		NA
130	Dibenzofuran	NA		**0.34**	M	NA		NA		NA		NA				NA		NA		NA		NA		NA

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL
1																		
2																		
3			LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D		LW4D	
4			CT67D		DE87K		DM30D		DW29G		ED30H		EN00H		ER93L		EZ17F	
5			2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
122	**PAHs (µg/L)**																	
123	**EPA Method SW8270 SIM**																	
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2																										
3			LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4			S167G		T176I		U235R		V208I		W391D		Y314C		Z225B		Z960G		AH27I		AU45D		BC27F		BH96I	
5			3/31/97		7/15/97		10/22/97		1/28/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/17/00	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.42**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	**1.1**	J2	**1.3**		**1.2**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**4.6**	
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	**5.1**		5.0	U	**7.1**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	**2.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	**41**		**61**		**78**	J2	**76**		**56**		**96**		**93**		**32**		**31**		**52**		**43**		**68**	
49	43	n-Propylbenzene	**14**		**28**		**40**		**36**		**20**		**44**		**32**		**8.9**		**9.3**		**14**		**7.7**		**10**	
50	44	tert-Butylbenzene	**2.4**		**2.7**	J2	**2.8**		**2.3**		**2.8**		**3.8**		**3.2**		**2.0**		**2.4**		**3.5**		**3.0**		**4.1**	
51	45	sec-Butylbenzene	**5.7**		**8.3**		**8.5**	J2	**7.1**		**7.8**		**14**	J2	**9.7**		**3.6**		**5.4**		**10**		**8.2**		**12**	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	**1.6**		**2.8**		**2.8**	J2	**2.9**		2.7	U	**5.0**		**3.2**		**1.2**		**2.1**		3.0	U	2.3	U	**3.6**	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	**1.0**		**1.0**		**1.2**		**0.80**		**0.86**		**1.3**		**1.0**		**0.62**		**0.92**		**1.4**		**1.0**		**1.0**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.013**		**0.015**		0.05	U	0.05	U	**0.017**		**0.011**		**0.016**		**0.014**		**0.018**		**0.016**		**0.016**		**0.016**	
65	59	Chromium (6010)	0.005	U	0.005	U	**0.011**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																							
2																							
3		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4		BR64J		CB85E		CL03C		CT55B		DE87G		DM30B		DW29H		ED23H		EM85I		ER93C		EZ03E	
5		5/24/00		8/30/00		11/8/00		2/13/01		6/5/01		8/13/01		11/27/01		2/26/02		6/26/02		08/26/02		11/12/02	
6																							
7	**CHLORINATED PHENOLS (µg/L)**																						
8	**EPA Method SW8040**																						
9	Pentachlorophenol	0.25	U	0.25	U	0.25	U	**0.46**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.3	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																							
17	**SEMIVOLATILES (µg/L)**																						
18	**EPA Method SW8270**																						
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.4	U	2.2	U
20	4-Methylphenol	**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.6	U	3.3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	60	U	54	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.4	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.4	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.8	U	4.3	U
33																							
34	**VOLATILES (µg/L)**																						
35	**EPA Method SW8260**																						
36	Acetone	5.0	U	5.0	U	5.0	U		R	5.0	U	5.0	U	5.0	U	5.0	U	**6.8**		5	U	**16**	
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	**24**		**16**		**24**		**14**		**10**		**8.8**		**2.6**		**7.0**		**2.6**		**7.5**		**3.4**	
49	n-Propylbenzene	**4.4**		1.0	U	**2.8**		**1.4**		**1.1**		**1.4**		1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	**2.3**		**3.5**		**2.8**		**2.8**		**3.4**		**2.8**		**3.1**		**3.1**		**1.8**		**3.4**		**3.2**	
51	sec-Butylbenzene	**4.4**		**6.0**		**6.4**		**5.3**		**4.7**		**4.3**		**2.4**		**3.4**		**1.7**		**3.3**		**2.2**	
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	**1.7**	M	1.2	U	1.0	U	**1.3**	M	1.3	U	1.4	U	1.0	U	**1.2**	M	1.0	U	1	U	1	U
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
55																							
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	**Method OR-DEQ**																						
58	**TPH-Diesel**	**1.1**		**1.2**		**1.2**		**1.8**		**1.4**		**1.7**		**1.8**		**1.9**		**1.6**		**2.6**		**2.2**	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																							
62	**PRIORITY POLLUTANT**																						
63	**METALS (mg/L)**																						
64	Arsenic (7060)	**0.012**		**0.018**		**0.015**		**0.015**		**0.017**		**0.020**		**0.021**		**0.016**		**0.016**		**0.02**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4			S167G		T176I		U235R		V208I		W391D		Y314C		Z225B		Z960G		AH27I		AU45D		BC27F		BH96I	
5			3/31/97		7/15/97		10/22/97		1/28/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/17/00	
66	60	Copper (6010)	**0.004**		**0.003**		**0.014**		**0.002**		**0.003**		0.002	U	0.002	U	0.002	U	0.002	U	**0.002**		0.002	U	0.002	U
67	61	Lead (7421)	**0.001**		**0.002**		0.02	U	0.02	U	**0.001**		0.001	U	**0.002**		0.001	U	0.001	U	0.001	U	**0.001**		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.006**		**0.009**	J2	**0.045**		**0.011**		**0.017**	J2	**0.006**		**0.009**		**0.008**	J	0.007	U	**0.009**		**0.011**	U	**0.010**	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**47.2**		**44.2**		**49.1**		**41.8**		NA		NA		NA		**42.9**		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**19.9**		**19**		**20.3**		**16.3**		NA		NA		NA		**17.6**		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**3.0**		**2.7**		**3.5**		**2.4**		NA		NA		NA		**2.3**		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**15.6**		**13.9**		**14.1**		**12.1**		NA		NA		NA		**11.6**		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**250**		**190**		**210**		**200**		NA		NA		NA		**210**		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**250**		**190**		**210**		**200**		NA		NA		NA		**210**		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**260**	J2	**260**		**230**		**220**		**240**		**240**		**260**		**240**		**240**		**250**		**240**	
80	74	Chloride (mg/L) (EPA 325.2)	**8.4**	J	**4.1**		**3.9**		**2.7**		**3.3**		**2.0**		**2.6**		**4.2**		1.0	U	**3.1**		**4.3**		**2.8**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.016**	J	0.010	U	**0.013**		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.025**	J	**0.014**		**0.010**		**0.014**		NA		NA		NA		**0.018**		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.041**	J	0.010	U	**0.023**		**0.016**		NA		NA		NA		**0.017**		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**4.7**	J	2.5	U	2.5	U	2.5	U	NA		NA		NA		**5.5**		NA		NA		NA		NA	
85	79																									

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																							
2																							
3		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4		BR64J		CB85E		CL03C		CT55B		DE87G		DM30B		DW29H		ED23H		EM85I		ER93C		EZ03E	
5		5/24/00		8/30/00		11/8/00		2/13/01		6/5/01		8/13/01		11/27/01		2/26/02		6/26/02		08/26/02		11/12/02	
66	Copper (6010)	0.002	U	**0.002**		**0.006**		0.002	U	**0.003**		**0.003**		0.002	U	0.002	U	0.002	U	**0.002**		0.002	U
67	Lead (7421)	**0.001**		**0.002**		**0.002**		**0.001**		**0.002**		**0.002**		0.001	U	0.001	U	0.001	U	0.001	U	0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	**0.007**		**0.008**		**0.007**		**0.008**		**0.009**		0.006	U	**0.008**		0.006	U	**0.007**		0.006	U
70																							
71	**MAJOR IONS AND CONVENTIONALS**																						
72	Calcium (mg/L) (6010)	NA		NA		NA		**40.8**		**44.2**		**40.8**		**40.9**		**42.5**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		**16.1**		**18.4**		**16.8**		**16.5**		**17.6**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		**2.1**		**3.2**		**2.6**		**2.0**		**2.7**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		**10.3**		**11.5**		**10.4**		**10.3**		**11.1**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		**200**		NA		NA		NA		**220**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		**200**		NA		NA		NA		**220**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**230**		**240**		**220**		**290**	J	**240**	J	**220**	J	**250**		**260**		**240**		**270**		**310**	
80	Chloride (mg/L) (EPA 325.2)	**2.1**		**1.4**		**2.2**		**1.8**		**2.2**		**3.8**		**2.1**		**2.8**		**2.5**		**2.2**		**2.8**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		0.010	U	NA		NA		NA		**0.010**		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		0.010	U	NA		NA		NA		**0.023**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		0.010	U	NA		NA		NA		**0.033**	J	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		**3.3**		NA		NA		NA		2.5	U	NA		NA		NA	
85																							

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4			S167G		T176I		U235R		V208I		W391D		Y314C		Z225B		Z960G		AH27I		AU45D		BC27F		BH96I	
5			3/31/97		7/15/97		10/22/97		1/28/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/17/00	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.53		6.63		6.84		6.65		6.35		6.34		6.17		6.78		5.66		6.64		6.38		6.57	
88	82	Temperature (° C) (avg)	12.2		15.7		13.2		13.5		13.0		17.9		13.1		13.7		14.6		15.5		12.8		13.5	
89	83	Conductivity (um/hos)	504		501		377		431		369		559		134		448		360		398		409		420	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		1.85		NA		1.58		2.77		1.60		1.96		1.86		0.82	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		0.0027	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		0.0011-0.0028	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		0.0013	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		0.0011-0.0029	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		0.0035	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		0.0029	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		0.0013-0.0045	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		0.0052	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		0.0019-0.0061	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		0.0030	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		0.0032	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		0.0041	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		0.0047	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		0.0041	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		0.0051	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		0.0076	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		0.0041	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		0.0024-0.0089	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		0.0047	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		0.0054	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		0.0017-0.0069	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		**0.0250**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		**0.0360**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		**0.0350**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		**0.2400**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120																										
121																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																							
2																							
3		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4		BR64J		CB85E		CL03C		CT55B		DE87G		DM30B		DW29H		ED23H		EM85I		ER93C		EZ03E	
5		5/24/00		8/30/00		11/8/00		2/13/01		6/5/01		8/13/01		11/27/01		2/26/02		6/26/02		08/26/02		11/12/02	
86	**FIELD PARAMETERS**																						
87	pH (avg)	6.42		5.85		5.73		6.32		6.58		6.72		6.58		6.54		6.41		6.58		6.73	
88	Temperature (° C) (avg)	17.1		15.1		13.8		16.6		14.1		15.7		13.4		15.7		16.6		17.3		13.7	
89	Conductivity (um/hos)	421		398		360		408		428		413		410		381		331		373		499	
90	Dissolved oxygen (mg/L) (avg)	0.48		1.36		1.20		2.16		2.06		1.50		3.91		7.27		3.07		1.39		1.14	
91																							
92	**DIOXINS AND FURANS (ng/L)**																						
93	**Method 8290**																						
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																							
120																							
121																							

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4			S167G		T176I		U235R		V208I		W391D		Y314C		Z225B		Z960G		AH27I		AU45D		BC27F		BH96I	
5			3/31/97		7/15/97		10/22/97		1/28/98		5/20/98		8/17/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/17/00	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																							
2																							
3		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D		LW6D	
4		BR64J		CB85E		CL03C		CT55B		DE87G		DM30B		DW29H		ED23H		EM85I		ER93C		EZ03E	
5		5/24/00		8/30/00		11/8/00		2/13/01		6/5/01		8/13/01		11/27/01		2/26/02		6/26/02		08/26/02		11/12/02	
122	**PAHs (µg/L)**																						
123	**EPA Method SW8270 SIM**																						
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D	
4			AH76Q		AU45E		BC27G		BH96Q		BR64M		CB85F		CL03D		CT67B		DE87H		DM30F		DW29B		ED34J		EM85H	
5			5/19/99		9/22/99		12/7/99		2/16/00		5/25/00		8/30/00		11/8/00		2/14/01		6/5/01		8/14/01		11/27/01		2/28/02		6/26/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	**17**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.2	U	**2.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.1**		1.0	U	1.0	U	**3.1**		4.0	U	4.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**6.1**		5.0	U	**6.7**		**37**		**14**	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	**10**		**5.5**		**8.5**		**1.1**		**3.0**		**3.0**		1.0	U	**2.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	**8.4**		**8.7**		**3.8**		1.0	U	**1.2**		**2.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	**2.3**		**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.25**		0.25	U	**0.35**		0.25	U	**0.26**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.50	U	NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.25	U	NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.025**		**0.030**		**0.022**		**0.028**		**0.028**		**0.032**		**0.030**		**0.037**		**0.033**		**0.044**		**0.042**		**0.030**		**0.033**	
65	59	Chromium (6010)	**0.025**		**0.020**		**0.009**		**0.014**		0.005	U	**0.013**		**0.010**		**0.012**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

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DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW9D		LW9D	
4		ER93M		EZ03F	
5		08/27/02		11/12/02	
6					
7	**CHLORINATED PHENOLS (µg/L)**				
8	**EPA Method SW8040**				
9	Pentachlorophenol	0.28	U	0.25	U
10	2,4,6-Trichlorophenol	NA		NA	
11	2,3,6-Trichlorophenol	NA		NA	
12	2,4,5-Trichlorophenol	NA		NA	
13	2,3,4-Trichlorophenol	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA	
16					
17	**SEMIVOLATILES (µg/L)**				
18	**EPA Method SW8270**				
19	Phenol	2.2	U	2.3	U
20	4-Methylphenol	1.1	U	1.1	U
21	Isophorone	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.3	U	3.4	U
23	Benzoic Acid	56	U	57	U
24	Naphthalene	1.1	U	1.1	U
25	2-Methylnaphthalene	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	5.6	U	5.7	U
27	2,4,5-Trichlorophenol	5.6	U	5.7	U
28	Acenaphthene	1.1	U	1.1	U
29	Dibenzofuran	1.1	U	1.1	U
30	Fluorene	1.1	U	1.1	U
31	Pentachlorophenol	5.6	U	5.7	U
32	bis(2-Ethylhexyl)phthalate	4.4	U	4.6	U
33					
34	**VOLATILES (µg/L)**				
35	**EPA Method SW8260**				
36	Acetone	5	U	5	U
37	Carbon Disulfide	1	U	1	U
38	2-Butanone	5	U	5	U
39	Benzene	1	U	1	U
40	Bromoform	1	U	1	U
41	Toluene	1	U	1	U
42	Ethylbenzene	1	U	1	U
43	Styrene	1	U	1	U
44	m,p-Xylene	1	U	1	U
45	o-Xylene	1	U	1	U
46	1,3,5-Trimethylbenzene	1	U	1	U
47	1,2,4-Trimethylbenzene	1	U	1	U
48	Isopropylbenzene	1	U	1	U
49	n-Propylbenzene	1	U	1	U
50	tert-Butylbenzene	1	U	1	U
51	sec-Butylbenzene	1	U	1	U
52	4-Isopropyltoluene	1	U	1	U
53	n-Butylbenzene	1	U	1	U
54	Naphthalene	5	U	5	U
55					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	**Method OR-DEQ**				
58	**TPH-Diesel**	0.25	U	0.25	U
59	**TPH-D Motor Oil**	NA		NA	
60	**TPH-Gasoline**	NA		NA	
61					
62	**PRIORITY POLLUTANT**				
63	**METALS (mg/L)**				
64	Arsenic (7060)	**0.033**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D	
4			AH76Q		AU45E		BC27G		BH96Q		BR64M		CB85F		CL03D		CT67B		DE87H		DM30F		DW29B		ED34J		EM85H	
5			5/19/99		9/22/99		12/7/99		2/16/00		5/25/00		8/30/00		11/8/00		2/14/01		6/5/01		8/14/01		11/27/01		2/28/02		6/26/02	
66	60	Copper (6010)	**0.027**		**0.019**		**0.011**		**0.016**		**0.004**		**0.013**		**0.015**		**0.014**		**0.009**		**0.002**		**0.005**		**0.004**		**0.002**	
67	61	Lead (7421)	**0.006**		**0.006**		**0.004**		**0.003**		**0.002**		**0.005**		**0.003**		**0.006**		0.001	U	0.001	U	**0.003**		0.001	U	0.001	U
68	62	Nickel (6010)	**0.02**		0.02	U	0.01	U	**0.02**		0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.070**		**0.052**		**0.032**	U	**0.042**		**0.013**		**0.033**		**0.028**		**0.039**		**0.012**		0.006	U	**0.019**		**0.009**		**0.011**	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**28.8**		**37.0**		**39.8**		**39.3**		**40.0**		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**11.0**	J	**13.2**		**13.8**		**13.7**		**13.8**		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**2.0**		**1.9**		**1.8**		**1.6**		**2.0**		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**5.18**		**5.47**		**5.76**		**6.14**		**7.23**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**150**		NA		NA		NA		**180**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**150**		NA		NA		NA		**180**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**130**		**120**		**130**		**110**		**140**		**150**		**170**		**190**		**210**	J	**200**		**220**		**260**		**220**	
80	74	Chloride (mg/L) (EPA 325.2)	**1.4**		**2.6**		**2.7**		**3.1**		**2.6**		**2.4**		**2.1**		**2.9**	J	**2.1**		**3.3**		**1.8**		**2.4**		**3.0**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		**0.011**	J	NA		NA		NA		**0.018**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		**0.018**		NA		NA		NA		**0.025**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**4.6**		NA		NA		NA		**5.3**		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW9D		LW9D	
4		ER93M		EZ03F	
5		08/27/02		11/12/02	
66	Copper (6010)	0.002	U	0.002	U
67	Lead (7421)	**0.002**		0.02	U
68	Nickel (6010)	0.01	U	0.01	U
69	Zinc (6010)	**0.012**		**0.008**	
70					
71	**MAJOR IONS AND CONVENTIONALS**				
72	Calcium (mg/L) (6010)	NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA	
74	Potassium (mg/L) (6010)	NA		NA	
75	Sodium (mg/L) (6010)	NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**190**		**210**	
80	Chloride (mg/L) (EPA 325.2)	**2.5**		**2.2**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D	
4			AH76Q		AU45E		BC27G		BH96Q		BR64M		CB85F		CL03D		CT67B		DE87H		DM30F		DW29B		ED34J		EM85H	
5			5/19/99		9/22/99		12/7/99		2/16/00		5/25/00		8/30/00		11/8/00		2/14/01		6/5/01		8/14/01		11/27/01		2/28/02		6/26/02	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.35		6.71		6.62		6.90		6.69		6.05		5.91		6.35		6.81		6.97		6.72		6.52		6.41	
88	82	Temperature (° C) (avg)	14.5		14.9		13.1		13.7		14.8		14.7		13.4		14.3		14.3		14.6		13.0		14.1		16.9	
89	83	Conductivity (um/hos)	171		160		166		198		198		227		242		259		330		324		345		361		310	
90	84	Dissolved oxygen (mg/L) (avg)	3.18		1.73		1.57		1.39		0.48		1.67		1.06		0.75		1.67		1.80		132		7.46		3.30	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW9D		LW9D	
4		ER93M		EZ03F	
5		08/27/02		11/12/02	
6					
86	**FIELD PARAMETERS**				
87	pH (avg)	6.89		6.91	
88	Temperature (° C) (avg)	15.6		14.3	
89	Conductivity (um/hos)	249		314	
90	Dissolved oxygen (mg/L) (avg)	0.99		1	
91					
92	**DIOXINS AND FURANS (ng/L)**				
93	**Method 8290**				
94	2,3,7,8-TCDF	NA		NA	
95	Total TCDF	NA		NA	
96	2,3,7,8-TCDD	NA		NA	
97	Total TCDD	NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA	
100	Total PeCDF	NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA	
102	Total PeCDD	NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA	
107	Total HxCDF	NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA	
111	Total HxCDD	NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	Total HpCDF	NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	Total HpCDD	NA		NA	
117	OCDF	NA		NA	
118	OCDD	NA		NA	
119					
120					
121					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D		LW9D	
4			AH76Q		AU45E		BC27G		BH96Q		BR64M		CB85F		CL03D		CT67B		DE87H		DM30F		DW29B		ED34J		EM85H	
5			5/19/99		9/22/99		12/7/99		2/16/00		5/25/00		8/30/00		11/8/00		2/14/01		6/5/01		8/14/01		11/27/01		2/28/02		6/26/02	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW9D		LW9D	
4		ER93M		EZ03F	
5		08/27/02		11/12/02	
122	**PAHs (µg/L)**				
123	**EPA Method SW8270 SIM**				
124	Naphthalene	NA		NA	
125	2-Methylnaphthalene	NA		NA	
126	Acenaphthylene	NA		NA	
127	Acenaphthene	NA		NA	
128	Fluorene	NA		NA	
129	Anthracene	NA		NA	
130	Dibenzofuran	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D	
4			AH76P		AU45H		BC27D		BH96H		BR64L		CB85H		CL03O		CT67A		DE87I		DM30E		DW29D		ED30C		EN00C	
5			5/19/99		9/22/99		12/7/99		2/17/00		5/25/00		8/31/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	3.2	U	**1.3**		1.0	U	**1.1**		**1.7**		1.0	U	**2.7**		**1.2**		1.0	U	**2.0**		1.0	U	4.0	U	4.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**11**		5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	0.25	U	**0.32**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		0.50	U	NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.038**		**0.038**		**0.022**		**0.032**		**0.025**		**0.037**		**0.022**		**0.025**		**0.023**		**0.027**		**0.017**		**0.019**		**0.031**	
65	59	Chromium (6010)	0.005	U	**0.021**		**0.006**		0.005	U	0.005	U	**0.034**		**0.013**		**0.011**		**0.008**		**0.019**		**0.010**		0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW10D		LW10D	
4		ER93E		EZ17I	
5		08/27/02		11/13/02	
6					
7	**CHLORINATED PHENOLS (µg/L)**				
8	**EPA Method SW8040**				
9	Pentachlorophenol	0.27	U	**0.47**	
10	2,4,6-Trichlorophenol	NA		NA	
11	2,3,6-Trichlorophenol	NA		NA	
12	2,4,5-Trichlorophenol	NA		NA	
13	2,3,4-Trichlorophenol	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA	
16					
17	**SEMIVOLATILES (µg/L)**				
18	**EPA Method SW8270**				
19	Phenol	2.2	U	2.1	U
20	4-Methylphenol	1.1	U	1.1	U
21	Isophorone	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.3	U	3.2	U
23	Benzoic Acid	54	U	53	U
24	Naphthalene	1.1	U	1.1	U
25	2-Methylnaphthalene	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	5.4	U	5.3	U
27	2,4,5-Trichlorophenol	5.4	U	5.3	U
28	Acenaphthene	1.1	U	1.1	U
29	Dibenzofuran	1.1	U	1.1	U
30	Fluorene	1.1	U	1.1	U
31	Pentachlorophenol	5.4	U	5.3	U
32	bis(2-Ethylhexyl)phthalate	4.3	U	4.3	U
33					
34	**VOLATILES (µg/L)**				
35	**EPA Method SW8260**				
36	Acetone	5	U	5	U
37	Carbon Disulfide	1	U	1	U
38	2-Butanone	5	U	5	U
39	Benzene	1	U	1	U
40	Bromoform	1	U	1	U
41	Toluene	1	U	1	U
42	Ethylbenzene	1	U	1	U
43	Styrene	1	U	1	U
44	m,p-Xylene	1	U	1	U
45	o-Xylene	1	U	1	U
46	1,3,5-Trimethylbenzene	1	U	1	U
47	1,2,4-Trimethylbenzene	1	U	1	U
48	Isopropylbenzene	1	U	1	U
49	n-Propylbenzene	1	U	1	U
50	tert-Butylbenzene	1	U	1	U
51	sec-Butylbenzene	1	U	1	U
52	4-Isopropyltoluene	1	U	1	U
53	n-Butylbenzene	1	U	1	U
54	Naphthalene	5	U	5	U
55					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	**Method OR-DEQ**				
58	**TPH-Diesel**	0.25	U	0.25	U
59	**TPH-D Motor Oil**	NA		0.5	U
60	**TPH-Gasoline**	NA		NA	
61					
62	**PRIORITY POLLUTANT**				
63	**METALS (mg/L)**				
64	Arsenic (7060)	**0.026**		0.05	U
65	Chromium (6010)	**0.007**		**0.009**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D	
4			AH76P		AU45H		BC27D		BH96H		BR64L		CB85H		CL03O		CT67A		DE87I		DM30E		DW29D		ED30C		EN00C	
5			5/19/99		9/22/99		12/7/99		2/17/00		5/25/00		8/31/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02	
66	60	Copper (6010)	**0.003**		**0.028**		**0.011**		0.002	U	**0.005**		**0.045**		**0.021**		**0.015**		**0.009**		**0.024**		**0.012**		**0.009**		**0.004**	
67	61	Lead (7421)	**0.001**		**0.008**		**0.003**		0.001	U	**0.002**		**0.012**		**0.006**		**0.006**		**0.003**		**0.008**		**0.004**		**0.002**		0.001	U
68	62	Nickel (6010)	0.01	U	0.02	U	0.01	U	0.01	U	0.01	U	**0.03**		0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.018**		**0.046**		0.022	U	**0.010**		**0.010**		**0.076**		**0.030**		**0.031**		**0.018**		**0.039**		**0.022**		**0.015**	J	**0.010**	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**19.2**		**20.4**		**22.5**		**21.0**		**19.0**		**19.1**	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**9.95**		**10.3**		**12.1**		**10.3**		**9.55**		**9.37**	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**1.1**		**1.2**		**1.5**		**0.9**		**1.0**		**0.7**	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**8.31**		**9.80**		**9.09**		**9.65**		**9.06**		**8.77**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**110**		NA		NA		NA		**100**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**110**		NA		NA		NA		**100**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**180**		**180**		**170**		**150**		**150**		**170**		**160**		**150**		**150**	J	**160**	J	**150**		**100**		**140**	
80	74	Chloride (mg/L) (EPA 325.2)	**1.7**		**1.9**		**2.1**		**3.5**		**2.3**		**14**		**2.0**		**2.6**	J	**1.9**		**4.1**		**1.7**		**1.3**	J	**2.1**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.012**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.013**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.025**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**6.2**		NA		NA		NA		**7.5**		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW10D		LW10D	
4		ER93E		EZ17I	
5		08/27/02		11/13/02	
66	Copper (6010)	**0.009**		**0.012**	
67	Lead (7421)	**0.004**		0.02	U
68	Nickel (6010)	0.01	U	**0.01**	
69	Zinc (6010)	**0.018**		**0.026**	
70					
71	**MAJOR IONS AND CONVENTIONALS**				
72	Calcium (mg/L) (6010)	NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA	
74	Potassium (mg/L) (6010)	NA		NA	
75	Sodium (mg/L) (6010)	NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**150**		**170**	
80	Chloride (mg/L) (EPA 325.2)	**2.2**		**2.5**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D	
4			AH76P		AU45H		BC27D		BH96H		BR64L		CB85H		CL03O		CT67A		DE87I		DM30E		DW29D		ED30C		EN00C	
5			5/19/99		9/22/99		12/7/99		2/17/00		5/25/00		8/31/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.44		6.49		6.79		6.86		6.90		6.71		6.10		6.72		6.88		7.03		6.80		6.50		6.56	
88	82	Temperature (° C) (avg)	14.7		17.1		12.6		15.8		13.9		13.8		13.0		13.7		13.7		16.2		14.1		13.5		14.1	
89	83	Conductivity (um/hos)	195		233		220		246		255		208		203		204		228		216		216		164		189	
90	84	Dissolved oxygen (mg/L) (avg)	2.03		1.29		2.53		0.52		0.72		1.47		1.09		0.52		2.70		0.63		3.97		7.74		5.59	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW10D		LW10D	
4		ER93E		EZ17I	
5		08/27/02		11/13/02	
86	**FIELD PARAMETERS**				
87	pH (avg)	6.67		6.35	
88	Temperature (° C) (avg)	14.3		13.7	
89	Conductivity (um/hos)	180		188	
90	Dissolved oxygen (mg/L) (avg)	0.95		1.22	
91					
92	**DIOXINS AND FURANS (ng/L)**				
93	**Method 8290**				
94	2,3,7,8-TCDF	NA		NA	
95	Total TCDF	NA		NA	
96	2,3,7,8-TCDD	NA		NA	
97	Total TCDD	NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA	
100	Total PeCDF	NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA	
102	Total PeCDD	NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA	
107	Total HxCDF	NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA	
111	Total HxCDD	NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	Total HpCDF	NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	Total HpCDD	NA		NA	
117	OCDF	NA		NA	
118	OCDD	NA		NA	
119					
120					
121					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D		LW10D	
4			AH76P		AU45H		BC27D		BH96H		BR64L		CB85H		CL03O		CT67A		DE87I		DM30E		DW29D		ED30C		EN00C	
5			5/19/99		9/22/99		12/7/99		2/17/00		5/25/00		8/31/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW10D		LW10D	
4		ER93E		EZ17I	
5		08/27/02		11/13/02	
122	**PAHs (µg/L)**				
123	**EPA Method SW8270 SIM**				
124	Naphthalene	NA		NA	
125	2-Methylnaphthalene	NA		NA	
126	Acenaphthylene	NA		NA	
127	Acenaphthene	NA		NA	
128	Fluorene	NA		NA	
129	Anthracene	NA		NA	
130	Dibenzofuran	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
2																												
3			LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D	
4			AH76H		AU45C		BC27I		BH96L		BR64G		CB49F		CK77H		CT55D		DE68B		DM52G		DW48B		ED34E		EM85C	
5			5/20/99		9/22/99		12/8/99		2/18/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	**46**		**8.1**		**1.1**		**0.36**		0.25	U	0.25	U	0.25	U	**1.6**		0.25	U	0.25	U	**0.62**		**0.76**		0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.57	U	1.3	U	0.39	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**2.2**		**1.5**		**0.36**		**0.12**	J1	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	**2.2**		**1.1**		**0.27**		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U
24	18	Naphthalene	**1.3**		1.0	U	**0.9**	J1	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	**0.6**	J1	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	**55**		**5.0**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	3.5	U	1.0	U	**2.6**		**2.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.9**		4.0	U	4.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	**8.9**		**16**		5.0	U	5.0	U	5.0	U	**8.4**		**12**			R	**35**		**10**		**130**		5.0	U	**54**	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	22	U	5.9	U	5.0	U	**5.4**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	**16**		**7.2**		**3.2**		**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	**22**		**7.4**		**2.1**		**1.3**		**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	**21**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	**34**		**26**		**10**		**7.5**		**8.0**		**4.4**		**3.1**		**4.2**		**3.4**		**2.2**		**1.1**		1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	**97**		**40**		**12**		**9.0**		**12**		**6.7**		**5.6**		**7.0**		**5.7**		**3.6**		**1.7**		1.0	U	**1.4**	
48	42	Isopropylbenzene	**12**		**11**		**6.9**		**4.0**		**2.4**		**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	**18**		**20**		**13**		**7.5**		**4.8**		**2.8**		**1.6**		**1.3**		**1.2**		**1.2**		1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**4.6**		**5.3**		**4.8**		**3.7**		**2.7**		**2.2**		**1.7**		**1.2**		**1.2**		**1.4**		**1.2**		1.0	U	1.0	U
52	46	4-Isopropyltoluene	**6.7**		**5.0**		**2.0**		**1.6**		**1.9**		**1.7**		1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	**5.8**		4.1	U	2.3	U	**2.3**		**2.2**	M	**2.4**	M	**1.5**		**1.4**	M	**1.5**		**1.5**		1.0	U	1.0	U	1.0	U
54	48	Naphthalene	**5.3**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	**0.68**		**1.4**		**0.76**		**0.60**		**0.74**		**0.88**		**0.70**		**1.1**		**1.0**		**0.88**		**0.98**		**0.87**		**1.1**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.006**		**0.008**		**0.006**		**0.007**		**0.007**		**0.007**		**0.007**		**0.006**		**0.007**		**0.009**		**0.009**		**0.007**		**0.007**	
65	59	Chromium (6010)	**0.008**		**0.053**		**0.015**		**0.011**		**0.013**		**0.018**		**0.016**		0.005	U	0.005	U	**0.024**		0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW11D		LW11D	
4		ES04C		EZ03B	
5		08/28/02		11/12/02	
6					
7	**CHLORINATED PHENOLS (µg/L)**				
8	**EPA Method SW8040**				
9	Pentachlorophenol	0.26	U	0.25	U
10	2,4,6-Trichlorophenol	NA		NA	
11	2,3,6-Trichlorophenol	NA		NA	
12	2,4,5-Trichlorophenol	NA		NA	
13	2,3,4-Trichlorophenol	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA	
16					
17	**SEMIVOLATILES (µg/L)**				
18	**EPA Method SW8270**				
19	Phenol	2	U	2.2	U
20	4-Methylphenol	1	U	1.1	U
21	Isophorone	1	U	1.1	U
22	2,4-Dimethylphenol	3.1	U	3.3	U
23	Benzoic Acid	51	U	54	U
24	Naphthalene	1	U	1.1	U
25	2-Methylnaphthalene	1	U	1.1	U
26	2,4,6-Trichlorophenol	5.1	U	5.4	U
27	2,4,5-Trichlorophenol	5.1	U	5.4	U
28	Acenaphthene	1	U	1.1	U
29	Dibenzofuran	1	U	1.1	U
30	Fluorene	1	U	1.1	U
31	Pentachlorophenol	5.1	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	4.1	U	4.3	U
33					
34	**VOLATILES (µg/L)**				
35	**EPA Method SW8260**				
36	Acetone	**27**		**31**	
37	Carbon Disulfide	1	U	1	U
38	2-Butanone	5	U	5	U
39	Benzene	1	U	1	U
40	Bromoform	1	U	1	U
41	Toluene	1	U	1	U
42	Ethylbenzene	1	U	1	U
43	Styrene	1	U	1	U
44	m,p-Xylene	1	U	1	U
45	o-Xylene	1	U	1	U
46	1,3,5-Trimethylbenzene	1	U	1	U
47	1,2,4-Trimethylbenzene	1	U	1	U
48	Isopropylbenzene	1	U	1	U
49	n-Propylbenzene	1	U	1	U
50	tert-Butylbenzene	1	U	1	U
51	sec-Butylbenzene	1	U	1	U
52	4-Isopropyltoluene	1	U	1	U
53	n-Butylbenzene	1	U	1	U
54	Naphthalene	5	U	5	U
55					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	**Method OR-DEQ**				
58	**TPH-Diesel**	**0.97**		**0.8**	
59	**TPH-D Motor Oil**	NA		NA	
60	**TPH-Gasoline**	NA		NA	
61					
62	**PRIORITY POLLUTANT**				
63	**METALS (mg/L)**				
64	Arsenic (7060)	**0.005**		0.05	U
65	Chromium (6010)	**0.02**		**0.032**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D	
4			AH76H		AU45C		BC27I		BH96L		BR64G		CB49F		CK77H		CT55D		DE68B		DM52G		DW48B		ED34E		EM85C	
5			5/20/99		9/22/99		12/8/99		2/18/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02	
66	60	Copper (6010)	**0.005**		**0.051**		**0.016**		**0.013**		**0.014**		**0.017**		**0.018**	J2	**0.005**		**0.002**		**0.024**		0.004	U	**0.007**		**0.003**	
67	61	Lead (7421)	**0.002**		**0.018**		**0.007**		**0.004**		**0.008**		**0.006**		**0.008**		**0.002**		**0.002**		**0.008**		**0.004**		**0.002**		0.001	U
68	62	Nickel (6010)	0.01	U	0.04	U	0.01	U	**0.01**		0.01	U	**0.02**		**0.01**		0.01	U	0.01	U	**0.02**		0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.030**		**0.142**		**0.047**		**0.042**		**0.040**		**0.052**		**0.058**		**0.023**		**0.018**		**0.064**		**0.022**		**0.022**		**0.013**	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**54.9**		**61.5**		**55.9**		**58.6**		**60.0**		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**26.4**		**31.0**		**27.6**		**28.6**		**31.3**		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**1.7**		**1.9**		**2.9**		**2.1**		**2.2**		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**15.6**		**16.6**		**17.5**		**16.2**		**17.6**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**350**		NA		NA		NA		**370**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**350**		NA		NA		NA		**370**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**420**		**310**		**310**		**290**		**350**		**380**		**380**		**360**		**370**		**300**		**340**		**340**		**410**	
80	74	Chloride (mg/L) (EPA 325.2)	**9.2**		**10**		**11**		**11**		**10**		**10**		**14**		**7.7**		**8.8**		**8.3**		**7.5**		**9.8**		**12**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.024**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.025**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.049**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**6.3**		NA		NA		NA		**7.6**		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW11D		LW11D	
4		ES04C		EZ03B	
5		08/28/02		11/12/02	
66	Copper (6010)	**0.02**		**0.034**	
67	Lead (7421)	**0.007**		0.02	U
68	Nickel (6010)	**0.01**		**0.05**	
69	Zinc (6010)	**0.053**		**0.096**	
70					
71	**MAJOR IONS AND CONVENTIONALS**				
72	Calcium (mg/L) (6010)	NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA	
74	Potassium (mg/L) (6010)	NA		NA	
75	Sodium (mg/L) (6010)	NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**390**		**470**	
80	Chloride (mg/L) (EPA 325.2)	**9.8**		**7.4**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D	
4			AH76H		AU45C		BC27I		BH96L		BR64G		CB49F		CK77H		CT55D		DE68B		DM52G		DW48B		ED34E		EM85C	
5			5/20/99		9/22/99		12/8/99		2/18/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.51		6.75		6.54		6.44		6.63		6.35		5.75		6.38		6.75		7.80		6.68		6.52		6.56	
88	82	Temperature (° C) (avg)	15.5		15.3		12.1		12.0		17.0		15.0		12.8		12.3		13.3		14.7		12.6		12.8		14.9	
89	83	Conductivity (um/hos)	630		487		617		551		643		523		544		454		493		488		473		576		694	
90	84	Dissolved oxygen (mg/L) (avg)	1.96		1.53		1.33		1.86		1.53		1.49		1.23		1.14		1.45		1.43		3.48		8.44		3.33	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW11D		LW11D	
4		ES04C		EZ03B	
5		08/28/02		11/12/02	
86	**FIELD PARAMETERS**				
87	pH (avg)	6.44		6.2	
88	Temperature (° C) (avg)	15.7		14	
89	Conductivity (um/hos)	466		642	
90	Dissolved oxygen (mg/L) (avg)	1.30		0.48	
91					
92	**DIOXINS AND FURANS (ng/L)**				
93	**Method 8290**				
94	2,3,7,8-TCDF	NA		NA	
95	Total TCDF	NA		NA	
96	2,3,7,8-TCDD	NA		NA	
97	Total TCDD	NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA	
100	Total PeCDF	NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA	
102	Total PeCDD	NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA	
107	Total HxCDF	NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA	
111	Total HxCDD	NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	Total HpCDF	NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	Total HpCDD	NA		NA	
117	OCDF	NA		NA	
118	OCDD	NA		NA	
119					
120					
121					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D		LW11D	
4			AH76H		AU45C		BC27I		BH96L		BR64G		CB49F		CK77H		CT55D		DE68B		DM52G		DW48B		ED34E		EM85C	
5			5/20/99		9/22/99		12/8/99		2/18/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/28/02		6/26/02	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		LW11D		LW11D	
4		ES04C		EZ03B	
5		08/28/02		11/12/02	
122	**PAHs (µg/L)**				
123	**EPA Method SW8270 SIM**				
124	Naphthalene	NA		NA	
125	2-Methylnaphthalene	NA		NA	
126	Acenaphthylene	NA		NA	
127	Acenaphthene	NA		NA	
128	Fluorene	NA		NA	
129	Anthracene	NA		NA	
130	Dibenzofuran	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2					Dup of LW-12D1								Dup of LW12D1													
3			LW12D1		LW120D1		LW12D1		LW12D1		LW12D1		Y		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1	
4			AH76C		AH76A		AU45L		BC27S		BH96M		BH96O		BR55B		CB85I		CL03K		CT67E		DE87M		DM52H	
5			5/20/99		5/20/99		9/23/99		12/9/99		2/18/00		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	**28**		**32**		**1.4**		**200**		**0.28**		**0.23**	J1	0.25	UJ	0.25	U	0.25	U	**0.62**		0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	**1.1**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	1.2	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**1.2**		**1.4**		**0.13**	J1	**6.2**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	**1.0**		**1.0**		**0.36**		**8.0**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	**2.2**	J1	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	**1.7**	J1	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	**110**	J2	**81**	J2	5.0	U	**380**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	**1.0**	J1	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	**7.6**		5.0	U	**12**	M	5.0	U	5.0	U	5.0	U	5.0	U	9.5	U	**8.4**		5.0	U	5.0	U	**5.7**	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	**11**		**9.7**		**3.6**		**1.5**		1.0	U	1.0	U	**2.4**		**3.3**		**4.8**		**4.4**		**1.9**		**1.5**	
47	41	1,2,4-Trimethylbenzene	**46**		**46**		**15**		**4.8**		**5.1**		**4.9**		**15**		**17**		**22**		**23**		**13**		**7.5**	
48	42	Isopropylbenzene	**2.6**		**2.6**		**1.7**		**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	**1.3**		**1.4**		**1.6**		1.0	U
49	43	n-Propylbenzene	**3.9**		**3.8**		**2.4**		**1.3**		1.0	U	1.0	U	**1.5**		**1.5**		**2.2**		**2.5**		**2.0**		1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**1.7**		**1.7**		**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		**1.6**		**1.9**		**1.3**		1.0	U
52	46	4-Isopropyltoluene	**2.0**		**2.0**		**1.3**		1.0	U	1.0	U	1.0	U	1.0	U	**1.1**		**1.6**		**1.9**		1.0	U	1.0	U
53	47	n-Butylbenzene	**1.7**		**1.7**	M	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.4	U	**1.7**	M	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	**0.96**		**0.86**		**0.98**		**0.88**		**0.66**		**0.66**		**0.82**		**0.64**		**0.78**		**0.83**		**0.77**		**0.81**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		0.50	U	NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.017**		**0.017**		**0.039**		**0.034**		**0.020**		**0.020**		**0.030**		**0.033**		**0.019**		**0.022**		**0.020**		**0.017**	
65	59	Chromium (6010)	**0.007**		**0.007**		**0.035**		**0.091**		**0.017**		**0.019**		0.005	U	**0.006**		**0.010**		**0.008**		**0.012**		**0.032**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF
1							
2							
3		LW12D1		LW12D1		LW12D1	
4		DW48J		ED34H		EN00K	
5		11/29/01		2/28/02		6/27/02	
6							
7	**CHLORINATED PHENOLS (µg/L)**						
8	**EPA Method SW8040**						
9	Pentachlorophenol	0.25	U	0.25	U	**1.6**	
10	2,4,6-Trichlorophenol	NA		NA		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA	
13	2,3,4-Trichlorophenol	NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA	
16							
17	**SEMIVOLATILES (µg/L)**						
18	**EPA Method SW8270**						
19	Phenol	2.0	U	2.0	U	2.0	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U
21	Isophorone	1.0	U	1.0	U	1.0	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U
23	Benzoic Acid	30	U	50	U	50	U
24	Naphthalene	1.0	U	1.0	U	1.0	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U
30	Fluorene	1.0	U	1.0	U	1.0	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	4.0	U	4.0	U
33							
34	**VOLATILES (µg/L)**						
35	**EPA Method SW8260**						
36	Acetone	5.0	U	5.0	U	5.0	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U
38	2-Butanone	**5.6**		**8.6**		5.0	U
39	Benzene	1.0	U	1.0	U	1.0	U
40	Bromoform	1.0	U	1.0	U	1.0	U
41	Toluene	1.0	U	1.0	U	1.0	U
42	Ethylbenzene	1.0	U	1.0	U	1.0	U
43	Styrene	1.0	U	1.0	U	1.0	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U
45	o-Xylene	1.0	U	1.0	U	1.0	U
46	1,3,5-Trimethylbenzene	**3.4**		**1.5**		1.0	U
47	1,2,4-Trimethylbenzene	**21**		**8.5**		**4.7**	
48	Isopropylbenzene	**1.6**		1.0	U	1.0	U
49	n-Propylbenzene	**2.8**		**1.1**		**1.3**	
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U
51	sec-Butylbenzene	**2.8**		1.0	U	**1.1**	
52	4-Isopropyltoluene	**2.2**		1.0	U	1.0	U
53	n-Butylbenzene	2.0	U	1.0	U	1.0	U
54	Naphthalene	5.0	U	5.0	U	5.0	U
55							
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**						
57	**Method OR-DEQ**						
58	**TPH-Diesel**	**0.97**		**1.2**		**1.0**	
59	**TPH-D Motor Oil**	NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA	
61							
62	**PRIORITY POLLUTANT**						
63	**METALS (mg/L)**						
64	Arsenic (7060)	**0.014**		**0.016**		**0.028**	
65	Chromium (6010)	**0.009**		**0.015**		**0.006**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW-12D1								Dup of LW12D1													
3			LW12D1		LW120D1		LW12D1		LW12D1		LW12D1		Y		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1	
4			AH76C		AH76A		AU45L		BC27S		BH96M		BH96O		BR55B		CB85I		CL03K		CT67E		DE87M		DM52H	
5			5/20/99		5/20/99		9/23/99		12/9/99		2/18/00		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01	
66	60	Copper (6010)	**0.008**		**0.008**		**0.036**		**0.122**		**0.022**		**0.024**		**0.007**		**0.007**		**0.016**		**0.012**		**0.015**		**0.038**	
67	61	Lead (7421)	**0.002**		**0.002**		**0.011**		**0.030**		**0.005**		**0.005**		**0.003**		**0.002**		**0.006**		**0.003**		**0.013**		**0.012**	
68	62	Nickel (6010)	0.01	U	0.01	U	0.03	U	**0.07**		**0.02**		**0.02**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.03**	
69	63	Zinc (6010)	**0.026**		**0.030**		**0.079**		**0.212**		**0.047**		**0.053**		**0.016**		**0.024**		**0.037**		**0.033**		**0.029**		**0.074**	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**54.8**		**60.5**		**53.1**	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**26.2**		**29.5**		**29.0**	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**0.9**		**1.8**		**1.9**	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**10.9**		**12.3**		**11.5**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**320**		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**320**		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**360**		**360**		**360**		**350**		**350**		**350**		**320**		**320**		**330**		**320**		**340**	J	**320**	
80	74	Chloride (mg/L) (EPA 325.2)	**3.8**		**3.8**		**3.3**		**4.5**		**3.8**		**4.2**		**4.1**		**6.8**		**3.3**		**4.2**	J	**3.7**		**7.8**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		**5.8**		NA		NA	
85	79																									

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF
1							
2							
3		LW12D1		LW12D1		LW12D1	
4		DW48J		ED34H		EN00K	
5		11/29/01		2/28/02		6/27/02	
66	Copper (6010)	0.012	U	**0.020**		**0.007**	
67	Lead (7421)	**0.005**		**0.006**		**0.002**	
68	Nickel (6010)	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	**0.021**		**0.032**		**0.022**	
70							
71	**MAJOR IONS AND CONVENTIONALS**						
72	Calcium (mg/L) (6010)	**58.4**		**55.1**		**59.3**	
73	Magnesium (mg/L) (6010)	**29.4**		**25.4**		**28.1**	
74	Potassium (mg/L) (6010)	**1.5**		**1.5**		**1.0**	
75	Sodium (mg/L) (6010)	**12.2**		**12.5**		**12.4**	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		**260**		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		1.0	U	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		**260**		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**350**		**330**		**300**	
80	Chloride (mg/L) (EPA 325.2)	**3.7**		**5.2**		**3.8**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		**0.027**		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		0.010	U	NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		**0.027**		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		**5.1**		NA	
85							

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW-12D1								Dup of LW12D1													
3			LW12D1		LW120D1		LW12D1		LW12D1		LW12D1		Y		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1	
4			AH76C		AH76A		AU45L		BC27S		BH96M		BH96O		BR55B		CB85I		CL03K		CT67E		DE87M		DM52H	
5			5/20/99		5/20/99		9/23/99		12/9/99		2/18/00		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.96		6.96		7.13		6.96		6.95		6.85		6.95		6.85		5.68		6.82		7.15		7.20	
88	82	Temperature (° C) (avg)	13.2		13.0		14.7		11.9		11.7		11.7		15.0		13.0		12.2		13.1		14.0		14.4	
89	83	Conductivity (um/hos)	486		502		504		346		526		524		495		485		444		454		481		469	
90	84	Dissolved oxygen (mg/L) (avg)	1.86		1.67		1.01		2.36		1.79		1.43		1.26		1.74		0.93		0.13		2.10		1.96	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120																										
121																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF
1							
2							
3		LW12D1		LW12D1		LW12D1	
4		DW48J		ED34H		EN00K	
5		11/29/01		2/28/02		6/27/02	
86	**FIELD PARAMETERS**						
87	pH (avg)	6.92		6.80		7.07	
88	Temperature (° C) (avg)	13.3		13.8		14.3	
89	Conductivity (um/hos)	434		431		410	
90	Dissolved oxygen (mg/L) (avg)	4.12		7.61		4.73	
91							
92	**DIOXINS AND FURANS (ng/L)**						
93	**Method 8290**						
94	2,3,7,8-TCDF	NA		NA		NA	
95	Total TCDF	NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA	
97	Total TCDD	NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA	
100	Total PeCDF	NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA	
102	Total PeCDD	NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA	
107	Total HxCDF	NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA	
111	Total HxCDD	NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA	
114	Total HpCDF	NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA	
116	Total HpCDD	NA		NA		NA	
117	OCDF	NA		NA		NA	
118	OCDD	NA		NA		NA	
119							
120							
121							

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW-12D1								Dup of LW12D1													
3			LW12D1		LW120D1		LW12D1		LW12D1		LW12D1		Y		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1		LW12D1	
4			AH76C		AH76A		AU45L		BC27S		BH96M		BH96O		BR55B		CB85I		CL03K		CT67E		DE87M		DM52H	
5			5/20/99		5/20/99		9/23/99		12/9/99		2/18/00		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF
1							
2							
3		LW12D1		LW12D1		LW12D1	
4		DW48J		ED34H		EN00K	
5		11/29/01		2/28/02		6/27/02	
122	**PAHs (µg/L)**						
123	**EPA Method SW8270 SIM**						
124	Naphthalene	NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA	
126	Acenaphthylene	NA		NA		NA	
127	Acenaphthene	NA		NA		NA	
128	Fluorene	NA		NA		NA	
129	Anthracene	NA		NA		NA	
130	Dibenzofuran	NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
2																											
3			LW-12D2		LW-12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2
4			AH76B		AU45M		BC27T		BH96N		BR55A		CB85J		CL03L		CT67F		DE87R		DM52F		DW48I		ED34I		EN00L
5			5/20/99		9/23/99		12/9/99		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01		11/29/01		2/28/02		6/27/02
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	**0.91**		0.25	U	**3.7**		0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U	**1.7**		0.25	U	0.25	U	NA		0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	**0.22**	J1	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	**0.50**		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	**2.8**	J1	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	**20**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	**5.4**
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
46	40	1,3,5-Trimethylbenzene	**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
47	41	1,2,4-Trimethylbenzene	**3.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	**0.32**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		0.25	U	NA
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		0.50	U	NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	**0.020**		**0.021**		**0.003**		**0.019**		**0.024**		**0.022**		**0.020**		**0.022**		**0.022**		**0.024**		**0.024**		**0.020**		**0.018**
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB
1		
2		
3		
4		
5		
6		
7	**CHLORINATED PHENOLS (µg/L)**	
8	**EPA Method SW8040**	
9	Pentachlorophenol	U
10	2,4,6-Trichlorophenol	
11	2,3,6-Trichlorophenol	
12	2,4,5-Trichlorophenol	
13	2,3,4-Trichlorophenol	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	
15	2,3,4,5-Tetrachlorophenol	
16		
17	**SEMIVOLATILES (µg/L)**	
18	**EPA Method SW8270**	
19	Phenol	U
20	4-Methylphenol	U
21	Isophorone	U
22	2,4-Dimethylphenol	U
23	Benzoic Acid	U
24	Naphthalene	U
25	2-Methylnaphthalene	U
26	2,4,6-Trichlorophenol	U
27	2,4,5-Trichlorophenol	U
28	Acenaphthene	U
29	Dibenzofuran	U
30	Fluorene	U
31	Pentachlorophenol	U
32	bis(2-Ethylhexyl)phthalate	
33		
34	**VOLATILES (µg/L)**	
35	**EPA Method SW8260**	
36	Acetone	U
37	Carbon Disulfide	U
38	2-Butanone	U
39	Benzene	U
40	Bromoform	U
41	Toluene	U
42	Ethylbenzene	U
43	Styrene	U
44	m,p-Xylene	U
45	o-Xylene	U
46	1,3,5-Trimethylbenzene	U
47	1,2,4-Trimethylbenzene	U
48	Isopropylbenzene	U
49	n-Propylbenzene	U
50	tert-Butylbenzene	U
51	sec-Butylbenzene	U
52	4-Isopropyltoluene	U
53	n-Butylbenzene	U
54	Naphthalene	U
55		
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**	
57	**Method OR-DEQ**	
58	**TPH-Diesel**	
59	**TPH-D Motor Oil**	
60	**TPH-Gasoline**	
61		
62	**PRIORITY POLLUTANT**	
63	**METALS (mg/L)**	
64	Arsenic (7060)	
65	Chromium (6010)	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW-12D2		LW-12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2
4			AH76B		AU45M		BC27T		BH96N		BR55A		CB85J		CL03L		CT67F		DE87R		DM52F		DW48I		ED34I		EN00L
5			5/20/99		9/23/99		12/9/99		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01		11/29/01		2/28/02		6/27/02
66	60	Copper (6010)	0.002	U	0.002	U	**0.005**		0.002	U	0.002	U	0.002	U	**0.004**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002
67	61	Lead (7421)	0.001	U	0.001	U	**0.002**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	0.001
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	63	Zinc (6010)	**0.007**		0.004	U	**0.306**		**0.009**		0.006	U	0.006	U	0.006	U	**0.009**		0.006	U	0.006	U	0.006	U	0.006	U	0.006
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**36.1**		**38.3**		**29.4**		**31.9**		**39.1**		**52.5**
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**16.4**		**17.3**		**13.7**		**14.0**		**17.3**		**23.0**
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**2.4**		**2.4**		**2.4**		**2.2**		**2.8**		**3.1**
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**15.0**		**17.6**		**13.5**		**14.0**		**16.8**		**21.7**
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**220**		NA		NA		NA		**230**		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**220**		NA		NA		NA		**230**		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**340**		**270**		**160**		**290**		**320**		**280**		**280**		**240**		**280**	J	**210**		**210**		**330**		**330**
80	74	Chloride (mg/L) (EPA 325.2)	**3.9**		**2.7**		**4.7**		**3.9**		**3.7**		**8.2**		**3.3**		**5.6**	J	**3.2**		**7.9**		**3.1**		**24**		**4.1**
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		**0.029**	J	NA		NA		NA		**0.042**		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		**0.031**		NA		NA		NA		**0.048**		NA
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**7.3**		NA		NA		NA		**6.5**		NA
85	79																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB
1		
2		
3		
4		
5		
65		
66	Copper (6010)	U
67	Lead (7421)	U
68	Nickel (6010)	U
69	Zinc (6010)	U
70		
71	**MAJOR IONS AND CONVENTIONALS**	
72	Calcium (mg/L) (6010)	
73	Magnesium (mg/L) (6010)	
74	Potassium (mg/L) (6010)	
75	Sodium (mg/L) (6010)	
76	Alkalinity (mg/L CaCO3) (SM 2320)	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	
80	Chloride (mg/L) (EPA 325.2)	
81	N-Nitrate (mg-N/L) (Calculated)	
82	N-Nitrite (mg-N/L) (EPA 354.1)	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	
84	Sulfate (mg/L) (EPA 375.2)	
85		

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW-12D2		LW-12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2
4			AH76B		AU45M		BC27T		BH96N		BR55A		CB85J		CL03L		CT67F		DE87R		DM52F		DW48I		ED34I		EN00L
5			5/20/99		9/23/99		12/9/99		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01		11/29/01		2/28/02		6/27/02
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.69		6.81		6.88		6.75		6.61		6.64		5.48		6.56		6.89		6.96		6.68		6.50		6.66
88	82	Temperature (° C) (avg)	13.8		14.2		11.9		13.0		13.9		13.7		13.3		13.3		13.9		14.0		13.1		13.1		14.2
89	83	Conductivity (um/hos)	514		391		250		475		468		443		442		429		473		356		375		439		528
90	84	Dissolved oxygen (mg/L) (avg)	2.40		0.42		2.80		1.42		0		0.52		0.29		0.00		0.50		0.34		3.45		7.16		4.25
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120																											
121																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB
1		
2		
3		
4		
5		
85		
86	**FIELD PARAMETERS**	
87	pH (avg)	
88	Temperature (° C) (avg)	
89	Conductivity (um/hos)	
90	Dissolved oxygen (mg/L) (avg)	
91		
92	**DIOXINS AND FURANS (ng/L)**	
93	**Method 8290**	
94	2,3,7,8-TCDF	
95	Total TCDF	
96	2,3,7,8-TCDD	
97	Total TCDD	
98	1,2,3,7,8-PeCDF	
99	2,3,4,7,8-PeCDF	
100	Total PeCDF	
101	1,2,3,7,8-PeCDD	
102	Total PeCDD	
103	1,2,3,4,7,8-HxCDF	
104	1,2,3,6,7,8-HxCDF	
105	2,3,4,6,7,8-HxCDF	
106	1,2,3,7,8,9-HxCDF	
107	Total HxCDF	
108	1,2,3,4,7,8-HxCDD	
109	1,2,3,6,7,8-HxCDD	
110	1,2,3,7,8,9-HxCDD	
111	Total HxCDD	
112	1,2,3,4,6,7,8-HpCDF	
113	1,2,3,4,7,8,9-HpCDF	
114	Total HpCDF	
115	1,2,3,4,6,7,8-HpCDD	
116	Total HpCDD	
117	OCDF	
118	OCDD	
119		
120		
121		

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			LW-12D2		LW-12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2		LW12D2
4			AH76B		AU45M		BC27T		BH96N		BR55A		CB85J		CL03L		CT67F		DE87R		DM52F		DW48I		ED34I		EN00L
5			5/20/99		9/23/99		12/9/99		2/18/00		5/22/00		8/31/00		11/10/00		2/15/01		6/6/01		8/15/01		11/29/01		2/28/02		6/27/02
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB
1		
2		
3		
4		
5		
121		
122	**PAHs (µg/L)**	
123	**EPA Method SW8270 SIM**	
124	Naphthalene	
125	2-Methylnaphthalene	
126	Acenaphthylene	
127	Acenaphthene	
128	Fluorene	
129	Anthracene	
130	Dibenzofuran	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2					Dup of LW14D																	
3			LW14D		W		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D	
4			BR64R		BR64Q		CT67N		DE87E		DM30Q		DW29J		ED30E		EN00E		ER93F		EZ17C	
5			5/25/00		5/25/00		2/14/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
6																						
7	1	**CHLORINATED PHENOLS (µg/L)**																				
8	2	**EPA Method SW8040**																				
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.27	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16	10																					
17	11	**SEMIVOLATILES (µg/L)**																				
18	12	**EPA Method SW8270**																				
19	13	Phenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	14	4-Methylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	15	Isophorone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	16	2,4-Dimethylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	17	Benzoic Acid	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	18	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	19	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	22	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	23	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	24	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	25	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
33	27																					
34	28	**VOLATILES (µg/L)**																				
35	29	**EPA Method SW8260**																				
36	30	Acetone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	31	Carbon Disulfide	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	32	2-Butanone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	33	Benzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	34	Bromoform	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	35	Toluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	36	Ethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	37	Styrene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	38	m,p-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	39	o-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	40	1,3,5-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	41	1,2,4-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	42	Isopropylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	43	n-Propylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	44	tert-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	45	sec-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	46	4-Isopropyltoluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	47	n-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	48	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
55	49																					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	51	**Method OR-DEQ**																				
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																					
62	56	**PRIORITY POLLUTANT**																				
63	57	**METALS (mg/L)**																				
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2					Dup of LW14D																	
3			LW14D		W		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D	
4			BR64R		BR64Q		CT67N		DE87E		DM30Q		DW29J		ED30E		EN00E		ER93F		EZ17C	
5			5/25/00		5/25/00		2/14/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																					
71	65	**MAJOR IONS AND CONVENTIONALS**																				
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2					Dup of LW14D																	
3			LW14D		W		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D	
4			BR64R		BR64Q		CT67N		DE87E		DM30Q		DW29J		ED30E		EN00E		ER93F		EZ17C	
5			5/25/00		5/25/00		2/14/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
86	80	**FIELD PARAMETERS**																				
87	81	pH (avg)	6.64		6.64		6.15		6.65		6.81		6.61		6.35		6.64		6.73		6.22	
88	82	Temperature (° C) (avg)	14.1		14.2		12.9		13.5		14.1		12.4		13.6		13.9		14.8		13.4	
89	83	Conductivity (um/hos)	312		312		345		371		296		362		356		487		434		477	
90	84	Dissolved oxygen (mg/L) (avg)	4.54		4.52		0.12		1.17		0.83		4.12		7.36		5.08		2.09		0.77	
91	85																					
92	86	**DIOXINS AND FURANS (ng/L)**																				
93	87	**Method 8290**																				
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2					Dup of LW14D																	
3			LW14D		W		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D		LW14D	
4			BR64R		BR64Q		CT67N		DE87E		DM30Q		DW29J		ED30E		EN00E		ER93F		EZ17C	
5			5/25/00		5/25/00		2/14/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/13/02	
122		**PAHs (µg/L)**																				
123		**EPA Method SW8270 SIM**																				
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			LW15D		LW15D	
4			BR64T		CL03T	
5			5/25/00		11/9/00	
6						
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	**0.33**		0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	NA		NA	
20	14	4-Methylphenol	NA		NA	
21	15	Isophorone	NA		NA	
22	16	2,4-Dimethylphenol	NA		NA	
23	17	Benzoic Acid	NA		NA	
24	18	Naphthalene	NA		NA	
25	19	2-Methylnaphthalene	NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA	
28	22	Acenaphthene	NA		NA	
29	23	Dibenzofuran	NA		NA	
30	24	Fluorene	NA		NA	
31	25	Pentachlorophenol	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	NA		NA	
37	31	Carbon Disulfide	NA		NA	
38	32	2-Butanone	NA		NA	
39	33	Benzene	NA		NA	
40	34	Bromoform	NA		NA	
41	35	Toluene	NA		NA	
42	36	Ethylbenzene	NA		NA	
43	37	Styrene	NA		NA	
44	38	m,p-Xylene	NA		NA	
45	39	o-Xylene	NA		NA	
46	40	1,3,5-Trimethylbenzene	NA		NA	
47	41	1,2,4-Trimethylbenzene	NA		NA	
48	42	Isopropylbenzene	NA		NA	
49	43	n-Propylbenzene	NA		NA	
50	44	tert-Butylbenzene	NA		NA	
51	45	sec-Butylbenzene	NA		NA	
52	46	4-Isopropyltoluene	NA		NA	
53	47	n-Butylbenzene	NA		NA	
54	48	Naphthalene	NA		NA	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA	
60	54	**TPH-Gasoline**	NA		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	NA		NA	
65	59	Chromium (6010)	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			LW15D		LW15D	
4			BR64T		CL03T	
5			5/25/00		11/9/00	
66	60	Copper (6010)	NA		NA	
67	61	Lead (7421)	NA		NA	
68	62	Nickel (6010)	NA		NA	
69	63	Zinc (6010)	NA		NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			LW15D		LW15D	
4			BR64T		CL03T	
5			5/25/00		11/9/00	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	6.69		6.12	
88	82	Temperature (° C) (avg)	14.6		12.8	
89	83	Conductivity (um/hos)	324		265	
90	84	Dissolved oxygen (mg/L) (avg)	0.67		1.25	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120						
121						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			LW15D		LW15D	
4			BR64T		CL03T	
5			5/25/00		11/9/00	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			LW16D	
4			BR64U	
5			5/25/00	
6				
7	1	**CHLORINATED PHENOLS (µg/L)**		
8	2	**EPA Method SW8040**		
9	3	Pentachlorophenol	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U
16	10			
17	11	**SEMIVOLATILES (µg/L)**		
18	12	**EPA Method SW8270**		
19	13	Phenol	NA	
20	14	4-Methylphenol	NA	
21	15	Isophorone	NA	
22	16	2,4-Dimethylphenol	NA	
23	17	Benzoic Acid	NA	
24	18	Naphthalene	NA	
25	19	2-Methylnaphthalene	NA	
26	20	2,4,6-Trichlorophenol	NA	
27	21	2,4,5-Trichlorophenol	NA	
28	22	Acenaphthene	NA	
29	23	Dibenzofuran	NA	
30	24	Fluorene	NA	
31	25	Pentachlorophenol	NA	
32	26	bis(2-Ethylhexyl)phthalate	NA	
33	27			
34	28	**VOLATILES (µg/L)**		
35	29	**EPA Method SW8260**		
36	30	Acetone	NA	
37	31	Carbon Disulfide	NA	
38	32	2-Butanone	NA	
39	33	Benzene	NA	
40	34	Bromoform	NA	
41	35	Toluene	NA	
42	36	Ethylbenzene	NA	
43	37	Styrene	NA	
44	38	m,p-Xylene	NA	
45	39	o-Xylene	NA	
46	40	1,3,5-Trimethylbenzene	NA	
47	41	1,2,4-Trimethylbenzene	NA	
48	42	Isopropylbenzene	NA	
49	43	n-Propylbenzene	NA	
50	44	tert-Butylbenzene	NA	
51	45	sec-Butylbenzene	NA	
52	46	4-Isopropyltoluene	NA	
53	47	n-Butylbenzene	NA	
54	48	Naphthalene	NA	
55	49			
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	51	**Method OR-DEQ**		
58	52	**TPH-Diesel**	NA	
59	53	**TPH-D Motor Oil**	NA	
60	54	**TPH-Gasoline**	NA	
61	55			
62	56	**PRIORITY POLLUTANT**		
63	57	**METALS (mg/L)**		
64	58	Arsenic (7060)	NA	
65	59	Chromium (6010)	NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			LW16D	
4			BR64U	
5			5/25/00	
66	60	Copper (6010)	NA	
67	61	Lead (7421)	NA	
68	62	Nickel (6010)	NA	
69	63	Zinc (6010)	NA	
70	64			
71	65	**MAJOR IONS AND CONVENTIONALS**		
72	66	Calcium (mg/L) (6010)	NA	
73	67	Magnesium (mg/L) (6010)	NA	
74	68	Potassium (mg/L) (6010)	NA	
75	69	Sodium (mg/L) (6010)	NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA	
85	79			

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			LW16D	
4			BR64U	
5			5/25/00	
6				
86	80	**FIELD PARAMETERS**		
87	81	pH (avg)	6.74	
88	82	Temperature (° C) (avg)	14.3	
89	83	Conductivity (um/hos)	314	
90	84	Dissolved oxygen (mg/L) (avg)	0.71	
91	85			
92	86	**DIOXINS AND FURANS (ng/L)**		
93	87	**Method 8290**		
94	88	2,3,7,8-TCDF	NA	
95	89	Total TCDF	NA	
96	90	2,3,7,8-TCDD	NA	
97	91	Total TCDD	NA	
98	92	1,2,3,7,8-PeCDF	NA	
99	93	2,3,4,7,8-PeCDF	NA	
100	94	Total PeCDF	NA	
101	95	1,2,3,7,8-PeCDD	NA	
102	96	Total PeCDD	NA	
103	97	1,2,3,4,7,8-HxCDF	NA	
104	98	1,2,3,6,7,8-HxCDF	NA	
105	99	2,3,4,6,7,8-HxCDF	NA	
106	100	1,2,3,7,8,9-HxCDF	NA	
107	101	Total HxCDF	NA	
108	102	1,2,3,4,7,8-HxCDD	NA	
109	103	1,2,3,6,7,8-HxCDD	NA	
110	104	1,2,3,7,8,9-HxCDD	NA	
111	105	Total HxCDD	NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA	
114	108	Total HpCDF	NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA	
116	110	Total HpCDD	NA	
117	111	OCDF	NA	
118	112	OCDD	NA	
119				
120				
121				

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			LW16D	
4			BR64U	
5			5/25/00	
122		**PAHs (µg/L)**		
123		**EPA Method SW8270 SIM**		
124		Naphthalene	NA	
125		2-Methylnaphthalene	NA	
126		Acenaphthylene	NA	
127		Acenaphthene	NA	
128		Fluorene	NA	
129		Anthracene	NA	
130		Dibenzofuran	NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D	
4			CB85A		CL03R		CT67L		DE87C		DM30P		DW48H		ED34B		EN00J		ER93N		EZ03H	
5			8/31/00		11/8/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
6																						
7	1	**CHLORINATED PHENOLS (µg/L)**																				
8	2	**EPA Method SW8040**																				
9	3	Pentachlorophenol	0.25	U	0.25	U	**0.56**		0.25	U	0.25	U	0.25	U	**6.8**		0.25	U	0.28	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16	10																					
17	11	**SEMIVOLATILES (µg/L)**																				
18	12	**EPA Method SW8270**																				
19	13	Phenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	14	4-Methylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	15	Isophorone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	16	2,4-Dimethylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	17	Benzoic Acid	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	18	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	19	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	22	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	23	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	24	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	25	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
33	27																					
34	28	**VOLATILES (µg/L)**																				
35	29	**EPA Method SW8260**																				
36	30	Acetone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	31	Carbon Disulfide	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	32	2-Butanone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	33	Benzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	34	Bromoform	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	35	Toluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	36	Ethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	37	Styrene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	38	m,p-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	39	o-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	40	1,3,5-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	41	1,2,4-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	42	Isopropylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	43	n-Propylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	44	tert-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	45	sec-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	46	4-Isopropyltoluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	47	n-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	48	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
55	49																					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	51	**Method OR-DEQ**																				
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																					
62	56	**PRIORITY POLLUTANT**																				
63	57	**METALS (mg/L)**																				
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D	
4			CB85A		CL03R		CT67L		DE87C		DM30P		DW48H		ED34B		EN00J		ER93N		EZ03H	
5			8/31/00		11/8/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																					
71	65	**MAJOR IONS AND CONVENTIONALS**																				
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D	
4			CB85A		CL03R		CT67L		DE87C		DM30P		DW48H		ED34B		EN00J		ER93N		EZ03H	
5			8/31/00		11/8/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
86	80	**FIELD PARAMETERS**																				
87	81	pH (avg)	6.14		5.95		6.15		6.53		6.67		6.44		6.49		6.68		6.41		6.64	
88	82	Temperature (° C) (avg)	13.8		13.5		14.4		14.0		15.3		14		13.7		14.2		16.1		13.7	
89	83	Conductivity (um/hos)	305		79		440		488		544		529		62		196		399		457	
90	84	Dissolved oxygen (mg/L) (avg)	2.10		1.21		0.47		2.27		1.69		3.81		7.82		4.92		1.31		0.94	
91	85																					
92	86	**DIOXINS AND FURANS (ng/L)**																				
93	87	**Method 8290**																				
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D		LW17D	
4			CB85A		CL03R		CT67L		DE87C		DM30P		DW48H		ED34B		EN00J		ER93N		EZ03H	
5			8/31/00		11/8/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
122		**PAHs (µg/L)**																				
123		**EPA Method SW8270 SIM**																				
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D	
4			CB85B		CL03S		CT67M		DE87D		DM30O		DW48G		ED34C		EN00I		ER93O		EZ03G	
5			8/31/00		11/9/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																				
8	2	**EPA Method SW8040**																				
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.26**		**0.44**		0.25	U	0.3	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16	10																					
17	11	**SEMIVOLATILES (µg/L)**																				
18	12	**EPA Method SW8270**																				
19	13	Phenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	14	4-Methylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	15	Isophorone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	16	2,4-Dimethylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	17	Benzoic Acid	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	18	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	19	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	22	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	23	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	24	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	25	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
33	27																					
34	28	**VOLATILES (µg/L)**																				
35	29	**EPA Method SW8260**																				
36	30	Acetone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	31	Carbon Disulfide	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	32	2-Butanone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	33	Benzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	34	Bromoform	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	35	Toluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	36	Ethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	37	Styrene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	38	m,p-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	39	o-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	40	1,3,5-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	41	1,2,4-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	42	Isopropylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	43	n-Propylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	44	tert-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	45	sec-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	46	4-Isopropyltoluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	47	n-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	48	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
55	49																					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	51	**Method OR-DEQ**																				
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																					
62	56	**PRIORITY POLLUTANT**																				
63	57	**METALS (mg/L)**																				
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D	
4			CB85B		CL03S		CT67M		DE87D		DM30O		DW48G		ED34C		EN00I		ER93O		EZ03G	
5			8/31/00		11/9/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																					
71	65	**MAJOR IONS AND CONVENTIONALS**																				
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D	
4			CB85B		CL03S		CT67M		DE87D		DM30O		DW48G		ED34C		EN00I		ER93O		EZ03G	
5			8/31/00		11/9/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
86	80	**FIELD PARAMETERS**																				
87	81	pH (avg)	6.48		6.12		6.08		6.38		6.60		6.44		6.26		6.45		6.64		6.57	
88	82	Temperature (° C) (avg)	14.1		12.8		13.9		14.7		15.2		13.8		14.5		15.5		16.0		14.6	
89	83	Conductivity (um/hos)	338		265		523		486		623		435		422		393		455		511	
90	84	Dissolved oxygen (mg/L) (avg)	2.14		1.25		0.37		0.69		1.82		3.27		7.60		4.42		0.82		0.69	
91	85																					
92	86	**DIOXINS AND FURANS (ng/L)**																				
93	87	**Method 8290**																				
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																						
120																						
121																						

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2																						
3			LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D		LW18D	
4			CB85B		CL03S		CT67M		DE87D		DM30O		DW48G		ED34C		EN00I		ER93O		EZ03G	
5			8/31/00		11/9/00		2/14/01		6/5/01		8/13/01		11/29/01		2/28/02		6/27/02		08/27/02		11/12/02	
122		**PAHs (µg/L)**																				
123		**EPA Method SW8270 SIM**																				
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
2																												
3			O		O		O		O		O		O		O		O		O		O		O		O		O	
4			S177M		T176J		U235P		V208J		W391L		Y314M		Z225S		Z960Y		AH27A		AU45O		BC30B		BH96A		BR64A	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
10	4	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	**8.9**		**20**		**2.8**		2.0	U	2.0	U	2.0	U	**4.1**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		**1.0**		1.0	U	**1.2**		1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	**2.2**		**2.0**		1.0	U	1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.2**		1.0	U	1.0	U	**1.9**		1.0	U	1.0	U	**1.7**	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	**1.0**	J2	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	**6.2**		**9.4**		**6.0**		8.5	U	**7.0**		**27**		5.0	U	5.0	U	**17**		5.0	U	17	U	**6.7**	M
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**7.1**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	**180**		**690**		**94**		1.0	U	1.0	U	**34**		**39**		**2.3**		**37**		**28**		1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	**1.1**		**1.6**		1.0	U	1.0	U	**6.3**		**5.3**		1.0	U	1.0	U	**2.5**		1.0	U	**1.5**		1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	**1.5**		1.0	U	1.0	U	**5.0**		**3.8**		1.0	U	1.0	U	**1.6**		1.0	U	**1.1**		1.0	U
45	39	o-Xylene	1.0	U	**1.3**		1.0	U	1.0	U	1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	**1.0**	J2	1.0	U	1.0	U	**2.2**		**4.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	**15**		**22**	J2	**1.2**		**18**		**28**		**71**		1.0	U	**2.2**		**20**		**7.8**		**27**		**6.0**	
49	43	n-Propylbenzene	1.0	U	**9.8**		**7.2**		1.0	U	1.0	U	**14**		**51**		1.0	U	**2.0**		**15**		**2.3**		**12**		**3.0**	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**	J1	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	**7.7**		**6.1**	J2	**1.3**		**5.2**		**10**	J2	**7.4**		**8.5**		**7.9**		**6.4**		**1.6**		**4.3**		**6.9**	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	**1.9**		**1.2**	J2	1.0	U	1.0	U	**2.9**		**3.7**		**1.4**		**2.9**		**2.7**		1.0	U	**1.1**		**1.0**	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																					
3		O		O		O		O		O		O		O		O		O		O	
4		CB85C		CL03P		CT55I		DE87A		DM30S		DW48E		ED23F		EM75L		ER93A		EY88A	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
7	**CHLORINATED PHENOLS (µg/L)**																				
8	**EPA Method SW8040**																				
9	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
16																					
17	**SEMIVOLATILES (µg/L)**																				
18	**EPA Method SW8270**																				
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.2	U	2.2	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.3	U	3.3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	56	U	54	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.4	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.4	U
28	Acenaphthene	**1.9**		**1.8**		1.0	U	1.0	U	**1.3**		1.0	U	1.0	U	1.0	U	1.1	U	**1.7**	
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
30	Fluorene	**2.9**		**3.5**		**2.0**		**1.6**		**1.6**		1.0	U	1.0	U	1.0	U	1.1	U	**2.1**	
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	**2.2**		1.0	U	**1.1**		**2.0**		1.0	U	4.0	U	4.0	U	4.4	U	4.3	U
33																					
34	**VOLATILES (µg/L)**																				
35	**EPA Method SW8260**																				
36	Acetone	**45**		**11**			R	**8.7**		5.0	U	5.0	U	5.0	U	**11**		**5.7**		5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	**18**		**7.7**		1.0	U	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U	**2.6**		**40**	
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	**1.8**		**3.0**		**2.3**		**1.6**		**1.1**		**2.4**		1.0	U	1.0	U	1	U	**2.5**	
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	**1.3**		**2.6**		**2.6**		**1.9**		**1.1**		**2.5**		1.0	U	1.0	U	1	U	**2.1**	
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	1.0	U	**1.4**		1.0	U	**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	**26**		**33**		**26**		**37**		**32**		**64**		**31**		**30**		**5.6**		**46**	
49	n-Propylbenzene	**15**		**18**		**15**		**22**		**13**		**36**		**19**		**7.3**		**4.1**		**46**	
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	**5.1**		**6.7**		**4.4**		**5.7**		**5.0**		**6.3**		**6.6**		**5.5**		**5.9**		**7.7**	
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	**2.0**		**2.5**		**1.6**		**2.2**		**2.0**		**2.8**		**2.9**		**1.8**		**1.2**		**5.3**	
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	**Method OR-DEQ**																				
58	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																					
62	**PRIORITY POLLUTANT**																				
63	**METALS (mg/L)**																				
64	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			O		O		O		O		O		O		O		O		O		O		O		O		O	
4			S177M		T176J		U235P		V208J		W391L		Y314M		Z225S		Z960Y		AH27A		AU45O		BC30B		BH96A		BR64A	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**330**	J2	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		O		O		O		O		O		O		O		O		O		O	
4		CB85C		CL03P		CT55I		DE87A		DM30S		DW48E		ED23F		EM75L		ER93A		EY88A	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
66	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70																					
71	**MAJOR IONS AND CONVENTIONALS**																				
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			O		O		O		O		O		O		O		O		O		O		O		O		O	
4			S177M		T176J		U235P		V208J		W391L		Y314M		Z225S		Z960Y		AH27A		AU45O		BC30B		BH96A		BR64A	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.77		6.82		6.86		6.79		6.43		6.39		6.32		6.62		5.57		6.70		6.27		6.62		6.39	
88	82	Temperature (° C) (avg)	12.3		15.7		13.6		14.2		14.1		15.0		13.3		14.6		15.0		17.8		13.0		15.0		15.6	
89	83	Conductivity (um/hos)	413		412		389		471		437		531		183		366		391		441		337		427		413	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		3.36		1.68		1.41		2.44		1.85		1.93		1.58		1.58		1.82	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		O		O		O		O		O		O		O		O		O		O	
4		CB85C		CL03P		CT55I		DE87A		DM30S		DW48E		ED23F		EM75L		ER93A		EY88A	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
86	**FIELD PARAMETERS**																				
87	pH (avg)	5.85		5.70		6.27		6.43		6.80		6.62		6.27		6.43		6.18		6.79	
88	Temperature (° C) (avg)	15.9		13.4		16.5		14.5		15.9		12.5		15.3		17.3		17.3		14.0	
89	Conductivity (um/hos)	409		437		445		510		563		536		500		471		464		592	
90	Dissolved oxygen (mg/L) (avg)	1.16		0.39		2.15		2.40		1.89		4.34		7.41		4.16		2.18		1.93	
91																					
92	**DIOXINS AND FURANS (ng/L)**																				
93	**Method 8290**																				
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																					
120																					
121																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			O		O		O		O		O		O		O		O		O		O		O		O		O	
4			S177M		T176J		U235P		V208J		W391L		Y314M		Z225S		Z960Y		AH27A		AU45O		BC30B		BH96A		BR64A	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		**0.47**		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		**0.31**		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		**0.92**		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		**0.28**	M	NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		O		O		O		O		O		O		O		O		O		O	
4		CB85C		CL03P		CT55I		DE87A		DM30S		DW48E		ED23F		EM75L		ER93A		EY88A	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
122	**PAHs (µg/L)**																				
123	**EPA Method SW8270 SIM**																				
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			R		R		R		R		R		R		R		R		R		R		R		R		R	
4			S177N		T176K		U235Q		V208K		W391M		Y314N		Z225T		Z960Z		AH27B		AU45P		BC30C		BH96Y		BR64B	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
6																												
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
10	4	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	**18**		**8.4**		2.0	U	2.0	U	2.0	U	**6.1**		**22**		**16**		**3.8**		**6.3**		2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	**4.0**	J2	**2.8**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	**13**		**6.9**		5.0	U	**11**		**8.9**		**17**		15	U	**7.5**		5.0	U	5.0	U	14	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	15	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	**410**		**990**		**4.7**		1.0	U	**2.5**		**160**		**120**		**740**		**57**		**120**		1.0	U	**2.1**		**9.3**	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	2.9		1.0	U	1.0	U	1.0	U	**6.0**		**3.5**		3.0	U	1.0	U	**6.0**		1.0	U	**1.2**		1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**14**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	2.9		1.0	U	1.0	U	1.0	U	**6.4**		**2.1**		**4.9**		1.0	U	**6.9**		1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.8		1.0	U	1.0	U	1.0	U	**1.2**		1.0	U	3.0	U	1.0	U	**1.1**		1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.5**		**1.4**		**15**		1.0	U	**1.4**		1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3.5**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	**2.6**		**16**		**5.1**	J2	1.0	U	**12**		**43**		**37**		**46**		**11**		**43**		1.0	U	**8.4**		**4.8**	
49	43	n-Propylbenzene	**1.7**		**3.7**		**1.6**		1.0	U	**2.4**		**19**		**19**		**51**		**3.9**		19	U	1.0	U	**5.4**		**1.2**	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**2.7**		**5.4**		**2.0**	J2	1.0	U	**3.2**		**5.1**	J2	**5.0**		**4.8**		**3.2**		**6.0**		1.0	U	**2.5**		**3.0**	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	3.0		1.0	U	1.0	U	1.0	U	**2.3**		**1.4**		**16**		**1.0**		2.5	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	15	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
2																					
3		R		R		R		R		R		R		R		R		R		R	
4		CB85D		CL03Q		CT55J		DE87B		DM30T		DW48F		ED23G		EM75M		ER93B		EY88B	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
7	**CHLORINATED PHENOLS (µg/L)**																				
8	**EPA Method SW8040**																				
9	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
16																					
17	**SEMIVOLATILES (µg/L)**																				
18	**EPA Method SW8270**																				
19	Phenol	**8.4**		**6.4**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.2	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.2	U	3.3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	53	U	54	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.4	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.4	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	**1.6**		1.0	U	**5.4**		1.0	U	4.0	U	4.0	U	4.3	U	4.3	U
33																					
34	**VOLATILES (µg/L)**																				
35	**EPA Method SW8260**																				
36	Acetone	**22**		**12**			R	5.0	U	**10**		**5.0**		5.0	U	**11**		**14**		5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	**5.0**	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	**120**		**77**		**36**		**3.1**		**13**		1.0	U	**41**		1.0	U	**32**		**7.7**	
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	**6.3**		**3.6**		**3.0**		**2.9**		**2.8**		**1.5**		1.0	U	1.0	U	**2.9**		**1.6**	
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	**5.8**		**2.4**		**1.8**		**4.1**		**3.4**		**1.6**		1.0	U	1.0	U	**3.5**		**1.4**	
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	**33**		**24**		**11**		**26**		**30**		**17**		**2.6**		**7.3**		**36**		**34**	
49	n-Propylbenzene	**18**		**14**		**5.1**		**9.1**		**16**		**6.8**		1.0	U	1.0	U	**14**		**20**	
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	**5.6**		**4.4**		**3.4**		**4.7**		**3.8**		**2.9**		**2.3**		**2.2**		**5.4**		**4.7**	
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	2.0	U	1.3	U	1.0	U	1.4	U	1.0	U	1.0	U	1.0	U	1.0	U	2.2	U	**2**	
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	**Method OR-DEQ**																				
58	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																					
62	**PRIORITY POLLUTANT**																				
63	**METALS (mg/L)**																				
64	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			R		R		R		R		R		R		R		R		R		R		R		R		R	
4			S177N		T176K		U235Q		V208K		W391M		Y314N		Z225T		Z960Z		AH27B		AU45P		BC30C		BH96Y		BR64B	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**340**	J2	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																											

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		R		R		R		R		R		R		R		R		R		R	
4		CB85D		CL03Q		CT55J		DE87B		DM30T		DW48F		ED23G		EM75M		ER93B		EY88B	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
66	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70																					
71	**MAJOR IONS AND CONVENTIONALS**																				
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			R		R		R		R		R		R		R		R		R		R		R		R		R	
4			S177N		T176K		U235Q		V208K		W391M		Y314N		Z225T		Z960Z		AH27B		AU45P		BC30C		BH96Y		BR64B	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.66		6.78		6.72		6.84		6.60		6.55		6.36		6.06		5.72		6.87		6.86		6.75		6.42	
88	82	Temperature (° C) (avg)	12.8		15.8		14.1		14.3		14.8		15.0		13.5		14.4		15.2		16.5		15.7		14.1		15.8	
89	83	Conductivity (um/hos)	503		629		1007		319		510		591		179		246		471		566		578		533		502	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		3.54		1.35		1.16		2.27		1.61		2.26		1.33		0.93		2.10	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120																												
121																												

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		R		R		R		R		R		R		R		R		R		R	
4		CB85D		CL03Q		CT55J		DE87B		DM30T		DW48F		ED23G		EM75M		ER93B		EY88B	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
86	**FIELD PARAMETERS**																				
87	pH (avg)	6.10		5.91		6.43		6.88		7.00		6.68		5.95		6.64		6.75		NM	
88	Temperature (° C) (avg)	15.0		13.5		15.4		14.5		15.1		14.2		14.5		15.2		15.8		NM	
89	Conductivity (um/hos)	560		571		661		694		628		600		170		591		631		NM	
90	Dissolved oxygen (mg/L) (avg)	1.90		0.69		2.01		1.49		1.26		4.02		7.80		4.86		1.19		NM	
91																					
92	**DIOXINS AND FURANS (ng/L)**																				
93	**Method 8290**																				
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																					
120																					
121																					

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			R		R		R		R		R		R		R		R		R		R		R		R		R	
4			S177N		T176K		U235Q		V208K		W391M		Y314N		Z225T		Z960Z		AH27B		AU45P		BC30C		BH96Y		BR64B	
5			4/1/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/17/99		5/17/99		9/22/99		12/7/99		2/16/00		5/23/00	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		R		R		R		R		R		R		R		R		R		R	
4		CB85D		CL03Q		CT55J		DE87B		DM30T		DW48F		ED23G		EM75M		ER93B		EY88B	
5		8/30/00		11/8/00		2/13/01		6/5/01		8/14/01		11/29/01		2/26/02		6/25/02		08/26/02		11/11/02	
122	**PAHs (µg/L)**																				
123	**EPA Method SW8270 SIM**																				
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3			J3		J3		J3		J3		J3		J3		J3	
4			S177K		T176R		U235L		V224Q		W371M		Y314K		Z225Q	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98	
7	1	**CHLORINATED PHENOLS (µg/L)**														
8	2	**EPA Method SW8040**														
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	**0.36**		0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	U
16	10															
17	11	**SEMIVOLATILES (µg/L)**														
18	12	**EPA Method SW8270**														
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27															
34	28	**VOLATILES (µg/L)**														
35	29	**EPA Method SW8260**														
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	**110**		1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**														
57	51	**Method OR-DEQ**														
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA	
61	55															
62	56	**PRIORITY POLLUTANT**														
63	57	**METALS (mg/L)**														
64	58	Arsenic (7060)	**0.010**		**0.012**		0.05	U	0.05	U	**0.011**		**0.014**		**0.017**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	**0.014**		**0.018**		**0.012**	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3			J3		J3		J3		J3		J3		J3		J3	
4			S177K		T176R		U235L		V224Q		W371M		Y314K		Z225Q	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98	
66	60	Copper (6010)	0.002	U	**0.005**		0.002	U	**0.005**		**0.017**		**0.020**		**0.013**	
67	61	Lead (7421)	0.001	U	**0.002**		0.02	U	0.02	U	**0.006**		**0.007**		**0.003**	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	**0.01**		**0.01**		**0.01**	
69	63	Zinc (6010)	0.004	U	**0.013**		**0.018**		**0.010**		**0.034**	J2	**0.048**		**0.036**	
70	64															
71	65	**MAJOR IONS AND CONVENTIONALS**														
72	66	Calcium (mg/L) (6010)	**94.6**		**101**		**103**		**90.2**		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**51.7**		**56.1**		**56.1**		**50.6**		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**1.8**		**1.9**		**2.0**		**1.6**		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**22.5**		**23.5**		**23.8**		**22.1**		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**470**		**460**	J2	**510**		**470**		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**470**		**460**	J2	**510**		**470**		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**580**	J2	**480**		**510**		**480**		**540**		**470**	
80	74	Chloride (mg/L) (EPA 325.2)	**9.9**		**9.3**		**11**		**12**		**12**		**13**		**12**	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	**0.013**		**0.016**	J2	NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.012**	J	**0.012**	J2	0.010	U	0.010	UJ	NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.014**		0.010	U	**0.013**		**0.016**	J2	NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**2.8**	J	2.5	U	2.5	U	2.5	U	NA		NA		NA	
85	79															

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3			J3		J3		J3		J3		J3		J3		J3	
4			S177K		T176R		U235L		V224Q		W371M		Y314K		Z225Q	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98	
86	80	**FIELD PARAMETERS**														
87	81	pH (avg)	6.78		6.80		6.85		6.70		6.53		6.46		6.43	
88	82	Temperature (° C) (avg)	13.9		16.3		13.7		13.4		13.4		14.9		11.9	
89	83	Conductivity (um/hos)	859		765		673		771		788		916		422	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		0.74		3.45		2.45	
91	85															
92	86	**DIOXINS AND FURANS (ng/L)**														
93	87	**Method 8290**														
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA	
119																
120																
121																

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3			J3		J3		J3		J3		J3		J3		J3	
4			S177K		T176R		U235L		V224Q		W371M		Y314K		Z225Q	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98	
122		**PAHs (µg/L)**														
123		**EPA Method SW8270 SIM**														
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA	

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
2															Dup of RW2				Dup of RW2				Dup of RW2			
3			RW2		RW2		RW2		RW2		RW2		RW2		X		RW2		X		RW2		X		RW2	
4			AH76G		AU45N		BC30E		BH96F		BR64P		CD97A		CD97B		CL03N		CL03M		CT37L		CT37M		DE87P	
5			5/20/99		9/23/99		12/7/99		2/17/00		5/25/00		9/13/00		9/13/00		11/9/00		11/9/00		2/13/01		2/13/01		6/6/01	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	210		7.7		0.25	U	300		46		580		630		45		38		21	J	19	J	0.25	U
10	4	2,4,6-Trichlorophenol	1.9		0.25	U	0.25	U	3.1		0.25	U	2.3		2.5		0.25	U	0.25	U	NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.31		0.25	U	0.25	U	0.45		0.25	U	0.48	U	0.51	U	0.25	U	0.25	U	NA		NA		NA	
12	6	2,4,5-Trichlorophenol	5.2	U	0.70	U	0.53	U	13	U	1.2	U	10	U	11	U	1.2	U	1.1		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	15		0.71		0.33		18		8.0		42		45		3.6		3.5		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	1.8		0.91		0.25	U	3.4		1.3		7.0		7.8		1.3		1.2		NA		NA		NA	
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	13		2.0	U	2.0	U	2.0	U	170	J2	150	J2	85		97		8.1		8.0		2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	6.0	J2	5.3	J2	14		18		2.9		2.7		1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	21		22		10	U	10	U	10	U
24	18	Naphthalene	1.3		18		3.8		9.7		3.7		16		16		13		14		2.5		2.2		1.0	U
25	19	2-Methylnaphthalene	1.0	U	33		1.8		20		23		44		41		31		32		10		9.1		2.0	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	4.5	J1	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	25		5.0	U	16	J	14	J	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	140		9.6		5.0	U	680		51		490	J2	440	J2	77		95		26	J	30	J	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.5	U	1.7		1.1		1.0		1.0	U	1.0	U	2.9	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	15	U	17	M	5.0	U	10	U	5.0	U	24	M	27	M	20		17		14	U	13	U	5.0	U
37	31	Carbon Disulfide	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	15	U	22	M	5.0	U	23	M	5.0	U	24		28		30		24		5.0	U	5.0	U	5.0	U
39	33	Benzene	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2.8		2.7		1.2		1.2		1.0	U
40	34	Bromoform	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	3.0	U	2.6		1.0	U	1.0	U	1.0	U	2.1		2.2		2.0	U	1.5		1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	25		45		13		22		3.9		28		27		27		29		4.8		4.3		1.0	U
43	37	Styrene	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	61		120		25		53		8.2		78		76		78		81		10		9.6		1.0	U
45	39	o-Xylene	20		37		11		26		2.6		28		28		15		15		2.1		2.2		1.0	U
46	40	1,3,5-Trimethylbenzene	100		91		42		120		49		100		100		58		66		12		11		1.0	U
47	41	1,2,4-Trimethylbenzene	370		330		110		360		150		180	M	190	M	200		220		42		40		3.6	
48	42	Isopropylbenzene	78		65		29		79		52		70		73		57		68		30		29		11	
49	43	n-Propylbenzene	130		77		38		110		86		88		90		75		90		37		34		12	
50	44	tert-Butylbenzene	4.0		3.1		1.0	U	3.5		3.3		3.2		3.4		2.1		2.8		1.2		1.3		1.0	U
51	45	sec-Butylbenzene	18		17		5.5		21		16		15		16		11		14		4.9		4.7		1.6	
52	46	4-Isopropyltoluene	19		13		4.6		20		7.7		11		12		5.7		7.6		1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	20		17.0	U	5.2	U	24		15	M	16	M	17	M	11		14	U	3.5		3.4		1.2	U
54	48	Naphthalene	18		30		8.3		25		7.0		28		30		22		25		5.0	U	5.0	U	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	2.2		2.6		1.2		2.4		1.5		3.4		3.8		5.2		5.0		1.7		1.7		0.86	
59	53	**TPH-D Motor Oil**	0.50	U	0.50	U	0.50	U	NA		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
60	54	**TPH-Gasoline**	5.7		10		1.9		NA		5.1		7.7		7.7		4.6		5.0		1.8		1.7		0.60	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	0.034		0.025		0.022		0.032		0.036		0.022		0.022		0.021		0.021		0.016		0.016		0.017	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
2		Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2		
3		X		RW2		W		RW2		W		RW2		W		RW2		W		RW2		W		RW2
4		DE87O		DM30I		DM30H		DW29E		DW29C		ED30D		ED30A		EN00D		EN00A		ER93G		ER93I		EZ17D
5		6/6/01		8/13/01		8/13/01		11/27/01		11/27/01		2/27/02		2/27/02		6/27/02		6/27/02		08/27/02		08/27/02		11/13/02
7	**CHLORINATED PHENOLS (µg/L)**																							
8	**EPA Method SW8040**																							
9	Pentachlorophenol	**0.68**		**5.0**		**5.0**		**1.7**		**1.8**		NA		NA		NA		NA		NA		NA		NA
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
16																								
17	**SEMIVOLATILES (µg/L)**																							
18	**EPA Method SW8270**																							
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	UJ	2.0	U	**10**		**10**		2.0	U	**5.9**	J	**15**		**13**		2.2
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3.8**	J	1.0	UJ	1.0	U	**1.1**		**1.8**		**1.5**		1.1
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U	1.1
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.8	U	3.3	U	3.3
23	Benzoic Acid	10	U	10	U	10	U	30	U	30	U	50	U	50	U	50	U	50	U	62	U	54	U	54
24	Naphthalene	1.0	U	**1.6**		**1.8**		**1.8**	J	**1.8**	J	**7.4**		**7.0**		**5.2**	J	**6.4**	J	**5.9**		**5.6**		**4.1**
25	2-Methylnaphthalene	**2.0**		**6.5**		**6.4**		**5.7**	J	**7.0**	J	**18**		**17**		**11**	J	**14**	J	**15**		**13**		**11**
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.2	U	5.4	U	5.4
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.2	U	5.4	U	5.4
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U	1.1
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U	1.1
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.1	U	1.1
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	**8.6**		**8.2**		**76**		**75**		**26**	J	**36**	J	**37**
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	4.0	U	4.0	U	4.0	U	4.0	U	5	U	4.3	U	4.3
33																								
34	**VOLATILES (µg/L)**																							
35	**EPA Method SW8260**																							
36	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.1	U	**5.2**		**6.4**		5
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U	1
38	2-Butanone	5.0	U	**5.2**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U	5
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.5**		**2.5**		**2.3**		**2.2**		**3.4**		**3.3**		**3.4**
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U	1
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		**1.7**		1.0	U	1.0	U	1	U	1	U	1
42	Ethylbenzene	1.0	U	**3.1**		**3.4**		**1.5**		**1.4**		**27**		**28**		**15**		**15**		**13**		**13**		**7.9**
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U	1
44	m,p-Xylene	1.0	U	**6.8**		**7.8**		**3.0**		**2.6**		**59**		**62**		**32**		**33**		**38**		**34**		**17**
45	o-Xylene	1.0	U	1.0	U	**1.6**		1.0	U	1.0	U	**14**		**14**		1.0	U	1.0	U	**6.5**		**5.9**		**2.3**
46	1,3,5-Trimethylbenzene	1.0	U	**6.5**		**6.7**		**3.9**		**3.7**		**44**		**44**		**21**		**23**		**27**		**24**		**9.8**
47	1,2,4-Trimethylbenzene	**3.8**		**23**		**26**		**13**		**12**		**150**		**150**		**62**		**62**		**84**		**78**		**37**
48	Isopropylbenzene	**11**		**24**		**25**		**30**		**30**		**54**		**51**		**46**		**44**		**44**		**45**		**37**
49	n-Propylbenzene	**12**		**28**		**29**		**36**		**37**		**76**		**73**		**58**		**57**		**58**		**59**		**46**
50	tert-Butylbenzene	1.0	U	**1.1**	M	**1.0**		**1.1**		**1.1**		**2.0**		**1.9**		**1.6**		**1.4**		**1.7**		**1.8**		**1.6**
51	sec-Butylbenzene	**1.7**		**3.9**		**4.1**		**4.7**		**4.7**		**9.6**		**9.5**		**8.4**		**8.2**		**8.3**		**8.4**		**6.7**
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**4.4**		**4.3**		**2.1**		**2.0**		**2.6**		**2.6**		**1.3**
53	n-Butylbenzene	1.2	U	**3.0**	M	**3.3**		**3.7**	M	**3.9**	M	**9.0**		**9.0**		6.5	U	6.1	U	7.6	U	7	U	**4.9**
54	Naphthalene	5.0	U	5.0	U	**5.0**		5.0	U	5.0	U	**15**		**16**		**8.7**		**8.5**		**10**		**9.9**		**6.3**
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																							
57	**Method OR-DEQ**																							
58	**TPH-Diesel**	**0.88**		**1.4**		**1.2**		**1.4**		**1.4**		**1.9**	J	**0.89**	J	**1.8**		**1.9**		**1.7**		**1.6**		**1.3**
59	**TPH-D Motor Oil**	0.50	U	0.50	U	0.50	U	0.50	U	NA		0.50	U	0.50	U	0.50	U	0.50	U	0.5	U	0.5	U	0.5
60	**TPH-Gasoline**	**0.66**		**1.3**		**1.3**		**1.2**		NA		**4.0**	J	**3.8**		**2.6**		**2.6**		**2.9**		**3**		**2.1**
61																								
62	**PRIORITY POLLUTANT**																							
63	**METALS (mg/L)**																							
64	Arsenic (7060)	**0.016**		**0.019**		**0.020**		**0.018**		**0.022**		**0.020**		**0.022**		**0.019**		**0.020**		**0.021**		**0.021**		0.05
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AX	AY	AZ
1				
2			Dup of RW2	
3			W	
4			EZ17B	
5			11/13/02	
6				
7	**CHLORINATED PHENOLS (µg/L)**			
8	**EPA Method SW8040**			
9	Pentachlorophenol		NA	
10	2,4,6-Trichlorophenol		NA	
11	2,3,6-Trichlorophenol		NA	
12	2,4,5-Trichlorophenol		NA	
13	2,3,4-Trichlorophenol		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol		NA	
15	2,3,4,5-Tetrachlorophenol		NA	
16				
17	**SEMIVOLATILES (µg/L)**			
18	**EPA Method SW8270**			
19	Phenol	U	2.2	U
20	4-Methylphenol	U	1.1	U
21	Isophorone	U	1.1	U
22	2,4-Dimethylphenol	U	3.3	U
23	Benzoic Acid	U	54	U
24	Naphthalene		**3.7**	
25	2-Methylnaphthalene		**9.6**	
26	2,4,6-Trichlorophenol	U	5.4	U
27	2,4,5-Trichlorophenol	U	5.4	U
28	Acenaphthene	U	1.1	U
29	Dibenzofuran	U	1.1	U
30	Fluorene	U	1.1	U
31	Pentachlorophenol		**35**	
32	bis(2-Ethylhexyl)phthalate	U	4.3	U
33				
34	**VOLATILES (µg/L)**			
35	**EPA Method SW8260**			
36	Acetone	U	5	U
37	Carbon Disulfide	U	1	U
38	2-Butanone	U	5	U
39	Benzene		**3.1**	
40	Bromoform	U	1	U
41	Toluene	U	1	U
42	Ethylbenzene		**7.3**	
43	Styrene	U	1	U
44	m,p-Xylene		**16**	
45	o-Xylene		**2.2**	
46	1,3,5-Trimethylbenzene		**9.6**	
47	1,2,4-Trimethylbenzene		**36**	
48	Isopropylbenzene		**36**	
49	n-Propylbenzene		**45**	
50	tert-Butylbenzene		**1.5**	
51	sec-Butylbenzene		**6.3**	
52	4-Isopropyltoluene		**1.2**	
53	n-Butylbenzene	M	**4.8**	M
54	Naphthalene		**5.7**	
55				
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**			
57	**Method OR-DEQ**			
58	**TPH-Diesel**		**1.3**	
59	**TPH-D Motor Oil**	U	0.5	U
60	**TPH-Gasoline**		**2.4**	
61				
62	**PRIORITY POLLUTANT**			
63	**METALS (mg/L)**			
64	Arsenic (7060)	U	0.05	U
65	Chromium (6010)	U	0.005	U

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2															Dup of RW2				Dup of RW2				Dup of RW2			
3			RW2		RW2		RW2		RW2		RW2		RW2		X		RW2		X		RW2		X		RW2	
4			AH76G		AU45N		BC30E		BH96F		BR64P		CD97A		CD97B		CL03N		CL03M		CT37L		CT37M		DE87P	
5			5/20/99		9/23/99		12/7/99		2/17/00		5/25/00		9/13/00		9/13/00		11/9/00		11/9/00		2/13/01		2/13/01		6/6/01	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.005**		**0.007**		0.002	U	**0.004**		0.002	U	0.002	U	**0.003**	
67	61	Lead (7421)	**0.001**		**0.001**		0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.016**		**0.042**		**0.025**		**0.031**		**0.016**		**0.022**	J2	**0.030**	J2	**0.116**		**0.122**		**0.022**		**0.022**		**0.058**	J
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**30.0**		NA		NA		NA		NA		NA		NA		NA		NA		**39.8**		**36.8**		**36.5**	
73	67	Magnesium (mg/L) (6010)	**9.90**		NA		NA		NA		NA		NA		NA		NA		NA		**17.1**		**15.8**		**17.2**	
74	68	Potassium (mg/L) (6010)	**2.5**		NA		NA		NA		NA		NA		NA		NA		NA		**2.4**		**2.1**		**3.1**	
75	69	Sodium (mg/L) (6010)	**7.68**		NA		NA		NA		NA		NA		NA		NA		NA		**12.6**		**11.7**		**12.6**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**140**		NA		NA		NA		NA		NA		NA		NA		NA		**220**		**220**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		1.0	U	1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**140**		NA		NA		NA		NA		NA		NA		NA		NA		**220**		**220**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**190**		**190**		**160**		**150**		**160**		**390**		**360**		**320**		**310**		**290**		**280**		**300**	J
80	74	Chloride (mg/L) (EPA 325.2)	**4.7**		**8.8**		**6.7**		**6.6**		**4.2**		**9.1**	J2	**7.4**	J2	**4.7**		**5.0**		**8.9**		**8.5**		**7.7**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.017**		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U	0.010	U	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	NA		NA		NA		NA		NA		NA		NA		NA		**0.018**		**0.016**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.017**		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U	0.010	U	NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**9.3**		NA		NA		NA		NA		NA		NA		NA		NA		**5.2**		**4.3**		NA	
85	79																									

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
1																								
2		Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2		
3		X		RW2		W		RW2		W		RW2		W		RW2		W		RW2		W		RW2
4		DE87O		DM30I		DM30H		DW29E		DW29C		ED30D		ED30A		EN00D		EN00A		ER93G		ER93I		EZ17D
5		6/6/01		8/13/01		8/13/01		11/27/01		11/27/01		2/27/02		2/27/02		6/27/02		6/27/02		08/27/02		08/27/02		11/13/02
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.008**
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		**0.001**		0.02
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	Zinc (6010)	**0.189**	J	**0.020**	J	**0.028**	J	**0.010**		**0.013**		**0.043**	J	**0.016**	J	**0.015**	J	**0.037**	J	**0.034**	J	**0.02**	J	**0.022**
70																								
71	**MAJOR IONS AND CONVENTIONALS**																							
72	Calcium (mg/L) (6010)	**40.7**		**39.0**		**41.0**		**39.4**		**41.6**		**38.9**		**37.5**		**42.3**		**43.3**		NA		NA		NA
73	Magnesium (mg/L) (6010)	**19.1**		**17.1**		**17.8**		**16.4**		**17.5**		**16.2**		**15.3**		**17.0**		**17.5**		NA		NA		NA
74	Potassium (mg/L) (6010)	**3.0**		**2.8**		**2.8**		**2.4**		**2.4**		**2.5**		**2.2**		**2.3**		**2.3**		NA		NA		NA
75	Sodium (mg/L) (6010)	**13.6**		**12.3**		**12.9**		**11.7**		**12.4**		**11.2**		**10.9**		**12.0**		**12.3**		NA		NA		NA
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		**220**		**200**		NA		NA		NA		NA		NA
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		1.0	U	1.0	U	NA		NA		NA		NA		NA
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		**220**		**200**		NA		NA		NA		NA		NA
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**290**	J	**270**	J	**290**	J	**260**		**280**		**270**		**290**		**250**		**270**		**270**		**270**		**270**
80	Chloride (mg/L) (EPA 325.2)	**7.4**		**8.9**		**8.2**		**5.5**		**5.7**		**24**	J	**4.1**	J	**6.1**		**5.8**		**4.6**		**5.1**		**4.8**
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		**0.019**		0.010	U	NA		NA		NA		NA		NA
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		**0.014**	J	**0.038**	J	NA		NA		NA		NA		NA
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		**0.033**		**0.028**		NA		NA		NA		NA		NA
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		**6.3**	J	**9.8**	J	NA		NA		NA		NA		NA
85																								

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AX	AY	AZ
1				
2			Dup of RW2	
3			W	
4			EZ17B	
5			11/13/02	
66	Copper (6010)	J	0.002	UJ
67	Lead (7421)	U	0.02	U
68	Nickel (6010)	U	0.01	U
69	Zinc (6010)		**0.017**	
70				
71	**MAJOR IONS AND CONVENTIONALS**			
72	Calcium (mg/L) (6010)		NA	
73	Magnesium (mg/L) (6010)		NA	
74	Potassium (mg/L) (6010)		NA	
75	Sodium (mg/L) (6010)		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**270**	
80	Chloride (mg/L) (EPA 325.2)		**4.6**	
81	N-Nitrate (mg-N/L) (Calculated)		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA	
85				

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2															Dup of RW2				Dup of RW2				Dup of RW2			
3			RW2		RW2		RW2		RW2		RW2		RW2		X		RW2		X		RW2		X		RW2	
4			AH76G		AU45N		BC30E		BH96F		BR64P		CD97A		CD97B		CL03N		CL03M		CT37L		CT37M		DE87P	
5			5/20/99		9/23/99		12/7/99		2/17/00		5/25/00		9/13/00		9/13/00		11/9/00		11/9/00		2/13/01		2/13/01		6/6/01	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.63		6.65		6.58		6.67		6.56		6.19		6.19		5.55		5.54		6.33		6.33		6.66	
88	82	Temperature (° C) (avg)	14.2		14.7		13.1		14.4		15.0		15.6		15.6		12.7		12.7		12.6		12.7		13.6	
89	83	Conductivity (um/hos)	294		292		260		278		365		463		463		513		513		475		479		573	
90	84	Dissolved oxygen (mg/L) (avg)	1.61		1.37		2.46		0.68		0.74		11.94		11.94		0.53		0.55		0.90		0.95		0.83	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120																										
121																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
2		Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2		
3		X		RW2		W		RW2		W		RW2		W		RW2		W		RW2		W		RW2
4		DE87O		DM30I		DM30H		DW29E		DW29C		ED30D		ED30A		EN00D		EN00A		ER93G		ER93I		EZ17D
5		6/6/01		8/13/01		8/13/01		11/27/01		11/27/01		2/27/02		2/27/02		6/27/02		6/27/02		08/27/02		08/27/02		11/13/02
86	**FIELD PARAMETERS**																							
87	pH (avg)	6.65		6.70		6.68		6.50		6.5		6.27		6.27		6.47		6.47		6.52		6.56		6.19
88	Temperature (° C) (avg)	13.6		15.7		15.6		13.1		13.1		13.5		13.5		14.5		14.5		13.9		13.9		13.6
89	Conductivity (um/hos)	573		455		454		458		458		422		422		450		448		408		409		461
90	Dissolved oxygen (mg/L) (avg)	0.82		0.52		0.37		3.34		3.22		7.06		7.05		4.87		4.72		0.60		0.31		0.55
91																								
92	**DIOXINS AND FURANS (ng/L)**																							
93	**Method 8290**																							
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																								
120																								
121																								

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AX	AY	AZ
1				
2			Dup of RW2	
3			W	
4			EZ17B	
5			11/13/02	
6				
86	**FIELD PARAMETERS**			
87	pH (avg)		6.17	
88	Temperature (° C) (avg)		13.6	
89	Conductivity (um/hos)		461	
90	Dissolved oxygen (mg/L) (avg)		0.34	
91				
92	**DIOXINS AND FURANS (ng/L)**			
93	**Method 8290**			
94	2,3,7,8-TCDF		NA	
95	Total TCDF		NA	
96	2,3,7,8-TCDD		NA	
97	Total TCDD		NA	
98	1,2,3,7,8-PeCDF		NA	
99	2,3,4,7,8-PeCDF		NA	
100	Total PeCDF		NA	
101	1,2,3,7,8-PeCDD		NA	
102	Total PeCDD		NA	
103	1,2,3,4,7,8-HxCDF		NA	
104	1,2,3,6,7,8-HxCDF		NA	
105	2,3,4,6,7,8-HxCDF		NA	
106	1,2,3,7,8,9-HxCDF		NA	
107	Total HxCDF		NA	
108	1,2,3,4,7,8-HxCDD		NA	
109	1,2,3,6,7,8-HxCDD		NA	
110	1,2,3,7,8,9-HxCDD		NA	
111	Total HxCDD		NA	
112	1,2,3,4,6,7,8-HpCDF		NA	
113	1,2,3,4,7,8,9-HpCDF		NA	
114	Total HpCDF		NA	
115	1,2,3,4,6,7,8-HpCDD		NA	
116	Total HpCDD		NA	
117	OCDF		NA	
118	OCDD		NA	
119				
120				
121				

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2															Dup of RW2				Dup of RW2				Dup of RW2			
3			RW2		RW2		RW2		RW2		RW2		RW2		X		RW2		X		RW2		X		RW2	
4			AH76G		AU45N		BC30E		BH96F		BR64P		CD97A		CD97B		CL03N		CL03M		CT37L		CT37M		DE87P	
5			5/20/99		9/23/99		12/7/99		2/17/00		5/25/00		9/13/00		9/13/00		11/9/00		11/9/00		2/13/01		2/13/01		6/6/01	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
131																										

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
1																								
2		Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2				Dup of RW2		
3		X		RW2		W		RW2		W		RW2		W		RW2		W		RW2		W		RW2
4		DE87O		DM30I		DM30H		DW29E		DW29C		ED30D		ED30A		EN00D		EN00A		ER93G		ER93I		EZ17D
5		6/6/01		8/13/01		8/13/01		11/27/01		11/27/01		2/27/02		2/27/02		6/27/02		6/27/02		08/27/02		08/27/02		11/13/02
122	**PAHs (µg/L)**																							
123	**EPA Method SW8270 SIM**																							
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
131																				NA		NA		

TABLE F-11
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - DEEP WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AX	AY	AZ
1				
2			Dup of RW2	
3			W	
4			EZ17B	
5			11/13/02	
122	**PAHs (µg/L)**			
123	**EPA Method SW8270 SIM**			
124	Naphthalene		NA	
125	2-Methylnaphthalene		NA	
126	Acenaphthylene		NA	
127	Acenaphthene		NA	
128	Fluorene		NA	
129	Anthracene		NA	
130	Dibenzofuran		NA	
131				

LANDAU ASSOCIATES

March 7, 2003

RECEIVED MAR 1 0 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the January 2003 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
3/6/03 \\Edmnas\wproc\231\TRANSMIT FAX\Monthly Rpt_Ltr doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
February 2003

SUMMARY OF WORK PERFORMED

- Prepared and submitted the January 2003 monthly report to DEQ.

- Continued operation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 9.9 gpm. HRW-1 did not operate during February. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 4.8 gpm. A total of approximately 10.29 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 483,600 gallons treated in February 2003.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.

- Continued internal review of the ISCO pilot study report.

- Submitted as-built drawings for storm drain modifications and the groundwater intercept system and to DEQ.

- Completed installation of a spill barrier in the bioreactor room of the wastewater treatment system building at the terminal. Spill collection sump, autodialer, and control modifications will be installed in March 2003.

- Continued client review of the 3rd quarter 2002 groundwater monitoring and groundwater interim action status report.

- Continued database input of the 4th quarter 2002 groundwater data and preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report.

- Conducted the 1st quarter 2003 groundwater monitoring event, February 10-13, 2003.

- Continued preparation of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report*.

- Continued incorporation of client comments on the draft *East Property Remedial Action Completion Report* in preparation for submittal to DEQ. The report will document remedial activities in the east property investigation area and demonstrate compliance with cleanup standards.

- Completed the well abandonment work plan for the east property monitoring wells and provided to client for review.

- Continued client review of the draft technical memorandum for interim subsurface investigations in the Phase III study area, including the CPT investigation.

BZTO104(e)017365

RESULTS COLLECTED

- None.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- None.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and of the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Complete client review of the draft 3rd quarter 2002 groundwater monitoring and interim action status report and submit to DEQ.
- Complete preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report and provide to client for review
- Receive data and begin data validation for the 1st quarter 2003 groundwater sampling event.
- Complete internal and client reviews of the ISCO pilot study report and submit to DEQ.
- Install the collection sump, autodialer, and control modifications in the bioreactor room of the wastewater treatment system building at the terminal.
- Collect semi-annual sample of treated stormwater.
- Complete preparation and internal reviews of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation and provide to client.
- Prepare design for use of injection or extraction system in the former PCP mixing area.
- Submit the *East Property Remedial Action Completion Report* to DEQ.
- Submit the well abandonment plan for the east property wells to DEQ.
- Complete client review of the Phase III CPT investigation technical memorandum and submit to DEQ.

BZTO104(e)017366

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1	
4			S177D		T176N		U235H		V224R		W371K		Y336A		Z225M		Z960E		AH49B		AU36A		BC30D		9912050-01A	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		12/8/1999 (d)	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	**3.1**	M	2.0	U	2.0	U	NA	
20	14	4-Methylphenol	**43**		1.0	U	1.0	U	**24**		**39**		**28**		**31**		**35**		**7.1**		1.0	U	**7.0**		NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	NA	
23	17	Benzoic Acid	10	U	10	U	10	U	**10**		10	U	10	U	10	U	10	U	**27**		10	U	10	U	NA	
24	18	Naphthalene	**16**		**12**		**18**		**16**		**20**	J2	**6.8**		**4.4**		**35**		**26**		1.0	U	**12**		NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	**1.5**	J2	**1.1**		1.0	U	**6.4**		**3.8**		1.0	U	**2.1**		NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
32	26	bis(2-Ethylhexyl)phthalate	2.9	U	**2.8**	J2	1.0	U	1.0	U	1.0	U	**2.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	**24**		5.0	U	**6.5**		5.0	U	**75**		5.0	U	5.0	U	36	U	230	U	25	U	25	U	NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	45	U	5.0	U	5.0	U	NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	**11**		**20**		5.0	U	**51**		**11**		230	U	25	U	25	U	NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	**250**		**440**		**190**		**160**		**2400**		**210**		**66**		**190**		NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	45	U	5.0	U	5.0	U	NA	
41	35	Toluene	**6.4**		1.0	U	1.0	U	**4.4**		**1400**		**450**		**190**		**4000**		**3700**		**920**		**290**		NA	
42	36	Ethylbenzene	**5.4**		**5.5**		**1.1**		**1.2**		**11**		**19**		**11**		**140**		**220**		**160**		**32**		NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	**4.2**		**7.0**		**3.8**		**93**		**130**		5.0	U	**5.0**	U	NA	
44	38	m,p-Xylene	**1.2**		**2.5**		**1.1**		**1.7**		**22**		**50**		**33**		**450**		**730**		**390**		**100**		NA	
45	39	o-Xylene	**1.1**		**1.2**		1.0	U	1.0	U	**7.4**		**22**		**14**		**210**		**360**		**200**		**44**		NA	
46	40	1,3,5-Trimethylbenzene	**2.5**		**3.6**		**12**		**6.4**		**13**		**4.8**		**3.8**		**25**		45	U	**8.8**		**5.2**		NA	
47	41	1,2,4-Trimethylbenzene	**4.6**		**8.8**		**47**	J2	**36**		**110**		**30**		**19**		**140**		**88**		**44**		**24**		NA	
48	42	Isopropylbenzene	**7.7**		**9.5**		**34**	J2	**23**		**34**		**11**		**7.4**		**28**		45	U	**9.1**		**6.2**		NA	
49	43	n-Propylbenzene	**3.1**		**4.9**		**21**		**17**		**29**		**13**		**8.8**		**36**		45	U	**9.7**		**8.2**		NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	45	U	5.0	U	5.0	U	NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	45	U	5.0	U	5.0	U	NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	45	U	5.0	U	5.0	U	NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		1.0	U	**1.0**		45	U	5.0	U	5.0	U	NA	
54	48	Naphthalene	**25**		**20**	J2	**52**	J2	**23**		**31**		**12**		**11**		**56**		230	U	25	U	25	U	NA	
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	**0.68**		**0.75**		**1.1**		**1.2**		**1.2**		**0.51**		**1.0**		**9.5**		**2.0**		**0.37**		**0.46**		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.006**		**0.008**		0.05	U	0.05	U	**0.010**		**0.008**		**0.008**		**0.004**		**0.006**		**0.008**		**0.006**		NA	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																Dup of B1										Dup of B1	
3		B1		B1		B1		B1		B1		B1		B1		X		B1		B1		B1		B1		X	
4		BH96T		BR55M		CB68E		CL03B		CT67H		DE68L		DM30L		DM30K		DW37B		ED23A		EM75J		ES04G		ES04A	
5		2/16/00		5/23/00		8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		08/28/02	
7	**CHLORINATED PHENOLS (µg/L)**																										
8	**EPA Method SW8040**																										
9	Pentachlorophenol	**0.14**	J1	**0.27**	J2	**0.43**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.65**		**1.0**		0.25	U	0.29	U	0.29	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
16																											
17	**SEMIVOLATILES (µg/L)**																										
18	**EPA Method SW8270**																										
19	Phenol	**4.6**		2.0	U	3.0	U	2.0	U	**2.6**		100	UJ	2.0	U	2.0	U	**6.2**		**15**		2.0	U	2.3	U	2.3	U
20	4-Methylphenol	**57**		**20**		**47**		**5.6**		**8.4**		**130**	J	**50**		**54**		**44**		**170**		**46**		1.2	U	**1.3**	
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.2	U
22	2,4-Dimethylphenol	**7.7**		3.0	U	3.0	U	3.0	U	3.0	U	150	UJ	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	**4.1**		**4.5**	
23	Benzoic Acid	10	U	**160**		**73**		10	U	10	U	500	UJ	10	U	10	U	50	U	50	U	50	U	58	U	58	U
24	Naphthalene	**51**		**34**		**27**		**2.0**		**5.1**		50	UJ	**13**		**14**		1.0	U	**17**		**15**		**2.8**		**3.3**	
25	2-Methylnaphthalene	**19**		**12**		**9.6**		1.0	U	1.0	U	50	UJ	**6.8**		**7.4**		1.0	U	**10**		**5.9**		1.2	U	**1.8**	
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	250	UJ	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.8	U	5.8	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	250	UJ	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.8	U	5.8	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.2	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.2	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.2	U	1.2	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	250	UJ	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.8	U	5.8	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	50	UJ	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.7	U	4.7	U
33																											
34	**VOLATILES (µg/L)**																										
35	**EPA Method SW8260**																										
36	Acetone	5.0	U	5.0	U	**410**		5.0	U	**1200**		**1100**		**230**		**280**		37	U	**250**		**18**		25	U	25	U
37	Carbon Disulfide	1.0	U	1.0	U	25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	1.0	U	3.0	U	5	U	5	U
38	2-Butanone	55	U	**6.1**		120	U	**28**		**260**		100	U	100	U	**160**		**13**		**54**		15	U	25	U	25	U
39	Benzene	**4700**		**990**		**1100**		**160**		**610**		**560**		**180**	J	**230**	J	**120**		**1000**		**240**		**160**		**130**	
40	Bromoform	1.0	U	1.0	U	25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	1.0	U	3.0	U	5	U	5	U
41	Toluene	**4700**		**1800**		**3600**		**1200**		**2000**		**3400**		**1400**	J	**1900**	J	**800**		**2800**		**520**		**210**		**210**	
42	Ethylbenzene	**160**		**110**		**300**		**100**		**160**		**220**		**130**		**150**		**86**		**170**		**97**		**88**		**74**	
43	Styrene	**29**		**8.3**	M	25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	**4.3**		3.0	U	5	U	5	U
44	m,p-Xylene	**1000**		**340**		**990**		**320**		**590**		**830**		**450**		**530**		**350**		**290**		**270**		**230**		**210**	
45	o-Xylene	**490**		**180**		**420**		**160**		**240**		**370**		**210**		**250**		**180**		**210**		**150**		**120**		**100**	
46	1,3,5-Trimethylbenzene	**46**		**18**		**37**		**15**		**31**		**37**		**33**		**37**		**29**		**37**		**22**		**18**		**19**	
47	1,2,4-Trimethylbenzene	**150**		**72**		**160**		**61**		**100**		**160**		**110**		**130**		**100**		**94**		**73**		**54**		**56**	
48	Isopropylbenzene	**28**		**10**		25	U	**9.0**		30	U	20	U	20	U	20	U	**11**		**12**		**11**		**7**		**8.5**	
49	n-Propylbenzene	**40**		**17**		**31**		**15**		30	U	**33**		**22**		**24**		**19**		**15**		**16**		**12**		**13**	
50	tert-Butylbenzene	1.0	U	1.0	U	25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	1.0	U	3.0	U	5	U	5	U
51	sec-Butylbenzene	**2.8**		**1.4**		25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	1.0	U	3.0	U	5	U	5	U
52	4-Isopropyltoluene	**2.7**		**1.1**		25	U	1.0	U	30	U	20	U	20	U	20	U	1.0	U	**1.0**		3.0	U	5	U	5	U
53	n-Butylbenzene	**4.5**		2.0	U	25	U	1.8	U	30	U	20	U	20	U	20	U	3.2	U	**4.0**	M	3.0	U	5	U	5	U
54	Naphthalene	**82**		**36**		120	U	**25**		150	U	100	U	100	U	100	U	**39**		**37**		**24**		25	U	25	U
55																											
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	**Method OR-DEQ**																										
58	**TPH-Diesel**	**4.8**		**0.44**		**1.4**		**0.37**		**2.1**		**47**		**8.7**	J	**6.9**	J	**0.94**		**12**		**1.3**		**0.64**		**0.9**	
59	**TPH-D Motor Oil**	NA		0.50	U	0.50	U	0.50	U	0.50	U	5.0	U	5.0	U	5.0	U	0.5	U	0.50	U	0.50	U	0.5	U	0.5	U
60	**TPH-Gasoline**	NA		**17**		**36**		**8.8**		**15**		**25**		**19**		**19**		**6.8**		**16**		**7.6**		**4.8**	J	**3.4**	J
61																											
62	**PRIORITY POLLUTANT**																										
63	**METALS (mg/L)**																										
64	Arsenic (7060)	**0.006**		**0.004**		**0.007**		**0.007**		**0.007**		**0.010**		**0.009**		**0.009**		**0.007**		**0.006**		**0.006**		**0.004**	J	**0.006**	J
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		B1	
4		EY88C	
5		11/11/02	
6			
7	**CHLORINATED PHENOLS (µg/L)**		
8	**EPA Method SW8040**		
9	Pentachlorophenol	0.25	U
10	2,4,6-Trichlorophenol	NA	
11	2,3,6-Trichlorophenol	NA	
12	2,4,5-Trichlorophenol	NA	
13	2,3,4-Trichlorophenol	NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA	
15	2,3,4,5-Tetrachlorophenol	NA	
16			
17	**SEMIVOLATILES (µg/L)**		
18	**EPA Method SW8270**		
19	Phenol	2.2	U
20	4-Methylphenol	1.1	U
21	Isophorone	1.1	U
22	2,4-Dimethylphenol	3.3	U
23	Benzoic Acid	54	U
24	Naphthalene	1.1	U
25	2-Methylnaphthalene	1.1	U
26	2,4,6-Trichlorophenol	5.4	U
27	2,4,5-Trichlorophenol	5.4	U
28	Acenaphthene	1.1	U
29	Dibenzofuran	1.1	U
30	Fluorene	1.1	U
31	Pentachlorophenol	5.4	U
32	bis(2-Ethylhexyl)phthalate	4.3	U
33			
34	**VOLATILES (µg/L)**		
35	**EPA Method SW8260**		
36	Acetone	5	U
37	Carbon Disulfide	1	U
38	2-Butanone	5	U
39	Benzene	**19**	
40	Bromoform	1	U
41	Toluene	**61**	
42	Ethylbenzene	**22**	
43	Styrene	1	U
44	m,p-Xylene	**71**	
45	o-Xylene	**26**	
46	1,3,5-Trimethylbenzene	**9.3**	
47	1,2,4-Trimethylbenzene	**30**	
48	Isopropylbenzene	**21**	
49	n-Propylbenzene	**26**	
50	tert-Butylbenzene	1	U
51	sec-Butylbenzene	**2.2**	
52	4-Isopropyltoluene	1	U
53	n-Butylbenzene	**2.2**	
54	Naphthalene	**9.1**	
55			
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	**Method OR-DEQ**		
58	**TPH-Diesel**	**0.84**	
59	**TPH-D Motor Oil**	0.5	U
60	**TPH-Gasoline**	**2.4**	
61			
62	**PRIORITY POLLUTANT**		
63	**METALS (mg/L)**		
64	Arsenic (7060)	0.05	U
65	Chromium (6010)	**0.03**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1	
4			S177D		T176N		U235H		V224R		W371K		Y336A		Z225M		Z960E		AH49B		AU36A		BC30D		9912050-01A	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		12/8/1999 (d)	
66	60	Copper (6010)	**0.009**		**0.009**		**0.004**		**0.006**		**0.002**		0.002	U	0.002	U	**0.078**		**0.043**		**0.008**		0.002	U	NA	
67	61	Lead (7421)	0.001	U	**0.001**		0.02	U	0.02	U	**0.003**		0.001	U	0.001	U	**0.002**		**0.002**		0.001	U	0.001	U	NA	
68	62	Nickel (6010)	**0.02**		**0.01**		0.01	U	**0.02**		**0.02**		**0.02**		0.01	U	**0.04**		**0.03**		**0.03**		**0.01**		NA	
69	63	Zinc (6010)	0.004	U	**0.009**		**0.027**		**0.004**		**0.006**	J2	**0.011**		**0.005**		**0.017**	J	**0.006**		**0.009**		0.006	U	NA	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**42.2**		**25.7**		**16.3**		**26.7**		NA		NA		NA		**16.5**		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**16.3**		**9.41**		**6.93**		**9.05**		NA		NA		NA		**3.94**		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**4.2**		**3.3**		**3.2**		**3.4**		NA		NA		NA		**2.7**		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**8.65**		**7.49**		**7.88**		**7.63**		NA		NA		NA		**6.29**		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**190**		**140**	J2	**130**		**170**		NA		NA		NA		**43**		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**190**		**140**	J2	**130**		**170**		NA		NA		NA		**43**		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**200**	J2	**190**		**290**		**360**		**430**		**260**		**170**		**210**		**160**		**150**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**5.1**		**5.9**		**5.6**		**4.3**		**3.5**		**3.4**		**2.4**		**2.0**		**7.9**		**3.8**		**6.6**		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.014**		0.010	U	**0.023**		**0.036**	J2	NA		NA		NA		0.010	U	NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.017	J	**0.053**	J2	**0.033**		0.010	UJ	NA		NA		NA		**0.015**		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.031		**0.032**	J2	**0.056**		**0.036**	J2	NA		NA		NA		**0.013**		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	2.5	U	2.5	U	**5.3**		2.5	U	NA		NA		NA		**2.8**		NA		NA		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																Dup of B1										Dup of B1	
3		B1		B1		B1		B1		B1		B1		B1		X		B1		B1		B1		B1		X	
4		BH96T		BR55M		CB68E		CL03B		CT67H		DE68L		DM30L		DM30K		DW37B		ED23A		EM75J		ES04G		ES04A	
5		2/16/00		5/23/00		8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		08/28/02	
66	Copper (6010)	**0.004**		**0.004**		0.002	U	**0.081**		0.002	U	0.002	U	0.002	U	0.002	U	**0.016**	J	**0.062**		**0.016**		**0.004**		0.002	U
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	0.001	U	**0.008**		**0.004**		**0.003**		0.001	U	0.001	U
68	Nickel (6010)	**0.06**		**0.03**		**0.01**		0.01	U	0.01	U	**0.12**		0.01	U	0.01	U	0.01	U	**0.08**		**0.07**		0.01	U	0.01	U
69	Zinc (6010)	**0.020**		0.006	U	0.006	U	0.006	U	**0.006**		**0.054**		0.006	U	0.006	U	**0.015**	J	**0.033**		**0.016**		**0.007**		0.006	U
70																											
71	**MAJOR IONS AND CONVENTIONALS**																										
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		**23.9**		**88.1**		**15.2**		**16.4**		**19.2**	J	**35.7**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		**9.46**		**40.8**		**6.11**		**6.64**		**7.26**	J	**15.7**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		**2.6**		**5.1**		**2.1**		**2.5**		**2.4**		**4.6**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		**8.18**		**13.3**		**6.43**		**6.89**		**7.22**		**12.3**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**160**		NA		NA		NA		NA		**140**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		1.0	U	NA		NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**160**		NA		NA		NA		NA		**140**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**250**		**220**		**170**		**140**		**250**		**1400**		**140**		**130**		**150**		**430**		**330**		**140**		**140**	
80	Chloride (mg/L) (EPA 325.2)	**3.8**		**7.2**		**1.7**		**2.5**		**3.4**	J	**2.8**		**8.0**	J	**6.0**	J	**2.2**		**3.2**		**6.2**		**5.1**		**4**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		0.010	U	NA		NA		NA		NA		0.010	U	NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		**0.012**	J	NA		NA		NA		NA		**0.021**		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		**0.015**		NA		NA		NA		NA		**0.020**	J	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		**2.8**		NA		NA		NA		NA		2.5	U	NA		NA		NA	
85																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		B1	
4		EY88C	
5		11/11/02	
6			
66	Copper (6010)	**0.073**	
67	Lead (7421)	**0.03**	
68	Nickel (6010)	**0.05**	
69	Zinc (6010)	**0.119**	
70			
71	**MAJOR IONS AND CONVENTIONALS**		
72	Calcium (mg/L) (6010)	NA	
73	Magnesium (mg/L) (6010)	NA	
74	Potassium (mg/L) (6010)	NA	
75	Sodium (mg/L) (6010)	NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**150**	
80	Chloride (mg/L) (EPA 325.2)	**3**	
81	N-Nitrate (mg-N/L) (Calculated)	NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	Sulfate (mg/L) (EPA 375.2)	NA	
85			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1	
4			S177D		T176N		U235H		V224R		W371K		Y336A		Z225M		Z960E		AH49B		AU36A		BC30D		9912050-01A	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		12/8/1999 (d)	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.59		6.61		6.64		6.41		5.64		5.28		5.37		5.11		5.36		6.18		5.93		NM	
88	82	Temperature (° C) (avg)	13.5		15.3		15.7		14.5		12.6		15.5		14.2		12.8		13.4		15.4		13.0		NM	
89	83	Conductivity (um/hos)	466		359		286		457		392		605		379		363		254		263		306		NM	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		1.29		1.83		1.75		2.18		2.20		2.61		1.81		NM	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**4200**	J2	**6300**	J2
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																Dup of B1										Dup of B1	
3		B1		B1		B1		B1		B1		B1		B1		X		B1		B1		B1		B1		X	
4		BH96T		BR55M		CB68E		CL03B		CT67H		DE68L		DM30L		DM30K		DW37B		ED23A		EM75J		ES04G		ES04A	
5		2/16/00		5/23/00		8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		08/28/02	
86	**FIELD PARAMETERS**																										
87	pH (avg)	4.81		6.02		6.13		4.89		5.53		4.70		6.43		6.49		6.14		4.97		6.50		6.50		6.50	
88	Temperature (° C) (avg)	12.3		14.9		17.7		13.4		13.1		14.0		15.1		15.2		13.0		13.1		16.4		16.7		16.8	
89	Conductivity (um/hos)	335		297		243		222		297		1883		259		248		270		501		718		432		413	
90	Dissolved oxygen (mg/L) (avg)	2.15		1.55		1.51		0.84		1.08		1.42		1.59		1.61		3.58		5.92		4.21		0.79		0.60	
91																											
92	**DIOXINS AND FURANS (ng/L)**																										
93	**Method 8290**																										
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																											
120	**ETHANOL (mg/L)**	**5100**		**16**		5.0	U	5.0	U	**5.0**		NA		NA		NA		NA		NA		NA		NA		NA	
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		B1	
4		EY88C	
5		11/11/02	
6			
86	**FIELD PARAMETERS**		
87	pH (avg)	6.8	
88	Temperature (° C) (avg)	15.8	
89	Conductivity (um/hos)	268	
90	Dissolved oxygen (mg/L) (avg)	1.64	
91			
92	**DIOXINS AND FURANS (ng/L)**		
93	**Method 8290**		
94	2,3,7,8-TCDF	NA	
95	Total TCDF	NA	
96	2,3,7,8-TCDD	NA	
97	Total TCDD	NA	
98	1,2,3,7,8-PeCDF	NA	
99	2,3,4,7,8-PeCDF	NA	
100	Total PeCDF	NA	
101	1,2,3,7,8-PeCDD	NA	
102	Total PeCDD	NA	
103	1,2,3,4,7,8-HxCDF	NA	
104	1,2,3,6,7,8-HxCDF	NA	
105	2,3,4,6,7,8-HxCDF	NA	
106	1,2,3,7,8,9-HxCDF	NA	
107	Total HxCDF	NA	
108	1,2,3,4,7,8-HxCDD	NA	
109	1,2,3,6,7,8-HxCDD	NA	
110	1,2,3,7,8,9-HxCDD	NA	
111	Total HxCDD	NA	
112	1,2,3,4,6,7,8-HpCDF	NA	
113	1,2,3,4,7,8,9-HpCDF	NA	
114	Total HpCDF	NA	
115	1,2,3,4,6,7,8-HpCDD	NA	
116	Total HpCDD	NA	
117	OCDF	NA	
118	OCDD	NA	
119			
120	**ETHANOL (mg/L)**	NA	
121			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3			B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1		B1	
4			S177D		T176N		U235H		V224R		W371K		Y336A		Z225M		Z960E		AH49B		AU36A		BC30D		9912050-01A	
5			4/2/97		7/16/97		10/22/97		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99		9/21/99		12/8/99		12/8/1999 (d)	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2																Dup of B1										Dup of B1	
3		B1		B1		B1		B1		B1		B1		B1		X		B1		B1		B1		B1		X	
4		BH96T		BR55M		CB68E		CL03B		CT67H		DE68L		DM30L		DM30K		DW37B		ED23A		EM75J		ES04G		ES04A	
5		2/16/00		5/23/00		8/29/00		11/10/00		2/15/01		6/5/01		8/14/01		8/14/01		11/28/01		2/26/02		6/25/02		08/28/02		08/28/02	
122	**PAHs (µg/L)**																										
123	**EPA Method SW8270 SIM**																										
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		B1	
4		EY88C	
5		11/11/02	
122	**PAHs (µg/L)**		
123	**EPA Method SW8270 SIM**		
124	Naphthalene	NA	
125	2-Methylnaphthalene	NA	
126	Acenaphthylene	NA	
127	Acenaphthene	NA	
128	Fluorene	NA	
129	Anthracene	NA	
130	Dibenzofuran	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			D		D		D		D		D		D		D		D		D		D		D		D		D
4			S177L		T176B		U235F		V208H		W391B		Y336D		Z225I		Z960I		AH76J		AU22D		BC27N		9912050-02A		BH96B
5			4/2/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/18/99		5/19/99		9/20/99		12/8/99		12/8/1999 (d)		2/17/00
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	0.25	U	0.25	U	**0.25**		0.25	U	**0.45**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	UJ	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	NA		2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
21	15	Isophorone	**3.4**		**5.5**		**5.2**			R	1.0	U	1.0	U	1.0	U	**2.4**		1.0	U	1.0	U	1.0	U	NA		1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	UJ	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	NA		3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10
24	18	Naphthalene	1.0	U	1.0	U	1.0	U		R	1.0	U	1.0	U	1.0	U	**3.1**		1.0	U	1.0	U	**3.2**		NA		1.0
25	19	2-Methylnaphthalene	1.2		1.0	U	1.0	U		R	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U		R	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U		R	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.4**		1.0	U	NA		1.0
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3.7**		NA		1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.9**		NA		1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.6**		NA		1.0
47	41	1,2,4-Trimethylbenzene	**2.2**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		1.0	U	1.0	U	**15**		NA		**1.0**
48	42	Isopropylbenzene	**1.6**		**2.7**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.7**		1.0	U	1.0	U	**11**		NA		**2.5**
49	43	n-Propylbenzene	**1.7**		**2.5**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**5.6**		NA		**1.1**
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
51	45	sec-Butylbenzene	**1.6**		**2.1**		1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.5	U	NA		**2.0**
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
53	47	n-Butylbenzene	1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	**0.82**		**0.82**		**0.55**		0.25	U	**0.34**		**0.35**		0.25	U	**0.52**		0.25	U	0.25	U	**0.56**		NA		**0.40**
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	**0.013**		**0.013**		0.05	U	0.05	U	**0.016**		**0.014**		**0.018**		**0.021**		**0.015**		**0.016**		**0.015**		NA		**0.019**
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA		0.005

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			D		D		D		D		D		D		D		D		D		D		D	
4			BR55E		CB49D		CK77F		CT37F		DE68G		DM30M		DW37E		ED34G		EM85B		ER93P		EZ03C	
5			5/22/00		8/28/00		11/7/00		2/12/01		6/4/01		8/14/01		11/28/01		2/28/02		6/26/02		08/27/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																							
8	**EPA Method SW8040**																							
9	Pentachlorophenol	U	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.55**		**0.32**		**0.38**		0.33	U	0.25	U
10	2,4,6-Trichlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																								
17	**SEMIVOLATILES (µg/L)**																							
18	**EPA Method SW8270**																							
19	Phenol	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.6	U	2.2	U
20	4-Methylphenol	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
21	Isophorone	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.9	U	3.3	U
23	Benzoic Acid	U	10	U	10	U	10	U	10	U	10	U	10	U	50	U	50	U	50	U	66	U	54	U
24	Naphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3**		1.0	U	1.3	U	1.1	U
25	2-Methylnaphthalene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.6	U	5.4	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.6	U	5.4	U
28	Acenaphthene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
29	Dibenzofuran	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
30	Fluorene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.3	U	1.1	U
31	Pentachlorophenol	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	6.6	U	5.4	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**12**		4.0	U	4.0	U	5.3	U	4.3	U
33																								
34	**VOLATILES (µg/L)**																							
35	**EPA Method SW8260**																							
36	Acetone	U	5.0	U	5.0	U	5.0	U	7.1	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
37	Carbon Disulfide	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		**1.7**		1.0	U	1	U	1	U
43	Styrene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		1.0	U	1.0	U	1	U	1	U
45	o-Xylene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.0**		**1.9**		1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**23**		**38**		**1.2**		1	U	1	U
48	Isopropylbenzene		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**6.0**		**7.7**		1.0	U	**3**		1	U
49	n-Propylbenzene		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**2.7**		**7.7**		1.0	U	**3.6**		1	U
50	tert-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**5.3**		1.0	U	**2.1**		1	U
52	4-Isopropyltoluene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.8**		1.0	U	1	U	1	U
53	n-Butylbenzene	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.5**		1.0	U	1	U	1	U
54	Naphthalene	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	7.5	U	5.0	U	**8.2**		5.0	U	5	U	5	U
55																								
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																							
57	**Method OR-DEQ**																							
58	**TPH-Diesel**		0.25	U	0.25	U	0.25	U	**0.26**		NA		NA		NA		NA		NA		NA		NA	
59	**TPH-D Motor Oil**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																								
62	**PRIORITY POLLUTANT**																							
63	**METALS (mg/L)**																							
64	Arsenic (7060)		**0.019**		**0.016**		**0.014**		**0.016**		**0.016**		**0.018**		**0.021**		**0.014**		**0.013**		**0.017**		0.05	U
65	Chromium (6010)	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			D		D		D		D		D		D		D		D		D		D		D		D		D
4			S177L		T176B		U235F		V208H		W391B		Y336D		Z225I		Z960I		AH76J		AU22D		BC27N		9912050-02A		BH96B
5			4/2/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/18/99		5/19/99		9/20/99		12/8/99		12/8/1999 (d)		2/17/00
66	60	Copper (6010)	**0.003**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.004**		0.002	U	0.002	U	0.002	U	NA		0.002
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	**0.004**		0.001	U	0.001	U	0.001	U	NA		0.001
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA		0.01
69	63	Zinc (6010)	0.004	U	0.004	U	0.004	U	0.004	U	**0.007**	J2	0.004	U	0.004	U	**0.020**	J	0.004	U	0.004	U	0.008	U	NA		0.006
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	**45.0**		**42.8**		**52.4**		**58.0**		NA		NA		NA		**49.1**		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	**16.2**		**15.4**		**18.8**		**20.9**		NA		NA		NA		**16.9**		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	**2.3**		**2.1**		**2.6**		**2.2**		NA		NA		NA		**2.7**		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	**8.31**		**7.96**		**9.13**		**9.54**		NA		NA		NA		**9.67**		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**200**		**180**		**220**		**280**		NA		NA		NA		**210**		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**200**		**180**		**220**		**280**		NA		NA		NA		**210**		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**230**	J2	**240**		**300**		**240**		**240**		**230**		**250**		**260**		**280**		**190**		NA		**310**
80	74	Chloride (mg/L) (EPA 325.2)	**11**		**2.0**		**2.4**		**2.4**		**3.2**		**1.4**		**2.1**		**2.8**		**2.0**		**2.8**		**2.8**		NA		**3.4**
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	0.010	U	0.010	U	NA		NA		NA		**0.049**		NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.022**	J	0.010	U	0.010	U	**0.011**		NA		NA		NA		**0.015**		NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.03**		0.010	U	0.010	U	**0.014**		NA		NA		NA		**0.064**		NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	2.5	U	2.5	U	**4.7**		2.5	U	NA		NA		NA		**5.8**		NA		NA		NA		NA		NA
85	79																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			D		D		D		D		D		D		D		D		D		D		D	
4			BR55E		CB49D		CK77F		CT37F		DE68G		DM30M		DW37E		ED34G		EM85B		ER93P		EZ03C	
5			5/22/00		8/28/00		11/7/00		2/12/01		6/4/01		8/14/01		11/28/01		2/28/02		6/26/02		08/27/02		11/12/02	
66	Copper (6010)	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.002**		0.002	U	**0.003**		0.002	U
67	Lead (7421)	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.02	U
68	Nickel (6010)	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.019**		0.006	U	0.006	U	0.006	U
70																								
71	**MAJOR IONS AND CONVENTIONALS**																							
72	Calcium (mg/L) (6010)		NA		NA		NA		**40.6**		**43.4**		**34.3**		**40.1**	J	**32.2**		NA		NA		NA	
73	Magnesium (mg/L) (6010)		NA		NA		NA		**13.8**		**14.9**		**12.0**		**14.0**	J	**11.3**		NA		NA		NA	
74	Potassium (mg/L) (6010)		NA		NA		NA		**1.8**		**2.2**		**1.9**		**2.2**		**2.0**		NA		NA		NA	
75	Sodium (mg/L) (6010)		NA		NA		NA		**7.40**		**7.64**		**6.73**		**7.77**		**7.57**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA		NA		NA		**200**		NA		NA		NA		**140**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		NA		**200**		NA		NA		NA		**140**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**290**		**230**		**220**		**240**		**240**		**180**		**220**		**200**		**260**		**320**		**320**	
80	Chloride (mg/L) (EPA 325.2)		**3.2**		**3.1**		**5.4**		**5.4**		**2.4**		**4.5**		**2.4**		**2.9**		**3.3**		**3**		**3.1**	
81	N-Nitrate (mg-N/L) (Calculated)		NA		NA		NA		0.010	U	NA		NA		NA		**0.020**		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA		NA		NA		0.010	UJ	NA		NA		NA		**0.020**		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA		NA		NA		**6.1**		NA		NA		NA		**12**		NA		NA		NA	
85																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			D		D		D		D		D		D		D		D		D		D		D		D		D
4			S177L		T176B		U235F		V208H		W391B		Y336D		Z225I		Z960I		AH76J		AU22D		BC27N		9912050-02A		BH96B
5			4/2/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/18/99		5/19/99		9/20/99		12/8/99		12/8/1999 (d)		2/17/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.85		6.68		6.96		6.83		6.44		6.53		6.26		6.74		6.24		6.11		6.53		NM		6.69
88	82	Temperature (° C) (avg)	13.4		14.6		14.7		14.3		14.9		15.1		13.5		12.8		13.1		15.3		13.5		NM		13.7
89	83	Conductivity (um/hos)	391		409		366		487		424		481		415		472		422		414		319		NM		531
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		2.65		1.70		1.70		1.75		2.08		1.69		2.47		NM		5.09
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		10	U	NA
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			D		D		D		D		D		D		D		D		D		D		D	
4			BR55E		CB49D		CK77F		CT37F		DE68G		DM30M		DW37E		ED34G		EM85B		ER93P		EZ03C	
5			5/22/00		8/28/00		11/7/00		2/12/01		6/4/01		8/14/01		11/28/01		2/28/02		6/26/02		08/27/02		11/12/02	
86	**FIELD PARAMETERS**																							
87	pH (avg)		6.77		6.47		5.41		6.52		6.65		6.94		6.62		6.58		6.42		6.77		6.63	
88	Temperature (° C) (avg)		12.1		15.4		14.3		14.2		14.4		14.5		15.0		11.9		13.8		15.7		14.6	
89	Conductivity (um/hos)		446		357		300		331		344		331		334		260		452		442		532	
90	Dissolved oxygen (mg/L) (avg)		1.99		1.56		2.04		1.29		1.29		1.54		4.01		7.74		4.39		0.69		2.16	
91																								
92	**DIOXINS AND FURANS (ng/L)**																							
93	**Method 8290**																							
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																								
120	**ETHANOL (mg/L)**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			D		D		D		D		D		D		D		D		D		D		D		D		D
4			S177L		T176B		U235F		V208H		W391B		Y336D		Z225I		Z960I		AH76J		AU22D		BC27N		9912050-02A		BH96B
5			4/2/97		7/15/97		10/22/97		1/28/98		5/19/98		8/18/98		11/13/98		2/18/99		5/19/99		9/20/99		12/8/99		12/8/1999 (d)		2/17/00
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			D		D		D		D		D		D		D		D		D		D		D	
4			BR55E		CB49D		CK77F		CT37F		DE68G		DM30M		DW37E		ED34G		EM85B		ER93P		EZ03C	
5			5/22/00		8/28/00		11/7/00		2/12/01		6/4/01		8/14/01		11/28/01		2/28/02		6/26/02		08/27/02		11/12/02	
122	**PAHs (µg/L)**																							
123	**EPA Method SW8270 SIM**																							
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			F	
4			Y314H	
5			8/18/98	
7	1	**CHLORINATED PHENOLS (µg/L)**		
8	2	**EPA Method SW8040**		
9	3	Pentachlorophenol	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U
16	10			
17	11	**SEMIVOLATILES (µg/L)**		
18	12	**EPA Method SW8270**		
19	13	Phenol	2.0	U
20	14	4-Methylphenol	1.0	U
21	15	Isophorone	1.0	U
22	16	2,4-Dimethylphenol	3.0	U
23	17	Benzoic Acid	10	U
24	18	Naphthalene	1.0	U
25	19	2-Methylnaphthalene	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U
28	22	Acenaphthene	1.0	U
29	23	Dibenzofuran	1.0	U
30	24	Fluorene	1.0	U
31	25	Pentachlorophenol	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U
33	27			
34	28	**VOLATILES (µg/L)**		
35	29	**EPA Method SW8260**		
36	30	Acetone	5.0	U
37	31	Carbon Disulfide	1.0	U
38	32	2-Butanone	5.0	U
39	33	Benzene	1.0	U
40	34	Bromoform	1.0	U
41	35	Toluene	1.0	U
42	36	Ethylbenzene	1.0	U
43	37	Styrene	1.0	U
44	38	m,p-Xylene	1.0	U
45	39	o-Xylene	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U
48	42	Isopropylbenzene	1.0	U
49	43	n-Propylbenzene	1.0	U
50	44	tert-Butylbenzene	1.0	U
51	45	sec-Butylbenzene	1.0	UJ
52	46	4-Isopropyltoluene	1.0	U
53	47	n-Butylbenzene	1.0	U
54	48	Naphthalene	5.0	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	51	**Method OR-DEQ**		
58	52	**TPH-Diesel**	0.25	U
59	53	**TPH-D Motor Oil**	NA	
60	54	**TPH-Gasoline**	NA	
61	55			
62	56	**PRIORITY POLLUTANT**		
63	57	**METALS (mg/L)**		
64	58	Arsenic (7060)	**0.034**	
65	59	Chromium (6010)	**0.042**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			F	
4			Y314H	
5			8/18/98	
6				
66	60	Copper (6010)	**0.016**	
67	61	Lead (7421)	**0.006**	
68	62	Nickel (6010)	**0.03**	
69	63	Zinc (6010)	**0.047**	
70	64			
71	65	**MAJOR IONS AND CONVENTIONALS**		
72	66	Calcium (mg/L) (6010)	NA	
73	67	Magnesium (mg/L) (6010)	NA	
74	68	Potassium (mg/L) (6010)	NA	
75	69	Sodium (mg/L) (6010)	NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**200**	
80	74	Chloride (mg/L) (EPA 325.2)	**1.1**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA	
85	79			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			F	
4			Y314H	
5			8/18/98	
86	80	**FIELD PARAMETERS**		
87	81	pH (avg)	6.37	
88	82	Temperature (° C) (avg)	14.2	
89	83	Conductivity (um/hos)	448	
90	84	Dissolved oxygen (mg/L) (avg)	2.30	
91	85			
92	86	**DIOXINS AND FURANS (ng/L)**		
93	87	**Method 8290**		
94	88	2,3,7,8-TCDF	NA	
95	89	Total TCDF	NA	
96	90	2,3,7,8-TCDD	NA	
97	91	Total TCDD	NA	
98	92	1,2,3,7,8-PeCDF	NA	
99	93	2,3,4,7,8-PeCDF	NA	
100	94	Total PeCDF	NA	
101	95	1,2,3,7,8-PeCDD	NA	
102	96	Total PeCDD	NA	
103	97	1,2,3,4,7,8-HxCDF	NA	
104	98	1,2,3,6,7,8-HxCDF	NA	
105	99	2,3,4,6,7,8-HxCDF	NA	
106	100	1,2,3,7,8,9-HxCDF	NA	
107	101	Total HxCDF	NA	
108	102	1,2,3,4,7,8-HxCDD	NA	
109	103	1,2,3,6,7,8-HxCDD	NA	
110	104	1,2,3,7,8,9-HxCDD	NA	
111	105	Total HxCDD	NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA	
114	108	Total HpCDF	NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA	
116	110	Total HpCDD	NA	
117	111	OCDF	NA	
118	112	OCDD	NA	
119				
120		**ETHANOL (mg/L)**	NA	
121				

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			F	
4			Y314H	
5			8/18/98	
122		**PAHs (µg/L)**		
123		**EPA Method SW8270 SIM**		
124		Naphthalene	NA	
125		2-Methylnaphthalene	NA	
126		Acenaphthylene	NA	
127		Acenaphthene	NA	
128		Fluorene	NA	
129		Anthracene	NA	
130		Dibenzofuran	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			H		H		H		H		H		H		H		H		H		H		H		H		H	
4			S177B		T176D		U235V		V208C		W371F		Y314A		Z225V		Z960X		AH27D		AU22A		BB82E		BH75K		BR55N	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/17/98		11/13/98		2/16/99		5/17/99		9/20/99		12/6/99		2/15/00		5/23/00	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	0.25	U	**0.16**	J1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.44**		0.25	U	0.25	U	**0.19**	J1	0.25	U	0.25	UJ
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.013**		**0.019**		0.05	U	0.05	U	**0.013**		**0.013**		**0.015**		**0.023**		**0.023**		**0.020**		**0.012**		**0.020**		**0.019**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		H		H	
4		CT37N		ED16K	
5		2/12/01		2/25/02	
6					
7	**CHLORINATED PHENOLS (µg/L)**				
8	**EPA Method SW8040**				
9	Pentachlorophenol	0.25	U	0.26	U
10	2,4,6-Trichlorophenol	NA		NA	
11	2,3,6-Trichlorophenol	NA		NA	
12	2,4,5-Trichlorophenol	NA		NA	
13	2,3,4-Trichlorophenol	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA	
16					
17	**SEMIVOLATILES (µg/L)**				
18	**EPA Method SW8270**				
19	Phenol	NA		NA	
20	4-Methylphenol	NA		NA	
21	Isophorone	NA		NA	
22	2,4-Dimethylphenol	NA		NA	
23	Benzoic Acid	NA		NA	
24	Naphthalene	NA		NA	
25	2-Methylnaphthalene	NA		NA	
26	2,4,6-Trichlorophenol	NA		NA	
27	2,4,5-Trichlorophenol	NA		NA	
28	Acenaphthene	NA		NA	
29	Dibenzofuran	NA		NA	
30	Fluorene	NA		NA	
31	Pentachlorophenol	NA		NA	
32	bis(2-Ethylhexyl)phthalate	NA		NA	
33					
34	**VOLATILES (µg/L)**				
35	**EPA Method SW8260**				
36	Acetone	NA		NA	
37	Carbon Disulfide	NA		NA	
38	2-Butanone	NA		NA	
39	Benzene	NA		NA	
40	Bromoform	NA		NA	
41	Toluene	NA		NA	
42	Ethylbenzene	NA		NA	
43	Styrene	NA		NA	
44	m,p-Xylene	NA		NA	
45	o-Xylene	NA		NA	
46	1,3,5-Trimethylbenzene	NA		NA	
47	1,2,4-Trimethylbenzene	NA		NA	
48	Isopropylbenzene	NA		NA	
49	n-Propylbenzene	NA		NA	
50	tert-Butylbenzene	NA		NA	
51	sec-Butylbenzene	NA		NA	
52	4-Isopropyltoluene	NA		NA	
53	n-Butylbenzene	NA		NA	
54	Naphthalene	NA		NA	
55					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	**Method OR-DEQ**				
58	**TPH-Diesel**	NA		NA	
59	**TPH-D Motor Oil**	NA		NA	
60	**TPH-Gasoline**	NA		NA	
61					
62	**PRIORITY POLLUTANT**				
63	**METALS (mg/L)**				
64	Arsenic (7060)	**0.015**		**0.021**	
65	Chromium (6010)	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			H		H		H		H		H		H		H		H		H		H		H		H		H	
4			S177B		T176D		U235V		V208C		W371F		Y314A		Z225V		Z960X		AH27D		AU22A		BB82E		BH75K		BR55N	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/17/98		11/13/98		2/16/99		5/17/99		9/20/99		12/6/99		2/15/00		5/23/00	
66	60	Copper (6010)	**0.003**		**0.006**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.010**		**0.011**		0.002	U	0.002	U	0.002	U	**0.003**	
67	61	Lead (7421)	0.001	U	**0.001**		0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.004	U	**0.014**	J2	**0.010**		**0.005**		**0.004**	J2	**0.006**		0.004	U	**0.012**	J	0.019	U	**0.006**		0.006	U	0.006	U	0.006	U
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	**22.4**		**27.7**		**25.4**		**24.9**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**7.80**		**9.86**		**8.80**		**8.27**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**2.3**		**2.2**		**2.4**		**2.3**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**5.41**		**6.27**		**5.92**		**5.70**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**100**		**110**		**110**		**120**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**100**		**110**		**110**		**120**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**160**	J2	**140**		**150**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**1.5**		**2.0**		**2.7**		**1.6**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.016**		0.010	U	**0.011**		0.010	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	0.010	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.016**		0.010	U	**0.011**		0.010	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**4.8**	J	2.5	U	**3.6**		**6.3**		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		H		H	
4		CT37N		ED16K	
5		2/12/01		2/25/02	
66	Copper (6010)	**0.004**		**0.007**	
67	Lead (7421)	0.001	U	**0.001**	
68	Nickel (6010)	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	**0.008**	
70					
71	**MAJOR IONS AND CONVENTIONALS**				
72	Calcium (mg/L) (6010)	NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA	
74	Potassium (mg/L) (6010)	NA		NA	
75	Sodium (mg/L) (6010)	NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA	
80	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			H		H		H		H		H		H		H		H		H		H		H		H		H	
4			S177B		T176D		U235V		V208C		W371F		Y314A		Z225V		Z960X		AH27D		AU22A		BB82E		BH75K		BR55N	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/17/98		11/13/98		2/16/99		5/17/99		9/20/99		12/6/99		2/15/00		5/23/00	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.77		6.85		7.02		6.85		6.37		6.56		6.41		7.07		7.07		7.07		6.26		6.64		6.58	
88	82	Temperature (° C) (avg)	13.7		15.1		15.1		14.4		15.0		14.8		14.4		14.3		14.3		14.3		14.5		13.5		14.2	
89	83	Conductivity (um/hos)	212		283		225		243		186		251		100		193		193		193		258		223		191	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		1.40		1.69		1.60		1.60		1.60		2.34		2.18		2.00	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																												

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		H		H	
4		CT37N		ED16K	
5		2/12/01		2/25/02	
86	**FIELD PARAMETERS**				
87	pH (avg)	6.54		6.29	
88	Temperature (° C) (avg)	13.3		13.4	
89	Conductivity (um/hos)	230		292	
90	Dissolved oxygen (mg/L) (avg)	3.06		4.89	
91					
92	**DIOXINS AND FURANS (ng/L)**				
93	**Method 8290**				
94	2,3,7,8-TCDF	NA		NA	
95	Total TCDF	NA		NA	
96	2,3,7,8-TCDD	NA		NA	
97	Total TCDD	NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA	
100	Total PeCDF	NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA	
102	Total PeCDD	NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA	
107	Total HxCDF	NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA	
111	Total HxCDD	NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	Total HpCDF	NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	Total HpCDD	NA		NA	
117	OCDF	NA		NA	
118	OCDD	NA		NA	
119					
120	**ETHANOL (mg/L)**	NA		NA	
121					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			H		H		H		H		H		H		H		H		H		H		H		H		H	
4			S177B		T176D		U235V		V208C		W371F		Y314A		Z225V		Z960X		AH27D		AU22A		BB82E		BH75K		BR55N	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/17/98		11/13/98		2/16/99		5/17/99		9/20/99		12/6/99		2/15/00		5/23/00	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF
1					
2					
3		H		H	
4		CT37N		ED16K	
5		2/12/01		2/25/02	
122	**PAHs (µg/L)**				
123	**EPA Method SW8270 SIM**				
124	Naphthalene	NA		NA	
125	2-Methylnaphthalene	NA		NA	
126	Acenaphthylene	NA		NA	
127	Acenaphthene	NA		NA	
128	Fluorene	NA		NA	
129	Anthracene	NA		NA	
130	Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of J1								Dup of J1											
3			J1		J1D		J1		J1		J1		J4		J1		J1		J1		J1		J1	
4			S177H		S177I		T176P		U235J		V224O		V224K		W371N		Y314I		Z225O		Z960C		AH49C	
5			4/2/97		4/2/97		7/16/97		10/22/97		1/29/98		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	**32**		**33**		**24**		**7.8**		**7.3**		**8.4**		**7.5**		**5.8**		**2.0**		**8.3**		**4.6**	
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.4	U	0.25	U	0.27	U	0.67	U	**0.29**		**0.22**	J1	**0.25**		0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**3.4**		**3.4**		**3.0**		**1.8**		**0.98**		**1.1**		**0.51**		**0.33**		0.25	U	**0.43**		0.17	J1
15	9	2,3,4,5-Tetrachlorophenol	**0.94**		**0.70**		**0.5**		**0.28**		**0.23**	J1	**0.20**	J1	**0.16**	J1	**0.23**	J1	0.25	U	0.25	U	0.25	U
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	**1.1**		**1.9**		**2.5**		**2.4**		**2.8**	J2	**1.4**		1.0	U	**3.6**		**2.4**	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	**1.1**		**1.8**		**2.6**		**2.4**		**2.9**	J2	**1.3**		1.0	U	**3.5**		**2.2**	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	**44**		**52**		**20**		**11**		**11**		**8.8**		**10**		**6.5**		5.0	U	**12**		**4.4**	J1
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	9.9	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	**6.5**		**5.9**		**12**		**7.5**		**4.0**		**3.3**		**8.4**		**5.5**		**2.5**		**6.2**		**1.9**	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	**4.4**		**4.0**		**6.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	**4.9**		**4.1**		**6.1**		**3.8**		**4.0**	J2	**2.4**	J2	**5.2**		**2.7**		**2.1**		**4.4**		1.0	U
47	41	1,2,4-Trimethylbenzene	**41**		**36**		**47**		**37**	J2	**26**	J2	**19**	J2	**46**		**29**		**16**		**44**		**8.8**	
48	42	Isopropylbenzene	**5.0**		**4.2**		**7.9**		**6.9**	J2	**4.2**	J2	**2.7**	J2	**7.7**		**6.6**		**4.8**		**7.6**		**2.1**	
49	43	n-Propylbenzene	**8.7**		**7.2**		**14**		**14**		**8.0**	J2	**5.0**	J2	**14**		**11**		**7.5**		**12**		**3.4**	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**1.6**		**1.4**		**2.2**		**1.8**	J2	**1.3**		1.0	U	**2.0**		**1.6**	J2	1.0	U	**2.6**		1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	**1.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	**1.3**		**1.1**		**1.9**		**1.7**	J2	**1.1**		1.0	U	**2.0**		**1.3**		1.0	U	**1.2**		1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**5.4**		5.0	U
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	**0.30**		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.52**		0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	**0.007**		**0.006**		**0.006**		0.05	U	0.05	U	0.05	U	**0.008**		**0.007**		**0.008**		**0.007**		**0.006**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																											
2																											
3		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1	
4		AU22H		BC27K		9912050-03A		BH96R		BR64D		CB49G		CL03H		CT55F		DE68I		DM52B		DW48C		ED23C		EM85D	
5		9/20/99		12/8/99		12/8/1999 (d)		2/16/00		5/24/00		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02	
7	**CHLORINATED PHENOLS (µg/L)**																										
8	**EPA Method SW8040**																										
9	Pentachlorophenol	**1.7**		**0.94**		NA		**0.81**		**1.7**		0.25	U	0.25	U	**0.50**		**0.36**		0.25	U	**0.25**		NA		**4.4**	
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA	
16																											
17	**SEMIVOLATILES (µg/L)**																										
18	**EPA Method SW8270**																										
19	Phenol	2.0	U	2.0	U	NA		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	4-Methylphenol	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	Isophorone	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	NA		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	Benzoic Acid	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U
24	Naphthalene	**1.1**		**0.7**	J1	NA		**1.4**		**3.6**		1.0	U	1.0	U	**2.9**		**1.3**		1.0	U	1.0	U	1.0	U	**1.4**	
25	2-Methylnaphthalene	**1.2**		**0.5**	J1	NA		**1.2**		**3.3**		1.0	U	1.0	U	**3.0**		**1.5**		1.0	U	1.0	U	1.0	U	1.0	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	Acenaphthene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	Dibenzofuran	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	Fluorene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	Pentachlorophenol	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**280**		5.0	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	**0.6**	J1	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**25**		1.0	U	1.0	U	4.0	U	4.0	U
33																											
34	**VOLATILES (µg/L)**																										
35	**EPA Method SW8260**																										
36	Acetone	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	12	U	5.0	U	5.0	U	5.0	U	**10**	M
37	Carbon Disulfide	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	2-Butanone	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	Benzene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	Bromoform	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	Toluene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	Ethylbenzene	**1.5**		1.0	U	NA		1.0	U	**3.4**		1.0	U	1.0	U	**1.2**		**1.2**		1.0	U	1.0	U	1.0	U	**1.1**	
43	Styrene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	m,p-Xylene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.5**		1.0	U
45	o-Xylene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3.0**		1.0	U
46	1,3,5-Trimethylbenzene	**1.4**		1.0	U	NA		1.0	U	**3.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**6.4**		1.0	U
47	1,2,4-Trimethylbenzene	**6.4**		**2.4**		NA		**2.4**		**7.4**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**50**		1.0	U
48	Isopropylbenzene	**2.4**		**1.2**		NA		**1.3**		**8.2**		**1.5**		**2.5**		**3.3**		**4.7**		1.0	U	**1.3**		**3.5**		**8.4**	
49	n-Propylbenzene	**4.4**		**1.9**		NA		**2.0**		**13**		**3.3**		**3.8**		**5.7**		**8.3**		**1.1**		**2.2**		**4.0**		**12**	
50	tert-Butylbenzene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	sec-Butylbenzene	1.0	U	1.0	U	NA		1.0	U	**1.6**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.0**	
52	4-Isopropyltoluene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.2**		1.0	U
53	n-Butylbenzene	1.0	U	1.0	U	NA		1.0	U	**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	Naphthalene	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55																											
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	**Method OR-DEQ**																										
58	**TPH-Diesel**	0.25	U	0.25	U	NA		0.25	U	0.25	(a)	0.25	U	0.25	U	**0.30**	(d)	NA		NA		NA		**2.1**		NA	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		0.50	U	NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																											
62	**PRIORITY POLLUTANT**																										
63	**METALS (mg/L)**																										
64	Arsenic (7060)	**0.015**		**0.015**		NA		**0.013**		**0.011**		**0.010**		**0.012**		**0.010**		**0.011**		**0.014**		**0.013**		**0.012**		**0.014**	
65	Chromium (6010)	0.005	U	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AY	AZ	BA	BB
1					
2					
3		J1		J1	
4		ES04F		EZ03K	
5		08/28/02		11/12/02	
6					
7	**CHLORINATED PHENOLS (µg/L)**				
8	**EPA Method SW8040**				
9	Pentachlorophenol	**3.1**		**0.57**	
10	2,4,6-Trichlorophenol	NA		NA	
11	2,3,6-Trichlorophenol	NA		NA	
12	2,4,5-Trichlorophenol	NA		NA	
13	2,3,4-Trichlorophenol	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA	
16					
17	**SEMIVOLATILES (µg/L)**				
18	**EPA Method SW8270**				
19	Phenol	2.3	U	2	U
20	4-Methylphenol	1.2	U	1	U
21	Isophorone	1.2	U	1	U
22	2,4-Dimethylphenol	3.5	U	3	U
23	Benzoic Acid	58	U	50	U
24	Naphthalene	1.2	U	**1**	
25	2-Methylnaphthalene	1.2	U	1	U
26	2,4,6-Trichlorophenol	5.8	U	5	U
27	2,4,5-Trichlorophenol	5.8	U	5	U
28	Acenaphthene	1.2	U	1	U
29	Dibenzofuran	1.2	U	1	U
30	Fluorene	1.2	U	1	U
31	Pentachlorophenol	5.8	U	5	U
32	bis(2-Ethylhexyl)phthalate	4.7	U	4	U
33					
34	**VOLATILES (µg/L)**				
35	**EPA Method SW8260**				
36	Acetone	5	U	5	U
37	Carbon Disulfide	1	U	1	U
38	2-Butanone	5	U	5	U
39	Benzene	1	U	1	U
40	Bromoform	1	U	1	U
41	Toluene	1	U	1	U
42	Ethylbenzene	1	U	1	U
43	Styrene	1	U	1	U
44	m,p-Xylene	1	U	1	U
45	o-Xylene	1	U	1	U
46	1,3,5-Trimethylbenzene	1	U	1	U
47	1,2,4-Trimethylbenzene	1	U	1	U
48	Isopropylbenzene	**5.2**		**3.5**	
49	n-Propylbenzene	**7.8**		**4.9**	
50	tert-Butylbenzene	1	U	1	U
51	sec-Butylbenzene	1	U	1	U
52	4-Isopropyltoluene	1	U	1	U
53	n-Butylbenzene	1	U	1	U
54	Naphthalene	5	U	5	U
55					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	**Method OR-DEQ**				
58	**TPH-Diesel**	NA		NA	
59	**TPH-D Motor Oil**	NA		NA	
60	**TPH-Gasoline**	NA		NA	
61					
62	**PRIORITY POLLUTANT**				
63	**METALS (mg/L)**				
64	Arsenic (7060)	**0.01**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of J1								Dup of J1											
3			J1		J1D		J1		J1		J1		J4		J1		J1		J1		J1		J1	
4			S177H		S177I		T176P		U235J		V224O		V224K		W371N		Y314I		Z225O		Z960C		AH49C	
5			4/2/97		4/2/97		7/16/97		10/22/97		1/29/98		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.001	U	0.02	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.004	U	0.004	U	0.004	U	0.004	U	**0.005**		**0.006**		0.004	U	**0.004**		0.004	U	**0.008**	J	**0.007**	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	**26.4**		**26.7**		**26.1**		**27.5**		**30.8**		**30.5**		NA		NA		NA		**20.2**		NA	
73	67	Magnesium (mg/L) (6010)	**10.1**		**10.2**		**9.96**		**10.1**		**10.9**		**10.8**		NA		NA		NA		**6.67**		NA	
74	68	Potassium (mg/L) (6010)	**3.1**		**2.8**		**3.2**		**3.4**		**3.5**		**3.4**		NA		NA		NA		**3.1**		NA	
75	69	Sodium (mg/L) (6010)	**7.40**		**7.47**		**8.13**		**8.29**		**8.49**		**8.46**		NA		NA		NA		**8.05**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**120**		**120**		**100**	**J2**	**130**		**140**		**140**		NA		NA		NA		**74**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**120**		**120**		**100**	J2	**130**		**140**		**140**		NA		NA		NA		**74**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		NT		**160**	J2	**180**		**170**		**170**		180		170		140		**140**		**150**	
80	74	Chloride (mg/L) (EPA 325.2)	**4.3**		**5.4**		**3.4**		**2.5**		**2.3**		**2.2**		3.7		1.0	U	1.8		**3.7**		**3.7**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.057**		**0.011**		0.010	U	**0.025**		**1.8**	J2	**1.4**	J2	NA		NA		NA		**1.8**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	**0.01**	J	**0.016**	J2	0.010	U	0.010	UJ	0.010	UJ	NA		NA		NA		0.010	U	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.057**		**0.021**		**0.015**	J2	**0.025**		**1.8**	J2	**1.4**	J2	NA		NA		NA		**1.8**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**7.0**	J	**26**	J	**10**		**8.6**		**9.0**		**12**		NA		NA		NA		**15**		NA	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																											
2																											
3		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1	
4		AU22H		BC27K		9912050-03A		BH96R		BR64D		CB49G		CL03H		CT55F		DE68I		DM52B		DW48C		ED23C		EM85D	
5		9/20/99		12/8/99		12/8/1999 (d)		2/16/00		5/24/00		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02	
66	Copper (6010)	0.002	U	0.002	U	NA		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.003**		0.002	U
67	Lead (7421)	0.001	U	**0.001**		NA		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U
68	Nickel (6010)	0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U
69	Zinc (6010)	0.004	U	0.006	U	NA		0.006	U	**0.006**		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.007**		0.006	U
70																											
71	**MAJOR IONS AND CONVENTIONALS**																										
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**20.6**		**20.5**		**22.7**		**21.1**		**29.4**		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**7.21**		**7.38**		**8.65**		**7.62**		**10.1**		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**2.3**		**2.4**		**2.6**		**2.6**		**3.4**		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**6.48**		**6.15**		**6.58**		**6.56**		**8.36**		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**100**		NA		NA		NA		**130**		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**100**		NA		NA		NA		**130**		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**170**		**160**		NA		**200**		**160**		**160**		**160**		**150**		**160**		**150**		**140**		**210**		**160**	
80	Chloride (mg/L) (EPA 325.2)	**2.6**		**3.1**		NA		**4.3**		**2.5**		**2.0**		**2.3**		**3.0**		**2.6**		**6.2**		**2.6**		**8.8**		**3.6**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**2.4**		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.018**		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**2.4**	J	NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**10**		NA		NA		NA		**14**		NA	
85																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AY	AZ	BA	BB
1					
2					
3		J1		J1	
4		ES04F		EZ03K	
5		08/28/02		11/12/02	
66	Copper (6010)	**0.003**		0.002	U
67	Lead (7421)	0.001	U	0.02	U
68	Nickel (6010)	0.01	U	0.01	U
69	Zinc (6010)	**0.007**		**0.006**	
70					
71	**MAJOR IONS AND CONVENTIONALS**				
72	Calcium (mg/L) (6010)	NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA	
74	Potassium (mg/L) (6010)	NA		NA	
75	Sodium (mg/L) (6010)	NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**160**		**180**	
80	Chloride (mg/L) (EPA 325.2)	**3.2**		**3.5**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of J1								Dup of J1											
3			J1		J1D		J1		J1		J1		J4		J1		J1		J1		J1		J1	
4			S177H		S177I		T176P		U235J		V224O		V224K		W371N		Y314I		Z225O		Z960C		AH49C	
5			4/2/97		4/2/97		7/16/97		10/22/97		1/29/98		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.75		6.75		6.62		6.75		6.66		6.65		6.56		6.35		6.17		6.43		5.77	
88	82	Temperature (° C) (avg)	12.8		12.8		14.7		15.3		14.5		14.5		12.6		15.5		15.0		13.1		12.9	
89	83	Conductivity (um/hos)	319		319		256		239		314		315		289		330		138		207		241	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		NA		2.85		2.20		1.82		1.84		2.33	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	0.0057	U	0.0017	U	0.0023	U	0.0038	U	NA		NA		0.0017	U	0.0019	U	0.0019	U	0.0035	U	0.0011	U
95	89	Total TCDF	**0.0110**		0.0012-0.0034	U	0.0010-0.0058	U	0.0018-0.0064	U	NA		NA		0.0017	U	0.0019	U	0.0019	U	**0.0024**		0.0011	U
96	90	2,3,7,8-TCDD	0.0054	U	0.0028	U	0.0029	U	0.0053	U	NA		NA		0.0022	U	0.0050	U	0.0034	U	0.0057	U	0.0044	U
97	91	Total TCDD	0.0037-0.0087	U	0.0015-0.0049	U	0.0015-0.0050	U	0.0024-0.0087	U	NA		NA		0.0022	U	0.0050	U	**0.0016**		0.0057	U	0.0044	U
98	92	1,2,3,7,8-PeCDF	0.0029	U	0.0032	U	0.0051	U	0.0031	U	NA		NA		0.0019	U	0.0035	U	0.0020	U	0.0049	U	0.0021	U
99	93	2,3,4,7,8-PeCDF	0.0035	U	0.0031	U	0.0024	U	0.0046	U	NA		NA		0.0023	U	0.0037	U	0.0027	U	0.0042	U	0.0020	U
100	94	Total PeCDF	0.0029-0.0064	U	0.0013-0.0047	U	0.0036-0.0067	U	**0.0022**		NA		NA		0.0021	U	0.0036	U	0.0024	U	0.0046	U	0.0021	U
101	95	1,2,3,7,8-PeCDD	0.0080	U	0.0088	U	0.0048	U	0.0068	U	NA		NA		0.0041	U	0.0046	U	0.0022	U	0.0095	U	0.0027	U
102	96	Total PeCDD	0.0057-0.016	U	0.0033-0.010	U	0.0027-0.010	U	0.0039-0.012	U	NA		NA		0.0041	U	0.0046	U	0.0022	U	0.0095	U	0.0027	U
103	97	1,2,3,4,7,8-HxCDF	0.0054	U	0.0025	U	0.0048	U	0.0017	U	NA		NA		**0.0018**		0.0039	U	0.0018	U	0.0059	U	0.0024	U
104	98	1,2,3,6,7,8-HxCDF	0.0042	U	0.0042	U	0.0020	U	0.0035	U	NA		NA		0.0025	U	0.0036	U	0.0180	U	0.0024	U	**0.0015**	
105	99	2,3,4,6,7,8-HxCDF	0.0052	U	0.0050	U	0.0038	U	0.0036	U	NA		NA		0.0041	U	0.0066	U	**0.0031**		0.0044	U	**0.0028**	
106	100	1,2,3,7,8,9-HxCDF	0.0044	U	0.0040	U	0.0023	U	0.0026	U	NA		NA		0.0037	U	0.0032	U	0.0025	U	0.0056	U	0.0030	U
107	101	Total HxCDF	0.0052	U	0.0022-0.0063	U	0.0018-0.0071	U	0.0036	U	NA		NA		0.0072	U	**0.0031**		**0.0047**		0.0046	U	**0.0130**	
108	102	1,2,3,4,7,8-HxCDD	0.0100	U	0.0058	U	0.0046	U	0.0072	U	NA		NA		0.0047	U	0.0032	U	0.0017	U	0.0085	U	0.0027	U
109	103	1,2,3,6,7,8-HxCDD	0.0100	U	0.0084	U	0.0068	U	0.0051	U	NA		NA		0.0039	U	0.0046	U	0.0015	U	0.0071	U	0.0031	U
110	104	1,2,3,7,8,9-HxCDD	0.0080	U	0.0073	U	0.0044	U	0.0041	U	NA		NA		0.0042	U	0.0037	U	0.0027	U	0.0041	U	0.0015	U
111	105	Total HxCDD	0.0047-0.014	U	0.0031-0.011	U	0.0025-0.011	U	0.0028-0.015	U	NA		NA		0.0043	U	0.0038	U	0.0020	U	0.0066	U	0.0024	U
112	106	1,2,3,4,6,7,8-HpCDF	0.0080	U	**0.0050**		**0.0031**		0.0021	U	NA		NA		0.0037	U	0.0180	U	0.0033	U	0.0023	U	**0.0018**	
113	107	1,2,3,4,7,8,9-HpCDF	0.0089	U	0.0190	U	0.0063	U	0.0035	U	NA		NA		0.0055	U	0.0077	U	0.0039	U	0.0039	U	0.0023	U
114	108	Total HpCDF	0.0042-0.015	U	**0.0050**		**0.0110**		0.0011-0.0052	U	NA		NA		0.0046	U	0.0129	U	**0.0055**		0.0031	U	**0.0120**	
115	109	1,2,3,4,6,7,8-HpCDD	0.0280	U	0.0250	U	**0.0089**		**0.0100**		NA		NA		0.0067	U	**0.0580**		**0.0067**		**0.0120**		**0.0070**	
116	110	Total HpCDD	**0.0410**		0.0250	U	**0.0089**		**0.0100**		NA		NA		0.0067	U	**0.0058**		**0.0150**		**0.0250**		**0.0094**	
117	111	OCDF	**0.0320**		**0.0300**		**0.0160**		0.0075	U	NA		NA		0.0110	U	**0.0074**		0.0110	U	**0.0180**		**0.0056**	
118	112	OCDD	**0.2500**		**0.2300**		**0.0840**		0.0420	U	NA		NA		0.0210	U	**0.0490**		**0.0580**		**0.1600**		0.0530	U
119	113																							
120	114	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121	115																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																											
2																											
3		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1	
4		AU22H		BC27K		9912050-03A		BH96R		BR64D		CB49G		CL03H		CT55F		DE68I		DM52B		DW48C		ED23C		EM85D	
5		9/20/99		12/8/99		12/8/1999 (d)		2/16/00		5/24/00		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02	
86	**FIELD PARAMETERS**																										
87	pH (avg)	6.33		6.57		NM		6.59		6.38		6.58		5.27		6.17		6.64		6.85		6.60		6.42		6.52	
88	Temperature (° C) (avg)	16.6		12.4		NM		14.3		14.8		15.6		14.4		14.3		13.6		15.8		14.6		13.6		15.4	
89	Conductivity (um/hos)	222		245		NM		272		291		248		212		202		226		278		241		284		224	
90	Dissolved oxygen (mg/L) (avg)	2.24		2.78		NM		1.57		1.74		1.62		1.09		0.57		1.51		1.44		3.88		6.41		4.98	
91																											
92	**DIOXINS AND FURANS (ng/L)**																										
93	**Method 8290**																										
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																											
120	**ETHANOL (mg/L)**	NA		NA		10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AY	AZ	BA	BB
1					
2					
3		J1		J1	
4		ES04F		EZ03K	
5		08/28/02		11/12/02	
86	**FIELD PARAMETERS**				
87	pH (avg)	6.79		6.4	
88	Temperature (° C) (avg)	15.7		15.6	
89	Conductivity (um/hos)	241		232	
90	Dissolved oxygen (mg/L) (avg)	1.34		3.21	
91					
92	**DIOXINS AND FURANS (ng/L)**				
93	**Method 8290**				
94	2,3,7,8-TCDF	NA		NA	
95	Total TCDF	NA		NA	
96	2,3,7,8-TCDD	NA		NA	
97	Total TCDD	NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA	
100	Total PeCDF	NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA	
102	Total PeCDD	NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA	
107	Total HxCDF	NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA	
111	Total HxCDD	NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	Total HpCDF	NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	Total HpCDD	NA		NA	
117	OCDF	NA		NA	
118	OCDD	NA		NA	
119					
120	**ETHANOL (mg/L)**	NA		NA	
121					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of J1								Dup of J1											
3			J1		J1D		J1		J1		J1		J4		J1		J1		J1		J1		J1	
4			S177H		S177I		T176P		U235J		V224O		V224K		W371N		Y314I		Z225O		Z960C		AH49C	
5			4/2/97		4/2/97		7/16/97		10/22/97		1/29/98		1/29/98		5/19/98		8/18/98		11/12/98		2/17/99		5/18/99	
122	116	**PAHs (µg/L)**																						
123	117	**EPA Method SW8270 SIM**																						
124	118	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	119	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	120	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	121	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	122	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	123	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	124	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																											
2																											
3		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1		J1	
4		AU22H		BC27K		9912050-03A		BH96R		BR64D		CB49G		CL03H		CT55F		DE68I		DM52B		DW48C		ED23C		EM85D	
5		9/20/99		12/8/99		12/8/1999 (d)		2/16/00		5/24/00		8/29/00		11/10/00		2/14/01		6/5/01		8/14/01		11/29/01		2/26/02		6/26/02	
122	**PAHs (µg/L)**																										
123	**EPA Method SW8270 SIM**																										
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AY	AZ	BA	BB
1					
2					
3		J1		J1	
4		ES04F		EZ03K	
5		08/28/02		11/12/02	
122	**PAHs (µg/L)**				
123	**EPA Method SW8270 SIM**				
124	Naphthalene	NA		NA	
125	2-Methylnaphthalene	NA		NA	
126	Acenaphthylene	NA		NA	
127	Acenaphthene	NA		NA	
128	Fluorene	NA		NA	
129	Anthracene	NA		NA	
130	Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2													Dup of K								Dup of K						
3			K		K		K		K		K		W		K		K		K		Z		K		K		K
4			S177A		T176U		U235X		V208E		W391J		W391K		Y314L		Z225U		Z960W		Z960V		AH27C		BB82B		BH75J
5			4/1/97		7/16/97		10/23/97		1/28/98		5/19/98		5/19/98		8/17/98		11/13/98		2/16/99		2/16/99		5/17/99		12/6/99		2/15/00
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	UJ	2.0	U	2.0	U	2.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
20	14	4-Methylphenol	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
21	15	Isophorone	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
22	16	2,4-Dimethylphenol	3.0	UJ	3.0	U	3.0	U	3.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
23	17	Benzoic Acid	10	UJ	10	U	10	U	10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
24	18	Naphthalene	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
25	19	2-Methylnaphthalene	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
26	20	2,4,6-Trichlorophenol	5.0	UJ	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
27	21	2,4,5-Trichlorophenol	5.0	UJ	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
28	22	Acenaphthene	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
29	23	Dibenzofuran	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
30	24	Fluorene	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
31	25	Pentachlorophenol	5.0	UJ	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	3.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA				NA		NA
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA		NA
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	0.001	U	**0.001**		0.05	U	0.05	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	**0.004**		**0.010**
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.028**		**0.117**

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			K		K		K		K		K		K		K		K		K		K		K	
4			BR55O		CB49K		CK77L		CT37O		DE68D		DM52K		DW29I		ED16H		EM75F		ER92B		EZ03J	
5			5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																							
8	**EPA Method SW8040**																							
9	Pentachlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
10	2,4,6-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
16																								
17	**SEMIVOLATILES (µg/L)**																							
18	**EPA Method SW8270**																							
19	Phenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	4-Methylphenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	Isophorone		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	2,4-Dimethylphenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	Benzoic Acid		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	2,4,6-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	2,4,5-Trichlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	Pentachlorophenol		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	bis(2-Ethylhexyl)phthalate		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
33																								
34	**VOLATILES (µg/L)**																							
35	**EPA Method SW8260**																							
36	Acetone		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	Carbon Disulfide		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	2-Butanone		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	Benzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	Bromoform		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	Toluene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	Ethylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	Styrene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	m,p-Xylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	o-Xylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	1,3,5-Trimethylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	1,2,4-Trimethylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	Isopropylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	n-Propylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	tert-Butylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	sec-Butylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	4-Isopropyltoluene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	n-Butylbenzene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
55																								
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																							
57	**Method OR-DEQ**																							
58	**TPH-Diesel**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	**TPH-D Motor Oil**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																								
62	**PRIORITY POLLUTANT**																							
63	**METALS (mg/L)**																							
64	Arsenic (7060)		0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	**0.001**		0.001	U	**0.001**		**0.002**		0.001	U	0.05	U
65	Chromium (6010)		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.009**		0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2													Dup of K								Dup of K						
3			K		K		K		K		K		W		K		K		K		Z		K		K		K
4			S177A		T176U		U235X		V208E		W391J		W391K		Y314L		Z225U		Z960W		Z960V		AH27C		BB82B		BH75J
5			4/1/97		7/16/97		10/23/97		1/28/98		5/19/98		5/19/98		8/17/98		11/13/98		2/16/99		2/16/99		5/17/99		12/6/99		2/15/00
66	60	Copper (6010)	**0.006**		**0.008**		0.002	U	**0.013**		**0.005**		**0.005**		**0.003**		0.002	U	**0.007**		**0.006**		**0.004**		**0.011**		**0.042**
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.007**		**0.010**
68	62	Nickel (6010)	**0.03**		**0.04**		**0.13**		**0.10**		**0.04**		0.03		**0.01**		**0.07**		**0.06**		**0.06**		**0.03**		**0.27**		**0.17**
69	63	Zinc (6010)	**0.025**		**0.042**		**0.051**		**0.128**		**0.045**	J2	**0.045**	J2	**0.008**		**0.036**		**0.052**		**0.053**		0.020	U	**0.111**		**0.155**
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	NA		NA		NA		**36.6**		NA		NA		NA		NA		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		**8.47**		NA		NA		NA		NA		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	NA		NA		NA		**5.4**		NA		NA		NA		NA		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	NA		NA		NA		**5.50**		NA		NA		NA		NA		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		**370**		NA		NA		NA		NA		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**130**	J2	**650**		**370**		NA		NA		NA		NA		NA		NA		NA		NA		NA
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
85	79																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			K		K		K		K		K		K		K		K		K		K		K	
4			BR55O		CB49K		CK77L		CT37O		DE68D		DM52K		DW29I		ED16H		EM75F		ER92B		EZ03J	
5			5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
66	Copper (6010)		**0.002**		**0.004**		**0.004**	J2	**0.002**		0.002	U	**0.002**		**0.003**		**0.012**		**0.010**		**0.004**		**0.006**	
67	Lead (7421)		0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		**0.003**		0.001	U	0.02	U
68	Nickel (6010)		**0.01**		**0.01**		**0.03**		**0.03**		**0.02**		**0.03**		**0.05**		**0.03**		**0.08**		**0.02**		**0.05**	
69	Zinc (6010)		**0.014**		**0.006**		**0.009**		**0.009**		**0.006**		**0.007**		**0.013**		**0.029**		**0.040**		**0.009**		**0.01**	
70																								
71	**MAJOR IONS AND CONVENTIONALS**																							
72	Calcium (mg/L) (6010)		NA		NA		NA		NA		**65.3**		**40.3**		**79.8**		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)		NA		NA		NA		NA		**16.0**		**13.7**		**18.2**		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)		NA		NA		NA		NA		**6.9**		**4.4**		**7.6**		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)		NA		NA		NA		NA		**11.2**		**8.24**		**12.2**		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	Chloride (mg/L) (EPA 325.2)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	N-Nitrate (mg-N/L) (Calculated)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2													Dup of K								Dup of K						
3			K		K		K		K		K		W		K		K		K		Z		K		K		K
4			S177A		T176U		U235X		V208E		W391J		W391K		Y314L		Z225U		Z960W		Z960V		AH27C		BB82B		BH75J
5			4/1/97		7/16/97		10/23/97		1/28/98		5/19/98		5/19/98		8/17/98		11/13/98		2/16/99		2/16/99		5/17/99		12/6/99		2/15/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	5.70		5.88		5.68		5.22		5.14		5.15		5.37		5.23		4.89		4.87		4.86		4.91		5.40
88	82	Temperature (° C) (avg)	12.0		17.4		16.8		12.7		13.9		13.8		17.6		15.2		12.1		11.9		14.1		14.7		11.9
89	83	Conductivity (um/hos)	157		155		677		382		187		185		130		175		184		187		114		1790		259
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		3.50		3.50		2.23		2.20		2.79		2.79		2.38		2.90		5.01
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			K		K		K		K		K		K		K		K		K		K		K	
4			BR55O		CB49K		CK77L		CT37O		DE68D		DM52K		DW29I		ED16H		EM75F		ER92B		EZ03J	
5			5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
86	**FIELD PARAMETERS**																							
87	pH (avg)		5.34		5.63		5.05		6.09		6.22		6.92		5.98		5.05		5.83		5.77		6.21	
88	Temperature (° C) (avg)		14.0		16.0		15.3		13.0		13.6		15.4		14.6		11.1		15.2		15.8		16	
89	Conductivity (um/hos)		157		161		323		694		531		350		645		78		199		157		325	
90	Dissolved oxygen (mg/L) (avg)		1.99		1.78		2.36		3.15		1.80		3.01		3.35		5.92		4.91		0.91		0.66	
91																								
92	**DIOXINS AND FURANS (ng/L)**																							
93	**Method 8290**																							
94	2,3,7,8-TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																								
120	**ETHANOL (mg/L)**		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2													Dup of K								Dup of K						
3			K		K		K		K		K		W		K		K		K		Z		K		K		K
4			S177A		T176U		U235X		V208E		W391J		W391K		Y314L		Z225U		Z960W		Z960V		AH27C		BB82B		BH75J
5			4/1/97		7/16/97		10/23/97		1/28/98		5/19/98		5/19/98		8/17/98		11/13/98		2/16/99		2/16/99		5/17/99		12/6/99		2/15/00
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																								
2																								
3			K		K		K		K		K		K		K		K		K		K		K	
4			BR55O		CB49K		CK77L		CT37O		DE68D		DM52K		DW29I		ED16H		EM75F		ER92B		EZ03J	
5			5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
122	**PAHs (µg/L)**																							
123	**EPA Method SW8270 SIM**																							
124	Naphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			L		L		L		L		L		L		L		L		L		L		L		L		L
4			S167H		T176A		U258B		V232H		W371E		Y336F		Z225F		Z960B		AH49E		AU22C		BC27A		BH75I		BR64H
5			4/1/97		7/15/97		10/23/97		1/30/98		5/18/98		8/18/98		11/13/98		2/16/99		5/18/99		9/20/99		12/7/99		2/15/00		5/24/00
7	1	**CHLORINATED PHENOLS (µg/L)**																									
8	2	**EPA Method SW8040**																									
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
16	10																										
17	11	**SEMIVOLATILES (µg/L)**																									
18	12	**EPA Method SW8270**																									
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
33	27																										
34	28	**VOLATILES (µg/L)**																									
35	29	**EPA Method SW8260**																									
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	**2.0**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
55	49																										
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																									
57	51	**Method OR-DEQ**																									
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
61	55																										
62	56	**PRIORITY POLLUTANT**																									
63	57	**METALS (mg/L)**																									
64	58	Arsenic (7060)	0.001	U	0.001	U	0.05	U	0.05	U	0.001	U	0.001	U	**0.007**		0.001	U	0.001	U	**0.003**		0.001	U	**0.001**		0.001
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.009**		0.005

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF
1						
2						
3			L		L	
4			CT37D		ED16E	
5			2/12/01		2/25/02	
6						
7	**CHLORINATED PHENOLS (µg/L)**					
8	**EPA Method SW8040**					
9	Pentachlorophenol	U	0.25	U	0.25	U
10	2,4,6-Trichlorophenol	U	NA		NA	
11	2,3,6-Trichlorophenol	U	NA		NA	
12	2,4,5-Trichlorophenol	U	NA		NA	
13	2,3,4-Trichlorophenol	U	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	NA		NA	
15	2,3,4,5-Tetrachlorophenol	U	NA		NA	
16						
17	**SEMIVOLATILES (µg/L)**					
18	**EPA Method SW8270**					
19	Phenol	U	2.0	U	2.0	U
20	4-Methylphenol	U	1.0	U	1.0	U
21	Isophorone	U	1.0	U	1.0	U
22	2,4-Dimethylphenol	U	3.0	U	3.0	U
23	Benzoic Acid	U	10	U	50	U
24	Naphthalene	U	1.0	U	1.0	U
25	2-Methylnaphthalene	U	1.0	U	1.0	U
26	2,4,6-Trichlorophenol	U	5.0	U	5.0	U
27	2,4,5-Trichlorophenol	U	5.0	U	5.0	U
28	Acenaphthene	U	1.0	U	1.0	U
29	Dibenzofuran	U	1.0	U	1.0	U
30	Fluorene	U	1.0	U	1.0	U
31	Pentachlorophenol	U	5.0	U	5.0	U
32	bis(2-Ethylhexyl)phthalate	U	1.0	U	4.0	U
33						
34	**VOLATILES (µg/L)**					
35	**EPA Method SW8260**					
36	Acetone	U	6.1	U	5.0	U
37	Carbon Disulfide	U	1.0	U	1.0	U
38	2-Butanone	U	5.0	U	5.0	U
39	Benzene	U	1.0	U	1.0	U
40	Bromoform	U	1.0	U	1.0	U
41	Toluene	U	1.0	U	1.0	U
42	Ethylbenzene	U	1.0	U	1.0	U
43	Styrene	U	1.0	U	1.0	U
44	m,p-Xylene	U	1.0	U	1.0	U
45	o-Xylene	U	1.0	U	1.0	U
46	1,3,5-Trimethylbenzene	U	1.0	U	1.0	U
47	1,2,4-Trimethylbenzene	U	1.0	U	1.0	U
48	Isopropylbenzene	U	1.0	U	1.0	U
49	n-Propylbenzene	U	1.0	U	1.0	U
50	tert-Butylbenzene	U	1.0	U	1.0	U
51	sec-Butylbenzene	U	1.0	U	1.0	U
52	4-Isopropyltoluene	U	1.0	U	1.0	U
53	n-Butylbenzene	U	1.0	U	1.0	U
54	Naphthalene	U	5.0	U	5.0	U
55						
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**					
57	**Method OR-DEQ**					
58	**TPH-Diesel**	U	0.25	U	0.25	U
59	**TPH-D Motor Oil**		NA		NA	
60	**TPH-Gasoline**		NA		NA	
61						
62	**PRIORITY POLLUTANT**					
63	**METALS (mg/L)**					
64	Arsenic (7060)	U	0.001	U	0.001	U
65	Chromium (6010)	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			L		L		L		L		L		L		L		L		L		L		L		L		L
4			S167H		T176A		U258B		V232H		W371E		Y336F		Z225F		Z960B		AH49E		AU22C		BC27A		BH75I		BR64H
5			4/1/97		7/15/97		10/23/97		1/30/98		5/18/98		8/18/98		11/13/98		2/16/99		5/18/99		9/20/99		12/7/99		2/15/00		5/24/00
66	60	Copper (6010)	**0.003**		**0.003**		**0.003**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.008**		**0.003**		**0.002**
67	61	Lead (7421)	**0.001**		0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	0.001
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01
69	63	Zinc (6010)	**0.004**		**0.004**	J2	**0.005**		**0.005**		**0.005**	J2	**0.005**		**0.004**		**0.051**		**0.004**		**0.008**		0.012	U	0.006	U	0.006
70	64																										
71	65	**MAJOR IONS AND CONVENTIONALS**																									
72	66	Calcium (mg/L) (6010)	**2.77**		**3.56**		**4.93**		**3.76**		NA		NA		NA		**3.24**		NA		NA		NA		NA		NA
73	67	Magnesium (mg/L) (6010)	**0.99**		**1.56**		**1.98**		**1.35**		NA		NA		NA		**1.18**		NA		NA		NA		NA		NA
74	68	Potassium (mg/L) (6010)	**1.2**		**0.8**		**1.6**		**1.1**		NA		NA		NA		**1.0**		NA		NA		NA		NA		NA
75	69	Sodium (mg/L) (6010)	**4.58**		**5.81**		**8.14**		**3.34**		NA		NA		NA		**3.61**		NA		NA		NA		NA		NA
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**16**		**30**		**28**		**21**		NA		NA		NA		**16**		NA		NA		NA		NA		NA
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**16**		**30**		**28**		**21**		NA		NA		NA		**16**		NA		NA		NA		NA		NA
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**100**	J2	**57**		**60**	J2	46		74		130		**36**		**57**		**92**		**77**		**65**		**56**
80	74	Chloride (mg/L) (EPA 325.2)	1.0	U	**3.8**		**1.9**		**1.0**		1.0		1.0	U	1.7		1.0	U	**1.5**		**1.5**		**3.4**		**2.0**		**1.8**
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.34**	J	**0.01**		**0.84**		**0.31**	J2	NA		NA		NA		**0.24**	J	NA		NA		NA		NA		NA
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	0.010	UJ	NA		NA		NA		0.010	UJ	NA		NA		NA		NA		NA
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.34**	J	**0.01**		**0.84**		**0.31**	J2	NA		NA		NA		**0.24**	J	NA		NA		NA		NA		NA
84	78	Sulfate (mg/L) (EPA 375.2)	**2.7**	J	**4.8**		**4.0**		**2.8**		NA		NA		NA		**3.6**		NA		NA		NA		NA		NA
85	79																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF
1						
2						
3			L		L	
4			CT37D		ED16E	
5			2/12/01		2/25/02	
66	Copper (6010)		0.002	U	0.002	U
67	Lead (7421)	U	0.001	U	0.001	U
68	Nickel (6010)	U	0.01	U	0.01	U
69	Zinc (6010)	U	0.006	U	0.006	U
70						
71	**MAJOR IONS AND CONVENTIONALS**					
72	Calcium (mg/L) (6010)		**11.5**		**3.20**	
73	Magnesium (mg/L) (6010)		**4.04**		**1.34**	
74	Potassium (mg/L) (6010)		**1.4**		**0.8**	
75	Sodium (mg/L) (6010)		**8.26**		**3.29**	
76	Alkalinity (mg/L CaCO3) (SM 2320)		**64**		**21**	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		1.0	U	1.0	U
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)		**64**		**21**	
79	Total Dissolved Solids (mg/L) (EPA 160.1)		**120**		**57**	
80	Chloride (mg/L) (EPA 325.2)		**1.4**		**2.4**	
81	N-Nitrate (mg-N/L) (Calculated)		**0.47**		**0.36**	
82	N-Nitrite (mg-N/L) (EPA 354.1)		0.010	U	0.010	U
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)		**0.47**	J	**0.36**	
84	Sulfate (mg/L) (EPA 375.2)		**4.4**		**3.6**	
85						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			L		L		L		L		L		L		L		L		L		L		L		L		L
4			S167H		T176A		U258B		V232H		W371E		Y336F		Z225F		Z960B		AH49E		AU22C		BC27A		BH75I		BR64H
5			4/1/97		7/15/97		10/23/97		1/30/98		5/18/98		8/18/98		11/13/98		2/16/99		5/18/99		9/20/99		12/7/99		2/15/00		5/24/00
86	80	**FIELD PARAMETERS**																									
87	81	pH (avg)	6.02		6.18		6.24		7.10		5.49		5.87		5.84		6.26		5.54		5.41		5.72		6.16		5.94
88	82	Temperature (° C) (avg)	9.8		15.5		16.4		9.6		13.1		15.7		13.8		8.9		13.1		15.5		13.0		10.8		13.1
89	83	Conductivity (um/hos)	41		68		81		55		60		95		89		39		42		101		75		50		63
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		4.51		2.60		1.87		5.67		2.93		2.16		4.48		4.25		3.14
91	85																										
92	86	**DIOXINS AND FURANS (ng/L)**																									
93	87	**Method 8290**																									
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
119																											
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF
1						
2						
3			L		L	
4			CT37D		ED16E	
5			2/12/01		2/25/02	
86	**FIELD PARAMETERS**					
87	pH (avg)		6.07		5.89	
88	Temperature (° C) (avg)		13.2		8.5	
89	Conductivity (um/hos)		104		37	
90	Dissolved oxygen (mg/L) (avg)		2.56		7.55	
91						
92	**DIOXINS AND FURANS (ng/L)**					
93	**Method 8290**					
94	2,3,7,8-TCDF		NA		NA	
95	Total TCDF		NA		NA	
96	2,3,7,8-TCDD		NA		NA	
97	Total TCDD		NA		NA	
98	1,2,3,7,8-PeCDF		NA		NA	
99	2,3,4,7,8-PeCDF		NA		NA	
100	Total PeCDF		NA		NA	
101	1,2,3,7,8-PeCDD		NA		NA	
102	Total PeCDD		NA		NA	
103	1,2,3,4,7,8-HxCDF		NA		NA	
104	1,2,3,6,7,8-HxCDF		NA		NA	
105	2,3,4,6,7,8-HxCDF		NA		NA	
106	1,2,3,7,8,9-HxCDF		NA		NA	
107	Total HxCDF		NA		NA	
108	1,2,3,4,7,8-HxCDD		NA		NA	
109	1,2,3,6,7,8-HxCDD		NA		NA	
110	1,2,3,7,8,9-HxCDD		NA		NA	
111	Total HxCDD		NA		NA	
112	1,2,3,4,6,7,8-HpCDF		NA		NA	
113	1,2,3,4,7,8,9-HpCDF		NA		NA	
114	Total HpCDF		NA		NA	
115	1,2,3,4,6,7,8-HpCDD		NA		NA	
116	Total HpCDD		NA		NA	
117	OCDF		NA		NA	
118	OCDD		NA		NA	
119						
120	**ETHANOL (mg/L)**		NA		NA	
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1																											
2																											
3			L		L		L		L		L		L		L		L		L		L		L		L		L
4			S167H		T176A		U258B		V232H		W371E		Y336F		Z225F		Z960B		AH49E		AU22C		BC27A		BH75I		BR64H
5			4/1/97		7/15/97		10/23/97		1/30/98		5/18/98		8/18/98		11/13/98		2/16/99		5/18/99		9/20/99		12/7/99		2/15/00		5/24/00
122		**PAHs (µg/L)**																									
123		**EPA Method SW8270 SIM**																									
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AB	AC	AD	AE	AF
1						
2						
3			L		L	
4			CT37D		ED16E	
5			2/12/01		2/25/02	
122	**PAHs (µg/L)**					
123	**EPA Method SW8270 SIM**					
124	Naphthalene		NA		NA	
125	2-Methylnaphthalene		NA		NA	
126	Acenaphthylene		NA		NA	
127	Acenaphthene		NA		NA	
128	Fluorene		NA		NA	
129	Anthracene		NA		NA	
130	Dibenzofuran		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4			S167K		T176E		U235T		V208F		W371G		Y336I		Z225E		Z960A		AH27G		AU45J		BB82C		BH75G		BR55G	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00	
7	1	**CHLORINATED PHENOLS (µg/L)**																										
8	2	**EPA Method SW8040**																										
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	UJ
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																											
17	11	**SEMIVOLATILES (µg/L)**																										
18	12	**EPA Method SW8270**																										
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																											
34	28	**VOLATILES (µg/L)**																										
35	29	**EPA Method SW8260**																										
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																											
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	51	**Method OR-DEQ**																										
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																											
62	56	**PRIORITY POLLUTANT**																										
63	57	**METALS (mg/L)**																										
64	58	Arsenic (7060)	**0.008**		**0.008**		0.05	U	0.05	U	**0.011**		**0.011**		**0.012**		**0.010**		**0.008**		**0.014**		**0.011**		**0.013**		**0.010**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4		CB49C		CK77D		CT37B		DE68F		DM52E		DW48M		ED16J		EM75G		ER92C		EY88E	
5		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
7	**CHLORINATED PHENOLS (µg/L)**																				
8	**EPA Method SW8040**																				
9	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.28	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																					
17	**SEMIVOLATILES (µg/L)**																				
18	**EPA Method SW8270**																				
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.2	U	2	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.3	U	3	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	56	U	50	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	4.0	U	4.4	U	4	U
33																					
34	**VOLATILES (µg/L)**																				
35	**EPA Method SW8260**																				
36	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
48	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
49	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
53	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5	U	5	U
55																					
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	**Method OR-DEQ**																				
58	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	NA		NA		NA		0.25	U	NA		NA		NA	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																					
62	**PRIORITY POLLUTANT**																				
63	**METALS (mg/L)**																				
64	Arsenic (7060)	**0.010**		**0.011**		**0.010**		**0.009**		**0.011**		**0.012**		**0.023**		**0.010**		**0.011**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.007**		0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4			S167K		T176E		U235T		V208F		W371G		Y336I		Z225E		Z960A		AH27G		AU45J		BB82C		BH75G		BR55G	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.004	U	**0.005**	J2	**0.011**		0.004	U	**0.008**	J2	**0.012**		0.004	U	**0.010**	J	0.012	U	**0.005**		0.006	U	**0.007**		0.006	U
70	64																											
71	65	**MAJOR IONS AND CONVENTIONALS**																										
72	66	Calcium (mg/L) (6010)	**16.7**		**19.5**		**20.2**		**20.1**		NA		NA		NA		**18.4**		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**5.95**		**6.73**		**7.53**		**7.23**		NA		NA		NA		**6.09**		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**2.9**		**3.3**		**2.6**		**2.4**		NA		NA		NA		**2.8**		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**7.70**		**9.08**		**7.22**		**8.08**		NA		NA		NA		**8.54**		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**80**		**77**		**88**		**94**		NA		NA		NA		**87**		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**80**		**77**		**88**		**94**		NA		NA		NA		**87**		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**140**	J2	**130**		**140**		110		99		140		**120**		**130**		**140**		**150**		**140**		**130**	
80	74	Chloride (mg/L) (EPA 325.2)	**2.1**	J	**2.3**		**2.5**		**2.4**		2.3		1.0	U	1.8		**1.2**		**1.2**		**2.4**		**3.7**		**2.9**		**3.4**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.58**	J	**1.3**		**0.11**		**0.48**		NA		NA		NA		**0.12**		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	0.010	U	NA		NA		NA		0.010	U	NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.58**	J	**1.3**		**0.11**		**0.48**		NA		NA		NA		**0.12**		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**9.3**	J	**13**		**5.5**		**5.1**		NA		NA		NA		**7.2**		NA		NA		NA		NA		NA	
85	79																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4		CB49C		CK77D		CT37B		DE68F		DM52E		DW48M		ED16J		EM75G		ER92C		EY88E	
5		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.009**		0.002	U	0.002	U	0.002	U
67	Lead (7421)	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	**0.004**		0.001	U	0.001	U	0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.030**		0.006	U	0.006	U	0.006	U
70																					
71	**MAJOR IONS AND CONVENTIONALS**																				
72	Calcium (mg/L) (6010)	NA		NA		**25.5**		**28.4**		**25.8**		**27.3**		**30.4**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		**9.47**		**10.6**		**10.2**		**10.4**		**11.7**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		**2.0**		**2.4**		**2.2**		**2.4**		**3.4**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		**7.23**		**7.87**		**7.24**		**7.20**		**10.2**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		**120**		NA		NA		NA		**120**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		**120**		NA		NA		NA		**120**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**160**		**170**		**170**		**180**		**160**		**170**		**160**		**200**		**210**		**210**	
80	Chloride (mg/L) (EPA 325.2)	**3.5**		**3.6**		**4.1**		**3.1**		**3.7**		**2.6**		**3.2**		**2.7**		**3.1**		**3**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		**0.17**		NA		NA		NA		**0.91**		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		**0.17**	J	NA		NA		NA		**0.91**		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		**6.8**		NA		NA		NA		**5.7**		NA		NA		NA	
85																					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4			S167K		T176E		U235T		V208F		W371G		Y336I		Z225E		Z960A		AH27G		AU45J		BB82C		BH75G		BR55G	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00	
86	80	**FIELD PARAMETERS**																										
87	81	pH (avg)	6.72		6.83		6.94		6.60		6.32		6.51		6.48		6.84		5.72		6.88		6.24		6.73		6.57	
88	82	Temperature (° C) (avg)	13.4		16.9		15.8		15.4		14.8		15.9		14.5		14.5		14.4		16.1		14.9		14.4		14.3	
89	83	Conductivity (um/hos)	190		203		154		213		195		193		100		174		146		197		212		206		182	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		1.73		1.84		3.04		3.91		1.22		2.53		2.34		2.17	
91	85																											
92	86	**DIOXINS AND FURANS (ng/L)**																										
93	87	**Method 8290**																										
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																												
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																												

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4		CB49C		CK77D		CT37B		DE68F		DM52E		DW48M		ED16J		EM75G		ER92C		EY88E	
5		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
86	**FIELD PARAMETERS**																				
87	pH (avg)	6.49		5.21		6.56		6.75		6.94		6.71		6.22		6.57		6.61		6.62	
88	Temperature (° C) (avg)	16.0		15.2		14.9		14.6		15.8		15.4		14.3		16.1		16.3		16	
89	Conductivity (um/hos)	196		207		217		250		245		245		257		370		265		367	
90	Dissolved oxygen (mg/L) (avg)	1.80		1.86		1.90		1.99		1.09		3.75		4.77		5.34		0.77		3.86	
91																					
92	**DIOXINS AND FURANS (ng/L)**																				
93	**Method 8290**																				
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																					
120	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1																												
2																												
3			LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4			S167K		T176E		U235T		V208F		W371G		Y336I		Z225E		Z960A		AH27G		AU45J		BB82C		BH75G		BR55G	
5			4/1/97		7/15/97		10/23/97		1/28/98		5/18/98		8/19/98		11/13/98		2/17/99		5/17/99		9/23/99		12/6/99		2/15/00		5/23/00	
122		**PAHs (µg/L)**																										
123		**EPA Method SW8270 SIM**																										
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
1																					
2																					
3		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S		LW1S	
4		CB49C		CK77D		CT37B		DE68F		DM52E		DW48M		ED16J		EM75G		ER92C		EY88E	
5		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/29/01		2/25/02		6/25/02		08/26/02		11/11/02	
122	**PAHs (µg/L)**																				
123	**EPA Method SW8270 SIM**																				
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2									Dup of LW2S													
3			LW2S		LW2S		LW2S		LW2D		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4			S177G		T176C		U235M		U235E		V224N		W391A		Y336G		Z225A		Z960Q		AH27F	
5			4/2/97		7/15/97		10/22/97		10/22/97		1/29/98		5/19/98		8/19/98		11/13/98		2/18/99		5/17/99	
7	1	**CHLORINATED PHENOLS (µg/L)**																				
8	2	**EPA Method SW8040**																				
9	3	Pentachlorophenol	**2600**		**2900**		**4400**		**4800**		**7600**		**8500**		**5000**		**3800**		**6000**		**560**	
10	4	2,4,6-Trichlorophenol	**0.46**		0.43	U	0.34	U	0.38	U	**0.56**		**0.57**		**0.34**		**0.34**		0.46		0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.86	U	0.25	U	0.49	U	0.51	U	0.25	U	**0.57**		**0.61**		0.25	U	0.60	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	**0.13**	J1	**0.18**	J1	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**150**		**150**		**190**		**190**		**290**		**370**		**180**		**130**		**300**		**20**	
15	9	2,3,4,5-Tetrachlorophenol	**2.5**		**3.4**		**4.8**		**4.7**		**4.4**		**6.6**		**8.6**		**2.8**		**3.2**		**1.1**	
16	10																					
17	11	**SEMIVOLATILES (µg/L)**																				
18	12	**EPA Method SW8270**																				
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	**5.5**		**2.3**		**20**		**17**		**13**		**10**	J2	**13**		**14**		**8.4**		1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	**3900**		**3000**		**6000**		**7300**		**7900**		**7300**		**4200**		**4100**		**5400**		**500**	
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	**1.9**		1.0	U	1.0	U	**12**		1.0	U	1.0	U	**1.6**		**1.3**	
33	27																					
34	28	**VOLATILES (µg/L)**																				
35	29	**EPA Method SW8260**																				
36	30	Acetone	10	U	5.0	U	6.9		45	U	5.0	U	**7.4**		5.0	U	**35**		15	U	5.0	U
37	31	Carbon Disulfide	2.0	U	1.0	U	1.0	U	9.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U
38	32	2-Butanone	10	U	5.0	U	5.0	U	45	U	5.0	U	5.0	U	5.0	U	**7.4**		15	U	**9.4**	
39	33	Benzene	2.0	U	1.0	U	1.0	U	9.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U
40	34	Bromoform	2.0	U	1.0	U	1.0	U	9.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U
41	35	Toluene	2.0	U	**2.0**		**1.1**		9.0	U	1.0	U	1.0	U	**1.4**		**1.3**		3.0	U	1.0	U
42	36	Ethylbenzene	**5.7**		**11**		**32**		**32**		**17**		**5.1**		**9.7**		**12**		**11**		**2.0**	
43	37	Styrene	2.0	U	1.0	U	1.0	U	9.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U
44	38	m,p-Xylene	**13**		**16**		**37**		**36**		**32**		**12**		**17**		**24**		**18**		**2.6**	
45	39	o-Xylene	**23**		**35**		**91**		**92**		**63**		**23**		**39**		**61**		**42**		**6.9**	
46	40	1,3,5-Trimethylbenzene	**53**		**49**		**130**		**110**		**80**		**34**		**54**		**62**		**93**		**8.7**	
47	41	1,2,4-Trimethylbenzene	**210**		**200**		**640**	J2	**790**	J2	**490**		**160**		**180**		**280**		**330**		**44**	
48	42	Isopropylbenzene	**7.5**		**14**		**62**	J2	**49**	J2	**19**		**6.4**		**10**		**12**		**16**		**2.2**	
49	43	n-Propylbenzene	**16**		**26**		**110**		**90**		**38**		**15**		**21**		**22**		**35**		**4.8**	
50	44	tert-Butylbenzene	2.0	U	**1.8**	MJ	**5.7**		9.0	U	**2.7**		1.0	U	1.0	U	1.0	U	3.0		1.0	U
51	45	sec-Butylbenzene	**7.6**		**11**		**40**	J2	**27**	J2	**22**		**8.2**		**12**	J2	**12**		**15**		**2.9**	
52	46	4-Isopropyltoluene	**9.6**		**9.6**		**31**	J2	**22**	J2	**21**		**9.1**		**12**		**12**		**12**		**2.0**	
53	47	n-Butylbenzene	**8.5**		**8.4**	M	**29**	J2	**18**	J2	**16**		**7.7**		**10**		**10**		**12**		**1.9**	
54	48	Naphthalene	**12.0**		**14**		**75**	J2	**58**	J2	**31**		**14**		**19**		**18**		**22**		5.0	U
55	49																					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																				
57	51	**Method OR-DEQ**																				
58	52	**TPH-Diesel**	**4.4**		**5.0**		**11**		**11**		**10**		**5.6**		**5.2**		**5.0**		**6.2**		**1.1**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																					
62	56	**PRIORITY POLLUTANT**																				
63	57	**METALS (mg/L)**																				
64	58	Arsenic (7060)	**0.008**		**0.012**		0.05	U	0.05	U	0.05	U	**0.011**		**0.011**		**0.017**		**0.007**		**0.005**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.006**		0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1																									
2																									
3		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4		AU22G		BC27H		9912050-04A		BH75F		BR64C		CB49I		CK77I		CT55G		DE68C		DM52I		DW48K		ED23E	
5		9/20/99		12/8/99		12/8/1999 (d)		2/15/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/26/02	
7	**CHLORINATED PHENOLS (µg/L)**																								
8	**EPA Method SW8040**																								
9	Pentachlorophenol	**1500**		**1300**		NA		**2100**		**1000**		**720**		**1100**		**650**	J	NA		NA		NA		NA	
10	2,4,6-Trichlorophenol	**0.16**	J1	**0.12**	J1	NA		**0.42**		0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.57	U	0.33	U	NA		0.37	U	0.25	U	0.74	U	0.33	U	NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**47**		**36**		NA		**84**		**28**		**28**		**47**		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	**2.2**		**1.6**		NA		**2.2**		**2.1**		**1.0**		**1.5**		NA		NA		NA		NA		NA	
16																									
17	**SEMIVOLATILES (µg/L)**																								
18	**EPA Method SW8270**																								
19	Phenol	2.0	U	2.0	U	NA		2.0	U	2.0	U	2.0	U	**2.4**	J2	2.0	U	2.0	U	2.0	U	**2.8**		2.0	U
20	4-Methylphenol	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**3.0**		1.0	U
21	Isophorone	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	NA		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	Benzoic Acid	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U
24	Naphthalene	**4.3**		**36**		NA		**8.2**		**5.2**		**1.4**		**9.2**		**12**		**21**		**6.8**		**14**		1.0	U
25	2-Methylnaphthalene	1.0	U	**1.2**		NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	Acenaphthene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	Dibenzofuran	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	Fluorene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	Pentachlorophenol	**1600**		**1800**		NA		**2100**		**1300**	J2	**200**		**1500**		**1200**	J	**1300**		**700**		**8000**		**320**	
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	**1.4**		1.0	U	1.0	U	**1.5**		4.0	U
33																									
34	**VOLATILES (µg/L)**																								
35	**EPA Method SW8260**																								
36	Acetone	5.0	U	**29**		NA		5.0	U	5.0	U	5.0	U	**27**			R	**33**		**20**		**39**		5.0	U
37	Carbon Disulfide	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	3.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	2-Butanone	**28**		**6.7**	M	NA		**32**		**22**		5.0	U	15	U	10	U	34	U	**32**		5.0	U	**5.2**	
39	Benzene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	3.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	Bromoform	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	3.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	Toluene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	3.0	U	2.0	U	**1.1**		1.0	U	1.0	U	1.0	U
42	Ethylbenzene	**6.3**		**22**		NA		**11**		**5.3**		**1.6**		**11**		**9.7**		**26**		1.0	U	**15**		1.0	U
43	Styrene	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	3.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	m,p-Xylene	**11**		**18**		NA		**18**		**9.9**		**3.0**		**15**		**18**		**36**		**14**		**35**		**1.2**	
45	o-Xylene	**29**		**97**		NA		**45**		**25**		**8.1**		**36**		**49**		**87**		**36**		**84**		**3.0**	
46	1,3,5-Trimethylbenzene	**45**		**80**		NA		**69**		**38**		**16**		**47**		**61**		**94**		**34**		**130**		**5.7**	
47	1,2,4-Trimethylbenzene	**120**		**540**		NA		**330**		**160**		**66**		**250**		**320**		**490**		**200**		**420**		**25**	
48	Isopropylbenzene	**7.0**		**38**		NA		**23**		**7.3**		**2.2**		**9.1**		**19**		**32**		**13**		**16**		1.0	U
49	n-Propylbenzene	**15**		**60**		NA		**48**		**16**		**5.8**		**20**		**36**		**67**		**28**		**32**		**2.0**	
50	tert-Butylbenzene	1.0	U	1.0	U	NA		3.1	U	**1.2**		1.0	U	3.0	U	**3.2**		1.0	U	1.0	U	**68**		1.0	U
51	sec-Butylbenzene	**8.0**		**27**		NA		**24**		**8.2**		**3.9**		**9.3**		**20**		**30**		**15**		1.0	U	**1.4**	
52	4-Isopropyltoluene	**8.8**		**20**		NA		**15**		**7.4**		**3.8**		**8.5**		**17**		**25**		**13**		**22**		**1.5**	
53	n-Butylbenzene	**7.0**		15	U	NA		17	U	**6.5**	M	**3.7**	M	**9.5**		**15**	M	**21**		**12**	M	**18**		**1.2**	
54	Naphthalene	**16**		**54**		NA		**26**		**10**		5.0	U	**27**		**23**		**60**		**28**		**54**		5.0	U
55																									
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	**Method OR-DEQ**																								
58	**TPH-Diesel**	**2.3**		**9.4**		NA		**5.5**		**3.5**		**1.8**		**4.0**		**9.1**		**9.4**		**5.4**		10		**1.5**	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																									
62	**PRIORITY POLLUTANT**																								
63	**METALS (mg/L)**																								
64	Arsenic (7060)	**0.008**		**0.011**		NA		**0.011**		**0.011**		**0.011**		**0.017**		**0.013**		**0.018**		**0.019**		**0.013**		**0.015**	
65	Chromium (6010)	0.005	U	0.005	U	NA		0.005	U	0.005	U	**0.005**		0.005	U	0.005	U	0.05	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AU	AV
1			
2			
3		LW2S	
4		EM85F	
5		6/26/02	
6			
7	**CHLORINATED PHENOLS (µg/L)**		
8	**EPA Method SW8040**		
9	Pentachlorophenol	NA	
10	2,4,6-Trichlorophenol	NA	
11	2,3,6-Trichlorophenol	NA	
12	2,4,5-Trichlorophenol	NA	
13	2,3,4-Trichlorophenol	NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA	
15	2,3,4,5-Tetrachlorophenol	NA	
16			
17	**SEMIVOLATILES (µg/L)**		
18	**EPA Method SW8270**		
19	Phenol	2.0	U
20	4-Methylphenol	1.0	U
21	Isophorone	1.0	U
22	2,4-Dimethylphenol	3.0	U
23	Benzoic Acid	50	U
24	Naphthalene	**6.2**	
25	2-Methylnaphthalene	1.0	U
26	2,4,6-Trichlorophenol	5.0	U
27	2,4,5-Trichlorophenol	5.0	U
28	Acenaphthene	1.0	U
29	Dibenzofuran	1.0	U
30	Fluorene	1.0	U
31	Pentachlorophenol	**950**	
32	bis(2-Ethylhexyl)phthalate	4.0	U
33			
34	**VOLATILES (µg/L)**		
35	**EPA Method SW8260**		
36	Acetone	**8.2**	
37	Carbon Disulfide	1.0	U
38	2-Butanone	**13**	
39	Benzene	1.0	U
40	Bromoform	1.0	U
41	Toluene	1.0	U
42	Ethylbenzene	**4.7**	
43	Styrene	1.0	U
44	m,p-Xylene	**7.3**	
45	o-Xylene	**18**	
46	1,3,5-Trimethylbenzene	**24**	
47	1,2,4-Trimethylbenzene	**110**	
48	Isopropylbenzene	**6.8**	
49	n-Propylbenzene	**14**	
50	tert-Butylbenzene	1.0	U
51	sec-Butylbenzene	**7.5**	
52	4-Isopropyltoluene	**6.6**	
53	n-Butylbenzene	5.7	U
54	Naphthalene	**11**	
55			
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	**Method OR-DEQ**		
58	**TPH-Diesel**	**2.8**	
59	**TPH-D Motor Oil**	NA	
60	**TPH-Gasoline**	NA	
61			
62	**PRIORITY POLLUTANT**		
63	**METALS (mg/L)**		
64	Arsenic (7060)	**0.014**	
65	Chromium (6010)	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2									Dup of LW2S													
3			LW2S		LW2S		LW2S		LW2D		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4			S177G		T176C		U235M		U235E		V224N		W391A		Y336G		Z225A		Z960Q		AH27F	
5			4/2/97		7/15/97		10/22/97		10/22/97		1/29/98		5/19/98		8/19/98		11/13/98		2/18/99		5/17/99	
66	60	Copper (6010)	0.002	U	**0.002**		0.002	U	0.002	U	0.002	U	0.002	U	**0.002**		0.002	U	**0.007**		0.002	U
67	61	Lead (7421)	0.001	U	**0.001**		0.02	U	0.02	U	0.02	U	0.001	U	**0.007**		0.001	U	**0.004**		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.004**		**0.006**	J2	**0.007**		**0.004**		**0.004**		**0.004**	J2	**0.098**		**0.006**		**0.026**		0.005	U
70	64																					
71	65	**MAJOR IONS AND CONVENTIONALS**																				
72	66	Calcium (mg/L) (6010)	NA		NA		**18.4**		**18.2**		**9.13**		NA		NA		NA		**7.23**		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		**5.15**		**5.12**		**2.30**		NA		NA		NA		**2.52**		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		**2.8**		**2.8**		**1.6**		NA		NA		NA		**1.9**		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		**4.77**		**4.74**		**2.54**		NA		NA		NA		**3.69**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		**62**		**61**		**52**		NA		NA		NA		**25**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		**62**		**61**		**52**		NA		NA		NA		**25**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**170**	J2	**130**		**140**		**66**		160		140		220		**76**		**160**	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		**15**		**15**		**1.9**		3.9		4.6		26		**1.9**		**1.8**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		**0.023**		**0.017**		0.010	UJ	NA		NA		NA		**0.040**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		0.010	U	0.010	U	0.010	UJ	NA		NA		NA		**0.016**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		**0.023**		**0.017**		0.010	UJ	NA		NA		NA		**0.056**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		**5.3**		**5.9**		**6.5**		NA		NA		NA		**9.4**		NA	
85	79																					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1																									
2																									
3		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4		AU22G		BC27H		9912050-04A		BH75F		BR64C		CB49I		CK77I		CT55G		DE68C		DM52I		DW48K		ED23E	
5		9/20/99		12/8/99		12/8/1999 (d)		2/15/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/26/02	
66	Copper (6010)	0.002	U	**0.002**		NA		**0.003**		**0.003**		**0.007**		**0.005**	J2	0.002	U	0.002	U	**0.004**		0.004	U	**0.003**	
67	Lead (7421)	0.001	U	0.001	U	NA		0.001	U	0.001	U	**0.003**		**0.003**		0.001	U	0.001	U	**0.001**		**0.004**		0.001	U
68	Nickel (6010)	0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	**0.008**		0.009	U	NA		**0.010**		**0.006**		**0.016**		**0.013**		**0.011**		0.006	U	**0.012**		**0.012**		**0.006**	
70																									
71	**MAJOR IONS AND CONVENTIONALS**																								
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**35.6**		**42.2**		**24.3**		**23.3**		**12.3**	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**9.27**		**10.1**		**7.63**		**7.65**		**3.88**	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**2.7**		**3.4**		**3.1**		**2.9**		**2.0**	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		**5.10**		**5.23**		**5.84**		**5.14**		**3.46**	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**140**		NA		NA		NA		**67**	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		**140**		NA		NA		NA		**67**	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**160**		**170**		NA		**84**		**140**		**180**		**220**		**210**		**300**		**210**		**190**		**120**	
80	Chloride (mg/L) (EPA 325.2)	**3.1**		**7.5**		NA		**1.8**		**2.5**		**2.8**		**26**		**15**		**38**		**26**		**9.7**		**4.1**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		**0.010**		NA		NA		NA		0.010	U
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**0.026**	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		**0.010**		NA		NA		NA		**0.033**	J
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		**5.7**		NA		NA		NA		**4.3**	
85																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AU	AV
1			
2			
3		LW2S	
4		EM85F	
5		6/26/02	
65			
66	Copper (6010)	0.002	U
67	Lead (7421)	0.001	U
68	Nickel (6010)	0.01	U
69	Zinc (6010)	**0.012**	
70			
71	**MAJOR IONS AND CONVENTIONALS**		
72	Calcium (mg/L) (6010)	NA	
73	Magnesium (mg/L) (6010)	NA	
74	Potassium (mg/L) (6010)	NA	
75	Sodium (mg/L) (6010)	NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**110**	
80	Chloride (mg/L) (EPA 325.2)	**3.3**	
81	N-Nitrate (mg-N/L) (Calculated)	NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	Sulfate (mg/L) (EPA 375.2)	NA	
85			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2									Dup of LW2S													
3			LW2S		LW2S		LW2S		LW2D		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4			S177G		T176C		U235M		U235E		V224N		W391A		Y336G		Z225A		Z960Q		AH27F	
5			4/2/97		7/15/97		10/22/97		10/22/97		1/29/98		5/19/98		8/19/98		11/13/98		2/18/99		5/17/99	
86	80	**FIELD PARAMETERS**																				
87	81	pH (avg)	6.69		6.62		6.77		6.78		6.83		6.19		6.18		5.9300		6.21		5.62	
88	82	Temperature (° C) (avg)	10.0		15		15.7		15.7		10.8		12.6		14.4		14.7000		8.6		11.2	
89	83	Conductivity (um/hos)	291		258		168		167		108		244		299		148.0000		57		221	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		2.71		1.43		1.31		1.47		3.08	
91	85																					
92	86	**DIOXINS AND FURANS (ng/L)**																				
93	87	**Method 8290**																				
94	88	2,3,7,8-TCDF	**0.0040**		0.0045	U	**0.036**		NA		**0.0052**	(c)	**0.0045**	(c)	**0.012**	(c)	**0.0080**	(c)	**0.0079**	(c)	**0.0045**	(c)
95	89	Total TCDF	**0.0180**		0.0016-0.0048	U	**0.310**		NA		**0.0190**		**0.0280**		**0.060**		**0.0370**		**0.0079**		**0.0230**	
96	90	2,3,7,8-TCDD	0.0042	U	0.0034	U	0.049	U	NA		0.0051	U	0.0025	U	0.0062	U	0.0044	U	**0.0280**		0.0035	U
97	91	Total TCDD	0.0014-0.0042	U	0.0011-0.0036	U	**0.940**		NA		**0.0044**		0.0025	U	0.0062	U	0.0044	U	**0.3000**		**0.0025**	
98	92	1,2,3,7,8-PeCDF	0.0340	U	0.2600	U	0.075	U	NA		**0.0077**		**0.0150**		2.0000	U (b)	**0.0200**		3.00	U,E	**0.0130**	
99	93	2,3,4,7,8-PeCDF	**0.0120**		0.0190	U	**0.110**		NA		0.0160	U	**0.0110**		0.1200	U (b)	**0.0430**		**0.2600**		**0.0240**	
100	94	Total PeCDF	**0.2400**		**0.120**		**1.300**		NA		**0.2200**		**0.1900**		**0.470**		**0.3000**		**0.4200**		**0.1600**	
101	95	1,2,3,7,8-PeCDD	0.0120	U	0.0072	U	**0.360**		NA		0.0160	U	**0.0049**		**0.014**		**0.0110**		**0.2800**		0.0045	U
102	96	Total PeCDD	0.0032-0.0077	U	0.0025-0.014	U	**3.000**		NA		0.0160	U	**0.0049**		**0.014**		**0.0110**		**1.5000**		**0.0019**	
103	97	1,2,3,4,7,8-HxCDF	**0.0590**		**0.019**		1.900	U	NA		0.1300	UE	0.1100	U	**0.180**		0.8400	U	0.50	U,E	**0.0280**	
104	98	1,2,3,6,7,8-HxCDF	**0.0300**		0.0160	U	**0.260**		NA		**0.0470**		**0.0260**		**0.120**		**0.0660**		**0.0870**		0.1900	U,E
105	99	2,3,4,6,7,8-HxCDF	**0.0580**		**0.033**		**0.620**		NA		**0.0740**		**0.0610**	J2	**0.220**		**0.0840**		**0.5700**		**0.0430**	
106	100	1,2,3,7,8,9-HxCDF	**0.0280**		**0.013**		**0.260**		NA		**0.0340**		0.0220	U	**0.078**		**0.0380**		0.53	U,E	**0.0220**	
107	101	Total HxCDF	**0.8800**		**0.370**		**14.000**		NA		**0.9700**		**2.0000**	J2	**2.700**		**1.6000**		**14.0000**		**1.5000**	
108	102	1,2,3,4,7,8-HxCDD	**0.0120**		0.0110	U	**0.630**		NA		**0.0180**		**0.0170**		**0.045**		**0.0310**		**0.2600**		**0.0110**	
109	103	1,2,3,6,7,8-HxCDD	**0.3400**		**0.150**		**3.400**		NA		**0.4000**		**0.4000**	J2	**1.200**		**0.5900**		**3.0000**		**0.1800**	
110	104	1,2,3,7,8,9-HxCDD	**0.0280**		**0.012**		**0.960**		NA		**0.0410**		**0.0400**		**0.110**		**0.0540**		**0.4900**		**0.0170**	
111	105	Total HxCDD	**0.7900**		**0.350**		**14.000**		NA		**0.9500**		**1.0000**	J2	**2.800**		**1.5000**		**10.0000**		**0.4200**	
112	106	1,2,3,4,6,7,8-HpCDF	**1.5000**		**0.600**		**9.700**		NA		**1.5000**		**1.4000**		**4.500**		**2.6000**		**11.0000**		**0.4800**	
113	107	1,2,3,4,7,8,9-HpCDF	**0.0980**		**0.039**		**0.990**		NA		**0.1000**		**0.0990**		**0.340**		**0.1800**		**0.8300**		**0.0440**	
114	108	Total HpCDF	**6.7000**		**0.640**		**43.000**		NA		**4.8000**		**6.3000**		**4.800**		**13.0000**		**65.0000**		**2.8000**	
115	109	1,2,3,4,6,7,8-HpCDD	**10.0000**		**3.800**		**54.000**		NA		**9.9000**		**8.4000**		**28.000**	J2	**17.0000**		**56.0000**		**4.0000**	
116	110	Total HpCDD	**15.0000**		**5.700**		**82.000**		NA		**15.0000**		**13.0000**		**39.000**	J2	**26.0000**		**84.0000**		**5.6000**	
117	111	OCDF	**8.8000**		**2.600**		**40.000**		NA		**7.0000**		**6.9000**		**20.000**		**12.0000**		**43.0000**		**3.1000**	
118	112	OCDD	**76.0000**		**25.000**		**350.000**		NA		**65.0000**		**58.0000**	J2	**190.000**	J2	**110.0000**		**320.0000**		**25.0000**	
119																						
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1																									
2																									
3		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4		AU22G		BC27H		9912050-04A		BH75F		BR64C		CB49I		CK77I		CT55G		DE68C		DM52I		DW48K		ED23E	
5		9/20/99		12/8/99		12/8/1999 (d)		2/15/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/26/02	
86	**FIELD PARAMETERS**																								
87	pH (avg)	6.06		6.25		NM		6.42		6.23		6.59		5.58		6.01		6.33		6.54		6.22		4.96	
88	Temperature (° C) (avg)	16.6		12.6		NM		10.8		12.8		15.5		15.3		11.3		12.7		15.5		14.5		11.1	
89	Conductivity (um/hos)	221		267		NM		91		267		268		302		305		427		299		321		124	
90	Dissolved oxygen (mg/L) (avg)	1.58		2.34		NM		0.95		1.22		1.73		0.98		0.59		1.32		3.04		3.76		7.98	
91																									
92	**DIOXINS AND FURANS (ng/L)**																								
93	**Method 8290**																								
94	2,3,7,8-TCDF	**0.0060**	(c)	0.00330	U	NA		0.086	U	NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	**0.0510**		**0.0280**		NA		**0.0540**		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	0.0054	U	0.00079	U	NA		0.0047	U	NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	0.0054	U	0.00079	U	NA		0.0047	U	NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	0.1800	UE	0.00170	U	NA		2.400	U	NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	**0.1100**		**0.0160**	J1	NA		**0.0260**	J1	NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	**0.6700**		**0.1000**		NA		**0.1200**		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	**0.0130**		**0.0049**	J1	NA		**0.0068**	J1	NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	**0.0200**		**0.0074**	J1	NA		**0.0110**		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	**0.1800**		**0.0690**		NA		0.860	U	NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	**0.1200**		0.720	U	NA		0.0460	U	NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	**0.1600**		**0.0330**	J1	NA		**0.0420**	J1	NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	**0.0950**		0.011	U	NA		0.0100	U	NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	**14.0000**		**2.1000**		NA		**2.9000**		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	**0.0620**		0.020	U	NA		0.012	U	NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	**1.2000**		**0.4800**		NA		**0.4400**		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	**0.1200**		**0.0410**	J1	NA		**0.0290**	J1	NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	**2.8000**		**1.1000**		NA		**1.2000**		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	**4.8000**		**2.2000**		NA		**1.7000**		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	**0.3300**		**0.1200**		NA		**0.1200**		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	**5.1000**		**10.0000**		NA		**9.2000**		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	**30.0000**		**14.0000**		NA		**11.0000**		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	**45.0000**		**20.0000**		NA		**17.0000**		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	**29.0000**		**11.0000**		NA		**9.0000**		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	**210.0000**		**100.0000**	N2	NA		**76.0000**		NA		NA		NA		NA		NA		NA		NA		NA	
119																									
120	**ETHANOL (mg/L)**	NA		NA		10	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AU	AV
1			
2			
3		LW2S	
4		EM85F	
5		6/26/02	
85			
86	**FIELD PARAMETERS**		
87	pH (avg)	6.39	
88	Temperature (° C) (avg)	15.2	
89	Conductivity (um/hos)	150	
90	Dissolved oxygen (mg/L) (avg)	3.67	
91			
92	**DIOXINS AND FURANS (ng/L)**		
93	**Method 8290**		
94	2,3,7,8-TCDF	NA	
95	Total TCDF	NA	
96	2,3,7,8-TCDD	NA	
97	Total TCDD	NA	
98	1,2,3,7,8-PeCDF	NA	
99	2,3,4,7,8-PeCDF	NA	
100	Total PeCDF	NA	
101	1,2,3,7,8-PeCDD	NA	
102	Total PeCDD	NA	
103	1,2,3,4,7,8-HxCDF	NA	
104	1,2,3,6,7,8-HxCDF	NA	
105	2,3,4,6,7,8-HxCDF	NA	
106	1,2,3,7,8,9-HxCDF	NA	
107	Total HxCDF	NA	
108	1,2,3,4,7,8-HxCDD	NA	
109	1,2,3,6,7,8-HxCDD	NA	
110	1,2,3,7,8,9-HxCDD	NA	
111	Total HxCDD	NA	
112	1,2,3,4,6,7,8-HpCDF	NA	
113	1,2,3,4,7,8,9-HpCDF	NA	
114	Total HpCDF	NA	
115	1,2,3,4,6,7,8-HpCDD	NA	
116	Total HpCDD	NA	
117	OCDF	NA	
118	OCDD	NA	
119			
120	**ETHANOL (mg/L)**	NA	
121			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1																						
2									Dup of LW2S													
3			LW2S		LW2S		LW2S		LW2D		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4			S177G		T176C		U235M		U235E		V224N		W391A		Y336G		Z225A		Z960Q		AH27F	
5			4/2/97		7/15/97		10/22/97		10/22/97		1/29/98		5/19/98		8/19/98		11/13/98		2/18/99		5/17/99	
122		**PAHs (µg/L)**																				
123		**EPA Method SW8270 SIM**																				
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		**8.2**		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		**0.41**		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		**0.11**	M	NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1																									
2																									
3		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S		LW2S	
4		AU22G		BC27H		9912050-04A		BH75F		BR64C		CB49I		CK77I		CT55G		DE68C		DM52I		DW48K		ED23E	
5		9/20/99		12/8/99		12/8/1999 (d)		2/15/00		5/24/00		8/29/00		11/8/00		2/14/01		6/5/01		8/15/01		11/29/01		2/26/02	
122	**PAHs (µg/L)**																								
123	**EPA Method SW8270 SIM**																								
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AU	AV
1			
2			
3		LW2S	
4		EM85F	
5		6/26/02	
122	**PAHs (µg/L)**		
123	**EPA Method SW8270 SIM**		
124	Naphthalene	NA	
125	2-Methylnaphthalene	NA	
126	Acenaphthylene	NA	
127	Acenaphthene	NA	
128	Fluorene	NA	
129	Anthracene	NA	
130	Dibenzofuran	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW4S	
3			LW4S		LW4S		LW4S		LW4S		LW4S (a)		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW40S	
4			S167J		T176G		U235O		V232E		B802035-01		W391F		Y314F		Z225K		Z960L		AH49G		AU45B		AU45A	
5			4/1/97		7/15/97		10/22/97		1/30/98		1/30/98		5/20/98		8/17/98		11/14/98		2/18/99		5/18/99		9/22/99		9/22/99	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	**5.3**		**1.7**		**1.2**		**0.43**		**0.282**		**5.3**		**5.9**		**3900**		**0.42**		**6.4**		**22**		**23**	
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	**0.85**		0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	4.4	U	0.25	U	0.25	U	0.29	U	0.29	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**0.32**		**0.16**	J1	0.25	U	0.25	U	0.250	U	**0.92**		**0.73**		**170**		0.25	U	**0.83**		**3.2**		**3.2**	
15	9	2,3,4,5-Tetrachlorophenol	**0.27**		0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	**15**	J1	0.25	U	0.25	U	0.25	U	0.25	U
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	5.00	U	2.0	U	2.0	U	2.0	U	2.0	U	**170**	J2	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	5.00	U	1.0	U	1.0	U	1.0	U	1.0	U	**27**		1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	10.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		10	U	10	U	10	U	10	U	**29**		10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	**39**		1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	**55**		1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.00	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.00	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	10.0	U	**5.6**		**8.2**		**4200**		5.0	U	**2.3**	J1	**22**		**21**	
32	26	bis(2-Ethylhexyl)phthalate	**2.0**		**2.8**	J2	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**12**		**13**	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**1.8**		1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**3.8**		1.0	U	1.0	U	**1.0**	J1	**1.4**	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**20**		1.0	U	**8.1**		**1.4**		**1.9**	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**5.7**		1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**77**		1.0	U	1.0	U	**10**	J2	**13**	J2
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**5.3**		1.0	U	1.0	U	1.0	U	**1.1**	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**6.0**		1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	UJ	**5.9**		1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	**2.5**		1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	**7.1**		5.0	U	5.0	U	5.0	U	5.0	U
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		**0.44**		**0.32**		**3.6**		0.25	U	0.25	U	**0.42**		**0.56**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	0.001	U	**0.002**		0.05	U	0.05	U	NA		**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
65	59	Chromium (6010)	0.005	U	**0.015**		0.005	U	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2				Dup of LW4S																							
3		LW4S		LW40S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S	
4		BC27Q		BC27O		BH96D		BR55C		CB68C		CL03F		CT67C		DE87J		DM30C		DW29F		ED30G		EN00G		ER93K	
5		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02	
7	**CHLORINATED PHENOLS (µg/L)**																										
8	**EPA Method SW8040**																										
9	Pentachlorophenol	**5.4**		**5.4**		**2.5**		**740**	J2	**7200**		**48**		0.25	U	0.25	U	0.25	U	0.25	U	**2.0**		NA		NA	
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	**0.35**	J2	**2.2**		0.25	U	NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	**0.27**	J2	**6.1**		0.25	U	NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	**2.7**	J2	37	U	3.8	U	NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	**2.9**		0.25	U	NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**0.63**		**0.59**		**0.32**		**190**	J2	**730**		**4.1**		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	**1.6**		**130**		**5.9**		NA		NA		NA		NA		NA		NA		NA	
16																											
17	**SEMIVOLATILES (µg/L)**																										
18	**EPA Method SW8270**																										
19	Phenol	2.0	U	2.0	U	2.0	UJ	2.0	U	200	U	**730**		**100**		2.0	U	**3.3**		2.0	U	2.1	U	**56**		**210**	
20	4-Methylphenol	1.0	U	1.0	U	1.0	UJ	1.0	U	**3.6**	M	**120**		**210**		**1.7**		1.0	U	1.0	U	1.1	U	22	U	**50**	
21	Isophorone	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.0	U	1.2	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	UJ	3.0	U	3.0	U	9.0	U	**4.4**		**3.1**		**5.9**		3.0	U	3.2	U	3.0	U	3.8	U
23	Benzoic Acid	10	U	10	U	10	UJ	10	U	**44**		**96**		**200**		10	U	10	U	30	U	53	U	50	U	62	U
24	Naphthalene	1.0	U	1.0	U	1.0	UJ	**15**		**21**		**13**		**8.5**		**19**		**19**		1.0	U	1.1	U	**14**		**5.6**	
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	**5.7**		**3.6**		**9.5**		**12**		1.0	U	1.1	U	**7.5**		**2.1**	
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	15	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	**17**		**7.7**	
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	15	U	5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	**8.9**		6.2	U
28	Acenaphthene	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.0	U	1.2	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.0	U	1.2	U
30	Fluorene	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.0	U	1.2	U
31	Pentachlorophenol	**4.9**	J1	**4.4**	J1	5.0	UJ	**760**	J2	**9400**	J2	**120**		5.0	U	5.0	U	5.0	U	5.0	U	5.3	U	**2200**		**770**	
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.1	UJ	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**120**		4.0	U	5	U
33																											
34	**VOLATILES (µg/L)**																										
35	**EPA Method SW8260**																										
36	Acetone	5.0	U	5.0	U	5.0	U	**25**		**83**		**49**		**41**		5.0	U	15	U	5.0	U	5.0	U	**120**		**320**	
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	3	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	**18**		25	U	**110**		**100**		5.0	U	15	U	5.0	U	5.0	U	**58**		**27**	
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	**7.4**		**110**		**80**		**78**		1.0	U	1.0	U	**4.1**		3	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	3	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	**9.2**		**19**		**25**		**41**		**6.9**		1.0	U	1.0	U	**7.5**		**10**	
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	**9.8**		**94**		**61**		**79**		**190**		**140**		1.0	U	1.0	U	**68**		**94**	J
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	1.0	U	3	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U	**17**		**110**		**170**		**240**		**600**		**460**		1.0	U	1.0	U	**95**		**150**	
45	o-Xylene	1.0	U	1.0	U	1.0	U	**140**		**210**		**88**		**120**		**240**		**180**		1.0	U	1.0	U	**180**		**180**	
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	**3.2**		**140**		**46**		**58**		**130**		**94**		1.0	U	1.0	U	**58**		**150**	J
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	**33**		**500**		**160**		**130**		**350**		**280**		**1.5**		1.0	U	**230**		**540**	J
48	Isopropylbenzene	1.0	U	1.0	U	1.0	U	**28**		**48**		**19**		**28**		**62**		**37**		1.0	U	1.0	U	**38**		**63**	J
49	n-Propylbenzene	1.0	U	1.0	U	1.0	U	**9.8**		**79**		**27**		**36**		**79**		**48**		**1.1**		1.0	U	**43**		**94**	J
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	**3.4**		5.0	U	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	1.0	U	**3.1**		3	U
51	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	**26**		**25**		**7.7**		**7.0**		1.0	U	3.0	U	1.0	U	1.0	U	**16**		**21**	J
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	**19**		**4.8**		**4.9**		**9.9**		**6.7**		1.0	U	1.0	U	**8.8**		**16**	
53	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.6	U	13	U	6.8	U	**6.2**		10	U	7.5	U	1.0	U	1.0	U	7.9		**11**	J
54	Naphthalene	5.0	U	5.0	U	5.0	U	**26**		**31**		**19**		**18**		**48**		**27**		5.0	U	5.0	U	**21**		15	U
55																											
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																										
57	**Method OR-DEQ**																										
58	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	**3.6**		**15**		**19**		**3.4**		**7.9**		**4.1**		0.25	U	**0.34**		**25**		**9.9**	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		5.0	U	NA		NA		NA		NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																											
62	**PRIORITY POLLUTANT**																										
63	**METALS (mg/L)**																										
64	Arsenic (7060)	0.001	U	0.001	U	0.001	U	**0.001**		**0.004**		**0.006**		**0.009**		**0.008**		**0.010**		**0.002**		0.001	U	**0.002**		**0.006**	
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		LW4S	
4		EZ17E	
5		11/13/02	
6			
7	**CHLORINATED PHENOLS (µg/L)**		
8	**EPA Method SW8040**		
9	Pentachlorophenol	**1.5**	
10	2,4,6-Trichlorophenol	NA	
11	2,3,6-Trichlorophenol	NA	
12	2,4,5-Trichlorophenol	NA	
13	2,3,4-Trichlorophenol	NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA	
15	2,3,4,5-Tetrachlorophenol	NA	
16			
17	**SEMIVOLATILES (µg/L)**		
18	**EPA Method SW8270**		
19	Phenol	2.2	U
20	4-Methylphenol	1.1	U
21	Isophorone	1.1	U
22	2,4-Dimethylphenol	3.3	U
23	Benzoic Acid	54	U
24	Naphthalene	1.1	U
25	2-Methylnaphthalene	1.1	U
26	2,4,6-Trichlorophenol	5.4	U
27	2,4,5-Trichlorophenol	5.4	U
28	Acenaphthene	1.1	U
29	Dibenzofuran	1.1	U
30	Fluorene	1.1	U
31	Pentachlorophenol	5.4	U
32	bis(2-Ethylhexyl)phthalate	4.3	U
33			
34	**VOLATILES (µg/L)**		
35	**EPA Method SW8260**		
36	Acetone	19	U
37	Carbon Disulfide	1	U
38	2-Butanone	5	U
39	Benzene	1	U
40	Bromoform	1	U
41	Toluene	1	U
42	Ethylbenzene	**4.8**	
43	Styrene	1	U
44	m,p-Xylene	**3.8**	
45	o-Xylene	**5.9**	
46	1,3,5-Trimethylbenzene	**1.7**	
47	1,2,4-Trimethylbenzene	**19**	
48	Isopropylbenzene	**4.5**	
49	n-Propylbenzene	**5.4**	
50	tert-Butylbenzene	1	U
51	sec-Butylbenzene	**2**	
52	4-Isopropyltoluene	1	U
53	n-Butylbenzene	1	U
54	Naphthalene	5	U
55			
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	**Method OR-DEQ**		
58	**TPH-Diesel**	**3.2**	
59	**TPH-D Motor Oil**	NA	
60	**TPH-Gasoline**	NA	
61			
62	**PRIORITY POLLUTANT**		
63	**METALS (mg/L)**		
64	Arsenic (7060)	0.05	U
65	Chromium (6010)	**0.07**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW4S	
3			LW4S		LW4S		LW4S		LW4S		LW4S (a)		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW40S	
4			S167J		T176G		U235O		V232E		B802035-01		W391F		Y314F		Z225K		Z960L		AH49G		AU45B		AU45A	
5			4/1/97		7/15/97		10/22/97		1/30/98		1/30/98		5/20/98		8/17/98		11/14/98		2/18/99		5/18/99		9/22/99		9/22/99	
66	60	Copper (6010)	**0.004**		**0.015**		0.002	U	**0.004**		NA		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	0.001	U	**0.006**		0.02	U	0.02	U	NA		0.001	U	0.001	U	0.001	U	0.001	U	**0.002**		0.001	U	0.001	U
68	62	Nickel (6010)	**0.02**		**0.02**		0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U
69	63	Zinc (6010)	**0.008**		**0.035**		0.004	U	**0.009**		NA		**0.005**	J2	0.004	U	**0.005**		**0.009**	J2	**0.011**		**0.007**		0.004	U
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**20.7**		**20.4**		**16.9**		**15.1**		NA		NA		NA		NA		**10.7**		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**5.92**		**7.1**		**4.46**		**4.60**		NA		NA		NA		NA		**2.98**		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**3.9**		**4.5**		**4.2**		**3.5**		NA		NA		NA		NA		**2.6**		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**13.2**		**13.7**		**11.6**		**10.0**		NA		NA		NA		NA		**6.10**		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**75**		**64**		**62**		**64**		NA		NA		NA		NA		**43**		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		1.0	U	NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**75**		**64**		**62**		**64**		NA		NA		NA		NA		**43**		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**140**	J2	**110**		**140**	J2	NA		160		160		180		**110**		**140**		**150**		**160**	
80	74	Chloride (mg/L) (EPA 325.2)	**4.5**	J	**3.1**		**3.5**		**2.1**		NA		4.5		4.3		13		1.0	U	**2.2**		**7.1**		**6.9**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**11**	J	**3.3**		**5.1**		**4.2**	J2	NA		NA		NA		NA		**1.8**		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	**0.021**	J2	NA		NA		NA		NA		0.010	U	NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**11**	J	**3.3**		**5.1**		**4.3**	J2	NA		NA		NA		NA		**1.8**		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**13**	J	**15**		**4.5**		**6.8**		NA		NA		NA		NA		**6.5**		NA		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2				Dup of LW4S																							
3		LW4S		LW40S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S	
4		BC27Q		BC27O		BH96D		BR55C		CB68C		CL03F		CT67C		DE87J		DM30C		DW29F		ED30G		EN00G		ER93K	
5		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	**0.008**		**0.016**		**0.008**		0.002	U	**0.002**		0.002	U	0.002	U	0.002	U	**0.085**		**0.05**	
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		**0.002**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**	
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	**0.01**		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.03**		0.01	U
69	Zinc (6010)	0.008	U	0.006	U	0.006	U	0.006	U	0.006	U	**0.009**		0.006	U	0.006	U	**0.007**		0.006	U	0.006	U	0.006	U	**0.011**	
70																											
71	**MAJOR IONS AND CONVENTIONALS**																										
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		**164**		**149**		**144**		**13.9**		**25.8**		**163**		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		**56.0**		**48.2**		**43.6**		**4.06**		**7.66**		**49.6**		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		**5.6**		**5.9**		**6.4**		**2.5**		**3.5**		**7.9**		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		**9.87**		**9.35**		**11.5**		**4.35**		**7.39**		**15.0**		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		**810**		NA		NA		NA		**80**		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		**810**		NA		NA		NA		**80**		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**120**		**120**		**150**		**490**		**420**		**990**		**760**		**720**	J	**580**	J	**95**		**300**		**890**		**380**	
80	Chloride (mg/L) (EPA 325.2)	**4.3**		**4.5**		**3.5**		**9.9**		**4.6**		**7.7**		**7.5**	J	**5.3**		**7.1**		**1.7**		**6.7**	J	**9.4**		**5.2**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**8.4**		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		**0.013**	J	NA		NA		NA		**0.022**		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA		**8.4**		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		**8.4**		NA		NA		NA		**18**		NA		NA	
85																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		LW4S	
4		EZ17E	
5		11/13/02	
6			
66	Copper (6010)	**0.163**	
67	Lead (7421)	**0.04**	
68	Nickel (6010)	**0.11**	
69	Zinc (6010)	**0.17**	
70			
71	**MAJOR IONS AND CONVENTIONALS**		
72	Calcium (mg/L) (6010)	NA	
73	Magnesium (mg/L) (6010)	NA	
74	Potassium (mg/L) (6010)	NA	
75	Sodium (mg/L) (6010)	NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**320**	
80	Chloride (mg/L) (EPA 325.2)	**7.3**	
81	N-Nitrate (mg-N/L) (Calculated)	NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	Sulfate (mg/L) (EPA 375.2)	NA	
85			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW4S	
3			LW4S		LW4S		LW4S		LW4S		LW4S (a)		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW40S	
4			S167J		T176G		U235O		V232E		B802035-01		W391F		Y314F		Z225K		Z960L		AH49G		AU45B		AU45A	
5			4/1/97		7/15/97		10/22/97		1/30/98		1/30/98		5/20/98		8/17/98		11/14/98		2/18/99		5/18/99		9/22/99		9/22/99	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.46		6.86		6.76		6.61		6.61		6.08		6.23		6.33		6.31		5.67		6.51		6.49	
88	82	Temperature (° C) (avg)	11.3		17.0		14.9		12.1		12.1		12.6		16.6		14.3		10.0		13.3		15.4		15.4	
89	83	Conductivity (um/hos)	212		212		173		163		163		263		301		111		110		192		229		229	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		2.41		2.15		1.75		4.54		2.58		1.74		1.67	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2				Dup of LW4S																							
3		LW4S		LW40S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S	
4		BC27Q		BC27O		BH96D		BR55C		CB68C		CL03F		CT67C		DE87J		DM30C		DW29F		ED30G		EN00G		ER93K	
5		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02	
86	**FIELD PARAMETERS**																										
87	pH (avg)	6.57		6.57		6.48		6.28		5.70		5.74		6.31		6.80		6.75		6.21		5.64		6.23		6.68	
88	Temperature (° C) (avg)	13.0		12.9		13.1		14.5		15.1		14.3		13.5		14.2		16.2		14.6		12.6		14.4		15.8	
89	Conductivity (um/hos)	177		177		209		478		433		884		809		1400		973		129		253		843		477	
90	Dissolved oxygen (mg/L) (avg)	4.58		4.75		0.93		1.91		1.36		0.62		0.00		0.00		0.84		4		7.53		5.19		0.62	
91																											
92	**DIOXINS AND FURANS (ng/L)**																										
93	**Method 8290**																										
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																											
120	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																											

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		LW4S	
4		EZ17E	
5		11/13/02	
86	**FIELD PARAMETERS**		
87	pH (avg)	6.2	
88	Temperature (° C) (avg)	16.1	
89	Conductivity (um/hos)	465	
90	Dissolved oxygen (mg/L) (avg)	2.03	
91			
92	**DIOXINS AND FURANS (ng/L)**		
93	**Method 8290**		
94	2,3,7,8-TCDF	NA	
95	Total TCDF	NA	
96	2,3,7,8-TCDD	NA	
97	Total TCDD	NA	
98	1,2,3,7,8-PeCDF	NA	
99	2,3,4,7,8-PeCDF	NA	
100	Total PeCDF	NA	
101	1,2,3,7,8-PeCDD	NA	
102	Total PeCDD	NA	
103	1,2,3,4,7,8-HxCDF	NA	
104	1,2,3,6,7,8-HxCDF	NA	
105	2,3,4,6,7,8-HxCDF	NA	
106	1,2,3,7,8,9-HxCDF	NA	
107	Total HxCDF	NA	
108	1,2,3,4,7,8-HxCDD	NA	
109	1,2,3,6,7,8-HxCDD	NA	
110	1,2,3,7,8,9-HxCDD	NA	
111	Total HxCDD	NA	
112	1,2,3,4,6,7,8-HpCDF	NA	
113	1,2,3,4,7,8,9-HpCDF	NA	
114	Total HpCDF	NA	
115	1,2,3,4,6,7,8-HpCDD	NA	
116	Total HpCDD	NA	
117	OCDF	NA	
118	OCDD	NA	
119			
120	**ETHANOL (mg/L)**	NA	
121			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW4S	
3			LW4S		LW4S		LW4S		LW4S		LW4S (a)		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW40S	
4			S167J		T176G		U235O		V232E		B802035-01		W391F		Y314F		Z225K		Z960L		AH49G		AU45B		AU45A	
5			4/1/97		7/15/97		10/22/97		1/30/98		1/30/98		5/20/98		8/17/98		11/14/98		2/18/99		5/18/99		9/22/99		9/22/99	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1																											
2				Dup of LW4S																							
3		LW4S		LW40S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S		LW4S	
4		BC27Q		BC27O		BH96D		BR55C		CB68C		CL03F		CT67C		DE87J		DM30C		DW29F		ED30G		EN00G		ER93K	
5		12/9/99		12/9/99		2/17/00		5/22/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02	
122	**PAHs (µg/L)**																										
123	**EPA Method SW8270 SIM**																										
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	BA	BB
1			
2			
3		LW4S	
4		EZ17E	
5		11/13/02	
122	**PAHs (µg/L)**		
123	**EPA Method SW8270 SIM**		
124	Naphthalene	NA	
125	2-Methylnaphthalene	NA	
126	Acenaphthylene	NA	
127	Acenaphthene	NA	
128	Fluorene	NA	
129	Anthracene	NA	
130	Dibenzofuran	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW5S																					
3			LW5S		LW5D		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S	
4			S167E		S167F		T160A		U235G		V232G		W391C		Y336E		Z225G		Z960J		AH49F		AU22E		BC27C	
5			3/31/97		3/31/97		7/14/97		10/22/97		1/30/98		5/19/98		8/18/98		11/13/98		2/18/99		5/18/99		9/20/99		12/7/99	
6																										
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	**0.25**		**0.26**		**0.24**	J1	**0.25**		**0.27**		**0.18**	J1	**0.18**	J1	0.25	U	**0.25**		0.25	U	**0.13**	J1	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.001**		**0.002**		**0.002**		0.05	U	0.05	U	**0.003**		**0.003**		**0.003**		**0.008**		**0.003**		**0.003**		**0.002**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.028**		0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH
1									
2									
3		LW5S		LW5S		LW5S		LW5S	
4		BH96C		BR64F		CT37E		ED16F	
5		2/17/00		5/24/00		2/12/01		2/25/02	
7	**CHLORINATED PHENOLS (µg/L)**								
8	**EPA Method SW8040**								
9	Pentachlorophenol	**0.18**	J1	0.25	U	0.25	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	NA		NA	
16									
17	**SEMIVOLATILES (µg/L)**								
18	**EPA Method SW8270**								
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U
23	Benzoic Acid	10	U	10	U	10	U	50	U
24	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U
25	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	4.0	U
33									
34	**VOLATILES (µg/L)**								
35	**EPA Method SW8260**								
36	Acetone	5.0	U	5.0	U	6.6	U	5.0	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U
38	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U
42	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U
44	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U
46	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
47	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
48	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
49	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
51	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U
53	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U
54	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U
55									
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**								
57	**Method OR-DEQ**								
58	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U
59	**TPH-D Motor Oil**	NA		NA		NA		NA	
60	**TPH-Gasoline**	NA		NA		NA		NA	
61									
62	**PRIORITY POLLUTANT**								
63	**METALS (mg/L)**								
64	Arsenic (7060)	**0.003**		**0.003**		**0.002**		**0.003**	
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW5S																					
3			LW5S		LW5D		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S	
4			S167E		S167F		T160A		U235G		V232G		W391C		Y336E		Z225G		Z960J		AH49F		AU22E		BC27C	
5			3/31/97		3/31/97		7/14/97		10/22/97		1/30/98		5/19/98		8/18/98		11/13/98		2/18/99		5/18/99		9/20/99		12/7/99	
66	60	Copper (6010)	**0.004**		**0.004**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.027**		0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	**0.004**		**0.003**		**0.002**		0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	**0.036**		0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.02**		0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.008**		**0.011**		**0.004**		**0.005**		**0.004**		**0.008**	J2	0.004	U	**0.006**		**0.081**		0.004	U	0.004	U	0.006	U
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**18.5**		**18.8**		**16**		**11.5**		**14.2**		NA		NA		NA		**22.3**		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**5.42**		**5.51**		**4.67**		**3.22**		**3.96**		NA		NA		NA		**9.38**		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**3.5**		**3.5**		**2.7**		**2.8**		**3.0**		NA		NA		NA		**4.8**		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**11.6**		**11.8**		**10.3**		**10.2**		**10.3**		NA		NA		NA		**13.4**		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**86**		**82**		**72**		**58**		**77**		NA		NA		NA		**78**		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**86**		**82**		**72**		**58**		**77**		NA		NA		NA		**78**		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		NT		**130**		**100**		**120**	J2	110		97		98		**120**		**160**		**120**		**110**	
80	74	Chloride (mg/L) (EPA 325.2)	1.0	U	**5.6**	J	**1.8**		**1.4**		**1.5**		2.5		1.0	U	1.5		**1.5**		**2.4**		**1.4**		**1.9**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.75**	J	0.010	U	**1.3**		**0.40**		**0.044**	J2	NA		NA		NA		**1.0**		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	**0.022**	J	0.010	U	0.010	U	**0.010**	J2	NA		NA		NA		**0.034**		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.75**	J	**0.016**	J	**1.3**		**0.40**		**0.054**	J2	NA		NA		NA		**1.0**		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**11**	J	**4.0**	J	**10**		**5.7**		**6.7**		NA		NA		NA		**9.5**		NA		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH
1									
2									
3		LW5S		LW5S		LW5S		LW5S	
4		BH96C		BR64F		CT37E		ED16F	
5		2/17/00		5/24/00		2/12/01		2/25/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	0.006	U	0.006	U	0.006	U
70									
71	**MAJOR IONS AND CONVENTIONALS**								
72	Calcium (mg/L) (6010)	NA		NA		**16.3**		**22.4**	
73	Magnesium (mg/L) (6010)	NA		NA		**4.44**		**6.49**	
74	Potassium (mg/L) (6010)	NA		NA		**2.6**		**3.4**	
75	Sodium (mg/L) (6010)	NA		NA		**9.64**		**11.4**	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		**81**		**100**	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		1.0	U	1.0	U
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		**81**		**100**	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**100**		**97**		**140**		**150**	
80	Chloride (mg/L) (EPA 325.2)	**1.9**		**1.6**		**6.3**		**1.1**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		**1.2**		**1.6**	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		0.010	U	0.010	U
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		**1.2**	J	**1.6**	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		**9.1**		**9.0**	
85									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW5S																					
3			LW5S		LW5D		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S	
4			S167E		S167F		T160A		U235G		V232G		W391C		Y336E		Z225G		Z960J		AH49F		AU22E		BC27C	
5			3/31/97		3/31/97		7/14/97		10/22/97		1/30/98		5/19/98		8/18/98		11/13/98		2/18/99		5/18/99		9/20/99		12/7/99	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.56		6.56		6.58		6.74		6.86		6.24		6.33		6.19		6.65		5.79		6.43		6.33	
88	82	Temperature (° C) (avg)	11.7		11.7		14.3		14.7		13.8		13.0		16.0		13.3		14.2		12.8		17.2		13.1	
89	83	Conductivity (um/hos)	175		175		197		125		175		177		171		80		169		200		146		133	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		3.37		1.83		1.86		5.67		2.40		2.38		2.85	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH
1									
2									
3		LW5S		LW5S		LW5S		LW5S	
4		BH96C		BR64F		CT37E		ED16F	
5		2/17/00		5/24/00		2/12/01		2/25/02	
86	**FIELD PARAMETERS**								
87	pH (avg)	6.49		6.42		6.17		5.91	
88	Temperature (° C) (avg)	11.8		14.6		13.7		12.4	
89	Conductivity (um/hos)	149		144		148		221	
90	Dissolved oxygen (mg/L) (avg)	2.51		2.85		2.08		5.42	
91									
92	**DIOXINS AND FURANS (ng/L)**								
93	**Method 8290**								
94	2,3,7,8-TCDF	NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA	
119									
120	**ETHANOL (mg/L)**	NA		NA		NA		NA	
121									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2					Dup of LW5S																					
3			LW5S		LW5D		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S		LW5S	
4			S167E		S167F		T160A		U235G		V232G		W391C		Y336E		Z225G		Z960J		AH49F		AU22E		BC27C	
5			3/31/97		3/31/97		7/14/97		10/22/97		1/30/98		5/19/98		8/18/98		11/13/98		2/18/99		5/18/99		9/20/99		12/7/99	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH
1									
2									
3		LW5S		LW5S		LW5S		LW5S	
4		BH96C		BR64F		CT37E		ED16F	
5		2/17/00		5/24/00		2/12/01		2/25/02	
122	**PAHs (µg/L)**								
123	**EPA Method SW8270 SIM**								
124	Naphthalene	NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2							Dup of LW7S																			
3			LW7S		LW7S		LW7D		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4			S167M		T176S		T176T		U235W		V208D		W371I		Y314G		Z225R		Z960N		AH27E		AU22F		BB82A	
5			4/1/97		7/16/97		7/16/97		10/23/97		1/28/98		5/18/98		8/17/98		11/12/98		2/17/99		5/17/99		9/20/99		12/6/99	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	**23**		**43**		**42**		**13**		**13**		**19**	J2	**10**		**6.5**		**4.0**		**17**		**19**		**7.8**	
25	19	2-Methylnaphthalene	**6.9**		**16**		**15**		**7.4**		**4.1**		**5.9**	J2	**4.6**		**3.4**		**1.2**		**4.7**		**11**		**7.4**	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	**3.6**	J2	2.7	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	20	U	10	U	5.0	U	57	U	5.0	U	5.0	U	**23**		13	U	**29**		5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	**8.8**		**9.0**	J2	**12**	J2	5.0	U	**5.8**		**8.9**		**8.1**		**11**		**10**		**20**		5.0	U	5.0	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	**160**		**140**		**160**		**86**		**71**		**62**		**69**		**36**		**14**		**56**		**80**		**40**	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	**110**		**100**		**120**		**37**		**43**		**30**		**33**		**21**		**8.4**		**22**		**28**		**17**	
45	39	o-Xylene	**4.2**		**3.9**		**4.4**		**1.3**		**1.3**		**1.6**		**1.6**		**1.1**		1.0	U	**1.0**		**1.6**		1.0	U
46	40	1,3,5-Trimethylbenzene	**15**		**24**		**25**		**21**		**6.4**		**9.1**		**5.9**		**8.0**		**2.0**		**8.3**		**4.4**		**2.4**	
47	41	1,2,4-Trimethylbenzene	**81**		**86**		**100**		**30**	J2	**15**		**9.9**		**7.0**		**2.9**		**3.7**		**17**		**6.3**		**2.5**	
48	42	Isopropylbenzene	**22**		**45**		**42**		**60**	J2	**20**		**29**		**33**		**38**		**7.9**		**27**		**36**		**29**	
49	43	n-Propylbenzene	**31**		**64**		60		**78**		**34**		**43**		**46**		**59**		**13**		**42**		**48**		**41**	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**2.4**		**4.9**		**4.6**		**5.7**	J2	**3.6**		**3.6**		**4.1**	J2	**4.5**		**1.8**		**3.1**		**4.0**		**3.4**	
52	46	4-Isopropyltoluene	**2.5**		**4.2**		**4.2**		**3.4**	J2	**1.6**		**2.3**		**2.4**		**2.1**		1.0	U	**2.0**		**2.2**		**1.4**	
53	47	n-Butylbenzene	**3.6**		**7.4**		**7.4**		**6.4**	J2	5.0		**4.4**		**5.2**		**5.3**		**2.5**		**3.4**		**5.2**		**4.3**	M
54	48	Naphthalene	**64**		**66**	J2	**87**	J2	**35**	J2	**37**		**28**		**32**		**22**		**9.1**		**29**		**41**		**9.6**	
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	**0.48**		**0.54**		**0.48**		**0.56**		0.25	U	**0.40**		**0.28**		0.25	U	0.25	U	**0.27**		**0.54**		**0.40**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.014**		**0.017**		**0.017**		0.05	U	0.05	U	**0.015**		**0.015**		**0.017**		**0.016**		**0.010**		**0.018**		**0.016**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																									
2																									
3		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4		BH75E		BR55H		CB49A		CK77C		CT37A		DE68A		DM52J		DW29A		ED16G		EM75E		ER92A		EZ03M	
5		2/15/00		5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**																								
8	**EPA Method SW8040**																								
9	Pentachlorophenol	0.25	U	0.25	UJ	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U	**0.25**		0.25	U	0.25	U	0.28	U	0.25	U
10	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16																									
17	**SEMIVOLATILES (µg/L)**																								
18	**EPA Method SW8270**																								
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.2	U	2.3	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.3	U	3.4	U
23	Benzoic Acid	10	U	10	U	10	U	10	U	10	U	10	U	10	U	30	U	50	U	50	U	56	U	57	U
24	Naphthalene	**1.6**		**5.7**		**12**		**5.2**		**3.7**		2.0		**1.8**		**1.3**		1.0	U	**9.0**		**5.2**		**1.8**	
25	2-Methylnaphthalene	1.0	U	**1.2**		**3.7**		**1.6**		**1.4**		1.0	U	1.0	U	1.0	U	1.0	U	**3.0**		**2**		1.1	U
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.7	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.7	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.6	U	5.7	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**4.3**		4.0	U	4.0	U	4.4	U	4.5	U
33																									
34	**VOLATILES (µg/L)**																								
35	**EPA Method SW8260**																								
36	Acetone	5.0	U	5.0	U	56	U	110	U	83	U	5.0	U	5.0	U	5.0	U	21	U	5.0	U	48	U	86	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	9.3	U	5.0	U	**8.2**		5.0	U	**7.7**		5.0	U	5.0	U	**13**		6.6	U	**21**	M
39	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
42	Ethylbenzene	**5.6**		**19**		**40**		**23**		**15**		**4.6**		**18**		**17**		**8.6**		**31**		**42**		**24**	
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
44	m,p-Xylene	**2.8**		**8.8**		**15**		**19**		**9.1**		**5.4**		**10**		**13**		**3.7**		**15**		**18**		**12**	
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
46	1,3,5-Trimethylbenzene	**2.3**		**2.1**		**3.0**		**2.8**		**1.5**		1.0	U	**1.6**		**1.4**		1.0	U	**20**		**4**		**1.4**	
47	1,2,4-Trimethylbenzene	1.1	U	**4.6**		**3.0**		**1.6**		**1.2**		1.0	U	**2.3**		1.0	U	**1.1**		**6.9**		**4.9**		**1.2**	
48	Isopropylbenzene	**8.1**		**11**		**18**		**22**		**16**		**1.3**		**21**		**20**		**6.1**		**20**		**26**		**26**	
49	n-Propylbenzene	**15**		**18**		**28**		**33**		**25**		**1.3**		**27**		**27**		**11**		**30**		**40**		**36**	
50	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1	U	1	U
51	sec-Butylbenzene	**1.7**		**1.4**		**2.3**		**2.6**		**2.3**		1.0	U	**2.2**		**2.3**		1.0	U	**2.6**		**3.3**		**3**	
52	4-Isopropyltoluene	1.0	U	**1.5**		**1.1**		**1.2**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**1.6**		**2.2**		**1.1**	
53	n-Butylbenzene	2.4	U	1.5	U	**2.8**		**3.2**		**2.6**		1.0	U	**2.8**	M	3.1	U	**1.0**		2.6	U	3.7	U	**3.2**	M
54	Naphthalene	5.0	U	**12**		**18**		**13**		**5.7**		5.0	U	**7.0**		5.0	U	5.0	U	**14**		**12**		**5.4**	
55																									
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	**Method OR-DEQ**																								
58	**TPH-Diesel**	0.25	U	0.25	U	**0.32**		**0.32**		**0.32**		**20**		**0.26**		**0.42**		0.25	U	**0.31**		**0.53**		**0.5**	
59	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.5	U	NA	
60	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61																									
62	**PRIORITY POLLUTANT**																								
63	**METALS (mg/L)**																								
64	Arsenic (7060)	**0.017**		**0.016**		**0.015**		**0.015**		**0.016**		**0.016**		**0.019**		**0.017**		**0.017**		**0.017**		**0.015**		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2							Dup of LW7S																			
3			LW7S		LW7S		LW7D		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4			S167M		T176S		T176T		U235W		V208D		W371I		Y314G		Z225R		Z960N		AH27E		AU22F		BB82A	
5			4/1/97		7/16/97		7/16/97		10/23/97		1/28/98		5/18/98		8/17/98		11/12/98		2/17/99		5/17/99		9/20/99		12/6/99	
66	60	Copper (6010)	**0.004**		**0.002**		**0.002**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	**0.003**		**0.005**		**0.005**		0.02	U	0.02	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.001**		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.015**		**0.005**		**0.005**		0.004	U	**0.004**		**0.007**	J2	**0.008**		0.004	U	**0.007**	J	0.006	U	**0.004**		**0.007**	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**24.9**		**27.9**		**26.9**		**31.4**		**30.6**		NA		NA		NA		**29.8**		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	**9.15**		**10.2**		**9.94**		**11.6**		**11.0**		NA		NA		NA		**10.8**		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	**2.7**		**3.0**		**2.9**		**2.9**		**2.5**		NA		NA		NA		**2.9**		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	**8.93**		**9.78**		**9.84**		**9.53**		**9.52**		NA		NA		NA		**9.86**		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**120**		**93**	**J2**	**130**	**J2**	**160**		**150**		NA		NA		NA		**140**		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**120**		**93**	J2	**130**	J2	**160**		**150**		NA		NA		NA		**140**		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**180**	J2	**150**	J2	**170**		**180**		130		130		140		**190**		**200**		**180**		**190**	
80	74	Chloride (mg/L) (EPA 325.2)	**3.6**	J	**3.5**		**3.6**		**3.0**		**2.4**		2.8		1.0	U	1.9		**3.0**		**3.0**		**2.6**		**5.0**	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.23**	J	0.010	U	0.010	U	**0.023**		**0.010**		NA		NA		NA		**0.24**		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.015**	J	**0.021**	J2	**0.048**	J2	0.010	U	0.010	U	NA		NA		NA		**0.017**		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.25**	J	**0.016**	J2	**0.027**	J2	**0.023**		**0.010**		NA		NA		NA		**0.26**		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**4.3**	J	**2.8**		**2.7**		2.5	U	2.5	U	NA		NA		NA		**7.7**		NA		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																									
2																									
3		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4		BH75E		BR55H		CB49A		CK77C		CT37A		DE68A		DM52J		DW29A		ED16G		EM75E		ER92A		EZ03M	
5		2/15/00		5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U
67	Lead (7421)	0.001	U	**0.001**		0.001	U	**0.002**		0.001	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.002**		**0.002**		0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	Zinc (6010)	0.006	U	0.006	U	0.006	U	**0.024**		0.006	U	**0.009**		0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
70																									
71	**MAJOR IONS AND CONVENTIONALS**																								
72	Calcium (mg/L) (6010)	NA		NA		NA		NA		**29.4**		**37.4**		**41.0**		**36.2**		**35.4**		NA		NA		NA	
73	Magnesium (mg/L) (6010)	NA		NA		NA		NA		**10.5**		**13.4**		**15.3**		**13.0**		**13.3**		NA		NA		NA	
74	Potassium (mg/L) (6010)	NA		NA		NA		NA		**2.5**		**3.1**		**3.2**		**3.4**		**3.5**		NA		NA		NA	
75	Sodium (mg/L) (6010)	NA		NA		NA		NA		**13.0**		**15.6**		**18.8**		**18.8**		**19.4**		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**160**		NA		NA		NA		**180**		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		1.0	U	NA		NA		NA		1.0	U	NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**160**		NA		NA		NA		**180**		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**190**		**160**		**190**		**210**		**200**		**250**		**250**		**230**		**230**		**260**		**290**		**250**	
80	Chloride (mg/L) (EPA 325.2)	**3.6**		**3.5**		**2.9**		**4.1**		**2.8**		**3.3**		**5.3**		**2.6**		**3.6**		**3.5**		**7.4**		**4.7**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		0.010	U	NA		NA		NA		0.010	U	NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		0.010	UJ	NA		NA		NA		0.010	U	NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		**3.0**		NA		NA		NA		**7.9**		NA		NA		NA	
85																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2							Dup of LW7S																			
3			LW7S		LW7S		LW7D		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4			S167M		T176S		T176T		U235W		V208D		W371I		Y314G		Z225R		Z960N		AH27E		AU22F		BB82A	
5			4/1/97		7/16/97		7/16/97		10/23/97		1/28/98		5/18/98		8/17/98		11/12/98		2/17/99		5/17/99		9/20/99		12/6/99	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.76		6.73		6.74		6.91		6.79		6.35		6.51		6.35		6.84		5.72		6.22		6.13	
88	82	Temperature (° C) (avg)	13.7		16.2		16.0		15.4		15.2		14.4		16.6		14.1		13.7		14.5		16.3		13.6	
89	83	Conductivity (um/hos)	278		299		303		310		323		315		308		121		309		293		267		297	
90	84	Dissolved oxygen (mg/L) (avg)	NA		NA		NA		NA		NA		NA		1.35		1.39		2.13		2.09		1.91		2.84	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																									
2																									
3		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4		BH75E		BR55H		CB49A		CK77C		CT37A		DE68A		DM52J		DW29A		ED16G		EM75E		ER92A		EZ03M	
5		2/15/00		5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
86	**FIELD PARAMETERS**																								
87	pH (avg)	6.73		6.52		6.36		5.18		6.46		6.70		6.93		6.60		6.21		6.56		6.66		6.6	
88	Temperature (° C) (avg)	15.5		14.5		15.5		14.9		14.2		14.1		15.2		15.1		14.1		15.1		15.5		15.6	
89	Conductivity (um/hos)	296		263		299		302		300		419		433		378		351		408		364		352	
90	Dissolved oxygen (mg/L) (avg)	1.20		0.87		1.66		2.02		2.78		1.37		1.06		3.24		4.55		5.27		1.46		0.41	
91																									
92	**DIOXINS AND FURANS (ng/L)**																								
93	**Method 8290**																								
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																									
120	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2							Dup of LW7S																			
3			LW7S		LW7S		LW7D		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4			S167M		T176S		T176T		U235W		V208D		W371I		Y314G		Z225R		Z960N		AH27E		AU22F		BB82A	
5			4/1/97		7/16/97		7/16/97		10/23/97		1/28/98		5/18/98		8/17/98		11/12/98		2/17/99		5/17/99		9/20/99		12/6/99	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		**4.0**		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		**1.3**		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		0.10	U	NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																									
2																									
3		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S		LW7S	
4		BH75E		BR55H		CB49A		CK77C		CT37A		DE68A		DM52J		DW29A		ED16G		EM75E		ER92A		EZ03M	
5		2/15/00		5/23/00		8/28/00		11/7/00		2/12/01		6/4/01		8/15/01		11/27/01		2/25/02		6/25/02		08/26/02		11/12/02	
122	**PAHs (µg/L)**																								
123	**EPA Method SW8270 SIM**																								
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2													Dup of LW8S						Dup of LW8S					
3			LW8S		LW8S		LW8S		LW8S		LW8S		Z		LW8S		LW8S		W		LW8S		LW8S	
4			AH27K		AU36D		BC30G		9912050-05A		BH96W		BH96V		BR64N		CB68F		CB68H		CL03A		CT67J	
5			5/17/99		9/21/99		12/8/99		12/8/1999 (d)		2/16/00		2/16/00		5/25/00		8/30/00		8/30/00		11/9/00		2/15/01	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	0.25	U	0.25	U	**1.2**		NA		**0.13**	J1,J2	**0.27**	J2	**0.51**		0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		**0.14**	J1	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	**0.21**	J1	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	**2.7**		2.0	U	2.0	U	NA		**3.1**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	**32**		1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	NA		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	**99**		**74**		**120**		NA		**55**		**54**		**70**		**40**		**38**		**4.3**		**6.7**	
25	19	2-Methylnaphthalene	**76**		**58**		**72**		NA		**71**		**73**		**77**		**30**		**30**		**4.7**		**7.0**	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	**6.9**		5.0	U	**5.8**		5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	**6.8**		NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	12	J2	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	**11**		5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	**12**		5.0	U
39	33	Benzene	**110**		**55**		**49**		NA		**62**		**60**		**77**		**29**		**29**		**5.0**		**9.1**	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	**180**		**160**		**170**		NA		**110**		**98**		**140**		**130**		**120**		**8.5**		**22**	
43	37	Styrene	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	**290**		**320**		**260**		NA		**160**		**130**		**180**		**200**		**200**		**2.2**		**4.7**	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	**62**		**120**		**100**		NA		**57**	J2	**45**	J2	**52**		**81**		**81**		1.0	U	**4.1**	
47	41	1,2,4-Trimethylbenzene	**280**		**180**		**180**		NA		**140**		**120**		**130**		**130**		**120**		**2.6**		**6.4**	
48	42	Isopropylbenzene	**290**		**130**		**160**		NA		**190**		**180**		**250**		**120**		**120**		**100**		**100**	
49	43	n-Propylbenzene	**190**		**110**		**140**		NA		**150**		**150**		**170**		**100**		**98**		**56**		**83**	
50	44	tert-Butylbenzene	**5.7**		**5.6**		**6.6**		NA		**8.8**		**8.7**		**7.3**		**5.5**		**5.5**		**4.9**		**5.7**	
51	45	sec-Butylbenzene	**22**		**23**		**25**		NA		**30**		**29**		**28**		**20**		20		**11**		**14**	
52	46	4-Isopropyltoluene	**5.1**		**10**		**5.4**		NA		**4.2**		**3.4**		**3.9**		1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	**12**		**18**		16	U	NA		**15**		**14**		**15**		**14**		13		**4.1**		**6.8**	
54	48	Naphthalene	**150**		**120**		**160**		NA		**180**		**160**		**150**		**110**		**100**		**6.6**		**19**	
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	**1.9**		**2.1**		**2.0**		NA		**2.2**	J2	**3.2**	J2	**2.6**		**1.6**		**1.6**		**2.3**		**3.4**	
59	53	**TPH-D Motor Oil**	0.50	U	0.50	U	0.50	U	NA		0.50	UJ	**1.3**	J2	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
60	54	**TPH-Gasoline**	**9.8**		**9.4**		**10**		NA		**9.5**		**10**		**15**		**13**		**13**		**3.9**		**4.6**	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	**0.022**		**0.025**		**0.025**		NA		**0.027**		**0.027**		**0.023**		**0.022**		**0.023**		**0.022**		**0.022**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1																			
2		Dup of LW8S								Dup of LW8S								Dup of LW8S	
3		W		LW8S		LW8S		LW8S		X		LW8S		LW8S		LW8S		X	
4		CT67I		DE68N		DM30J		ED23J		ED23K		EM85G		ER92E		EZ17G		EZ17A	
5		2/15/01		6/4/01		8/14/01		2/26/02		2/26/02		6/26/02		08/26/02		11/13/02		11/13/02	
7	**CHLORINATED PHENOLS (µg/L)**																		
8	**EPA Method SW8040**																		
9	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.27	U	0.25	U	0.25	U
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA	
16																			
17	**SEMIVOLATILES (µg/L)**																		
18	**EPA Method SW8270**																		
19	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.2	U	2.3	U	2.3	U
20	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U	1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U	1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.3	U	3.5	U	3.4	U
23	Benzoic Acid	10	U	10	U	10	U	50	U	50	U	50	U	54	U	58	U	57	U
24	Naphthalene	**6.4**		**22**		**2.3**		**54**		**57**		**57**		**62**		**11**		**11**	
25	2-Methylnaphthalene	**6.8**		**14**		**2.6**		**69**		**74**		**51**		**44**		**22**		**25**	
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.4	U	5.8	U	5.7	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.4	U	5.8	U	5.7	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U	1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U	1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	**1.3**		**1.2**		1.0	U	1.1	U	1.2	U	1.1	U
31	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.4	U	5.8	U	5.7	U
32	bis(2-Ethylhexyl)phthalate	1.0	U	**1.5**		1.0	U	**5.0**		4.0	U	4.0	U	4.3	U	4.7	U	4.5	U
33																			
34	**VOLATILES (µg/L)**																		
35	**EPA Method SW8260**																		
36	Acetone	5.0	U	5.0	U	8.2	U	5.0	U	5.0	U	**14**	M	15	U	**7.2**		**7.4**	M
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
38	2-Butanone	5.0	U	5.0	U	5.3	U	5.0	U	5.0	U	5.9	U	15	U	5	U	5	U
39	Benzene	**9.1**		**9.0**		**2.0**		**30**		**30**		**91**	J	**35**		**2.5**		**2.4**	
40	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
41	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
42	Ethylbenzene	**23**		**61**		**11**		**420**	J	**390**		**300**	J	**280**		**37**		**33**	
43	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
44	m,p-Xylene	**5.0**		**17**		1.0	U	**56**		**60**		**44**	J	**37**		**1**		1	U
45	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
46	1,3,5-Trimethylbenzene	**5.0**		**15**		**1.7**		**62**		**64**		**67**	J	**68**		**7.7**		**6.3**	
47	1,2,4-Trimethylbenzene	**7.1**		**23**		**1.8**		**130**		**140**		**150**	J	**170**		**13**		**11**	
48	Isopropylbenzene	**130**		**130**		**67**		**240**	J	**240**		**260**	J	**240**		**180**		**170**	
49	n-Propylbenzene	**100**		**110**		**40**		**210**	J	**210**		**250**	J	**220**		**160**		**150**	
50	tert-Butylbenzene	**6.2**		**6.0**		**4.7**		**10**		**10**		**12**	MJ	**8.4**		**7.6**		**7.1**	
51	sec-Butylbenzene	**15**		**16**		**8.7**		**31**		**32**		**40**	J	**24**		**24**		**23**	
52	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	3	U	1	U	1	U
53	n-Butylbenzene	**7.1**		8.0	U	**3.2**	M	**18**		**18**		**20**	MJ	**16**	M	**14**	M	**13**	M
54	Naphthalene	**20**		**35**		5.0	U	**180**		**100**		**140**		**150**		**19**		**17**	
55																			
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																		
57	**Method OR-DEQ**																		
58	**TPH-Diesel**	**3.2**		**4.4**		**4.0**		**7.1**		**7.6**		**4.0**		**4.5**		**4.3**		**4.2**	
59	**TPH-D Motor Oil**	0.50	U	0.50	U	2.5	U	0.50	U	0.50	U	0.50	U	0.5	U	0.5	U	0.5	U
60	**TPH-Gasoline**	**4.9**		**4.7**		**3.9**		**12**	J	**12**		**11**		**10**		**7.8**		**8.6**	
61																			
62	**PRIORITY POLLUTANT**																		
63	**METALS (mg/L)**																		
64	Arsenic (7060)	**0.022**		**0.024**		**0.028**		**0.027**		**0.030**		**0.025**		**0.028**		0.05	U	0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.017**		0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2													Dup of LW8S						Dup of LW8S					
3			LW8S		LW8S		LW8S		LW8S		LW8S		Z		LW8S		LW8S		W		LW8S		LW8S	
4			AH27K		AU36D		BC30G		9912050-05A		BH96W		BH96V		BR64N		CB68F		CB68H		CL03A		CT67J	
5			5/17/99		9/21/99		12/8/99		12/8/1999 (d)		2/16/00		2/16/00		5/25/00		8/30/00		8/30/00		11/9/00		2/15/01	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	NA		0.002	U	0.002	U	**0.003**		0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.001	U	NA		**0.001**		0.001	U	0.001	U	0.001	U	0.001	U	**0.005**		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	0.008	U	**0.008**		**0.006**		NA		0.006	U	0.006	U	**0.007**		0.006	U	**0.007**		**0.041**		0.006	U
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**25.5**	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**6.81**	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**2.6**	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**7.52**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**170**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		1.0	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**170**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**220**		**200**		**210**		NA		**190**		**210**		**180**		**210**		**210**		**190**		**220**	
80	74	Chloride (mg/L) (EPA 325.2)	**5.4**		**4.1**		**4.6**		NA		**4.1**		**3.4**		**3.7**		**2.2**		**2.3**		**4.2**		**3.4**	J2
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**0.051**	J2
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**0.041**	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**2.8**	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1																			
2		Dup of LW8S								Dup of LW8S								Dup of LW8S	
3		W		LW8S		LW8S		LW8S		X		LW8S		LW8S		LW8S		X	
4		CT67I		DE68N		DM30J		ED23J		ED23K		EM85G		ER92E		EZ17G		EZ17A	
5		2/15/01		6/4/01		8/14/01		2/26/02		2/26/02		6/26/02		08/26/02		11/13/02		11/13/02	
66	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.029**		0.002	U	0.002	U
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.006**		0.02	U	0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.04**		0.01	U	0.01	U
69	Zinc (6010)	0.006	U	**0.007**		0.006	U	0.006	U	0.006	U	0.006	U	**0.096**		**0.009**		0.006	U
70																			
71	**MAJOR IONS AND CONVENTIONALS**																		
72	Calcium (mg/L) (6010)	**25.6**		**31.1**		**27.5**		**41.6**		**38.6**		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)	**6.85**		**8.18**		**7.58**		**9.98**		**9.30**		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)	**2.5**		**2.8**		**2.8**		**4.2**		**4.0**		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)	**7.55**		**8.47**		**7.86**		**9.95**		**9.31**		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	**160**		NA		NA		**220**		**230**		NA		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	NA		NA		1.0	U	1.0	U	NA		NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**160**		NA		NA		**220**		**230**		NA		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**210**		**250**		**200**		**300**		**290**		**240**		**220**		**200**		**200**	
80	Chloride (mg/L) (EPA 325.2)	**4.9**	J	**2.8**		**5.3**		**4.2**		**3.6**		**4.4**		**2.7**		**2.9**		**2.9**	
81	N-Nitrate (mg-N/L) (Calculated)	0.010	U	NA		NA		0.010	U	**0.012**		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	**0.035**	J	NA		NA		**0.059**		**0.054**		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.035**		NA		NA		**0.044**	J	**0.066**	J	NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	2.5	U	NA		NA		2.5	U	**3.2**		NA		NA		NA		NA	
85																			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2													Dup of LW8S						Dup of LW8S					
3			LW8S		LW8S		LW8S		LW8S		LW8S		Z		LW8S		LW8S		W		LW8S		LW8S	
4			AH27K		AU36D		BC30G		9912050-05A		BH96W		BH96V		BR64N		CB68F		CB68H		CL03A		CT67J	
5			5/17/99		9/21/99		12/8/99		12/8/1999 (d)		2/16/00		2/16/00		5/25/00		8/30/00		8/30/00		11/9/00		2/15/01	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	5.55		6.10		6.28		NM		6.57		6.56		6.44		4.89		4.89		5.74		6.26	
88	82	Temperature (° C) (avg)	14.0		17.2		13.0		NM		13.2		13.2		13.4		15.2		15.3		14.7		13.6	
89	83	Conductivity (um/hos)	357		303		328		NM		351		351		354		330		330		352		404	
90	84	Dissolved oxygen (mg/L) (avg)	2.14		2.13		2.06		NM		0.83		0.82		1.55		1.12		1.13		0.53		0.57	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		10	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1																			
2		Dup of LW8S								Dup of LW8S								Dup of LW8S	
3		W		LW8S		LW8S		LW8S		X		LW8S		LW8S		LW8S		X	
4		CT67I		DE68N		DM30J		ED23J		ED23K		EM85G		ER92E		EZ17G		EZ17A	
5		2/15/01		6/4/01		8/14/01		2/26/02		2/26/02		6/26/02		08/26/02		11/13/02		11/13/02	
86	**FIELD PARAMETERS**																		
87	pH (avg)	6.28		6.49		6.61		6.37		6.37		6.23		6.42		6.17		6.16	
88	Temperature (° C) (avg)	13.6		14.4		15.0		13.6		13.6		15.3		16.1		14.7		14.6	
89	Conductivity (um/hos)	403		402		467		489		490		405		330		353		351	
90	Dissolved oxygen (mg/L) (avg)	0.53		1.58		1.85		6.71		6.75		3.92		0.87		1.82		1.94	
91																			
92	**DIOXINS AND FURANS (ng/L)**																		
93	**Method 8290**																		
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																			
120	**ETHANOL (mg/L)**	5.0	U	NA		NA		NA		NA		NA		NA		NA		NA	
121																			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2													Dup of LW8S						Dup of LW8S					
3			LW8S		LW8S		LW8S		LW8S		LW8S		Z		LW8S		LW8S		W		LW8S		LW8S	
4			AH27K		AU36D		BC30G		9912050-05A		BH96W		BH96V		BR64N		CB68F		CB68H		CL03A		CT67J	
5			5/17/99		9/21/99		12/8/99		12/8/1999 (d)		2/16/00		2/16/00		5/25/00		8/30/00		8/30/00		11/9/00		2/15/01	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1																			
2		Dup of LW8S								Dup of LW8S								Dup of LW8S	
3		W		LW8S		LW8S		LW8S		X		LW8S		LW8S		LW8S		X	
4		CT67I		DE68N		DM30J		ED23J		ED23K		EM85G		ER92E		EZ17G		EZ17A	
5		2/15/01		6/4/01		8/14/01		2/26/02		2/26/02		6/26/02		08/26/02		11/13/02		11/13/02	
122	**PAHs (µg/L)**																		
123	**EPA Method SW8270 SIM**																		
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3			LW10S		LW10S		LW10S		LW10S		LW10S		LW10S	
4			AH76O		BC30A		BH96G		BR64K		ED30B		EN00B	
5			5/19/99		12/8/99		2/17/00		5/25/00		2/27/02		6/27/02	
7	1	**CHLORINATED PHENOLS (µg/L)**												
8	2	**EPA Method SW8040**												
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
16	10													
17	11	**SEMIVOLATILES (µg/L)**												
18	12	**EPA Method SW8270**												
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	50	U	50	U
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	**22**		1.0	U	1.0	U	4.0	U	4.0	U
33	27													
34	28	**VOLATILES (µg/L)**												
35	29	**EPA Method SW8260**												
36	30	Acetone	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U
37	31	Carbon Disulfide	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U
39	33	Benzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
40	34	Bromoform	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
42	36	Ethylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
43	37	Styrene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
45	39	o-Xylene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
46	40	1,3,5-Trimethylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
47	41	1,2,4-Trimethylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
48	42	Isopropylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
49	43	n-Propylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
50	44	tert-Butylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
52	46	4-Isopropyltoluene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
53	47	n-Butylbenzene	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U
54	48	Naphthalene	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U
55	49													
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**												
57	51	**Method OR-DEQ**												
58	52	**TPH-Diesel**	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.25	U
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA	
61	55													
62	56	**PRIORITY POLLUTANT**												
63	57	**METALS (mg/L)**												
64	58	Arsenic (7060)	0.001	U	NA		**0.004**		**0.001**		**0.002**		**0.001**	
65	59	Chromium (6010)	0.005	U	NA		0.005	U	0.005	U	0.005	U	**0.007**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3			LW10S		LW10S		LW10S		LW10S		LW10S		LW10S	
4			AH76O		BC30A		BH96G		BR64K		ED30B		EN00B	
5			5/19/99		12/8/99		2/17/00		5/25/00		2/27/02		6/27/02	
66	60	Copper (6010)	0.002	U	NA		**0.004**		0.002	U	0.002	U	**0.012**	
67	61	Lead (7421)	0.001	U	NA		**0.003**		**0.001**		**0.001**		**0.001**	
68	62	Nickel (6010)	0.01	U	NA		0.01	U	0.01	U	0.01	U	**0.02**	
69	63	Zinc (6010)	**0.004**		NA		**0.016**		**0.007**		**0.008**	J	**0.043**	
70	64													
71	65	**MAJOR IONS AND CONVENTIONALS**												
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		**11.1**		**26.2**	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		**3.27**		**9.50**	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		**2.5**		**3.9**	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		**5.27**		**8.31**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**34**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		**34**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**84**		NA		**100**		**90**		**100**		**120**	
80	74	Chloride (mg/L) (EPA 325.2)	**1.3**		NA		**3.2**		**2.2**		**1.4**	J	**2.3**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		**3.4**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		**0.014**		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		**3.4**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		**12**		NA	
85	79													

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3			LW10S		LW10S		LW10S		LW10S		LW10S		LW10S	
4			AH76O		BC30A		BH96G		BR64K		ED30B		EN00B	
5			5/19/99		12/8/99		2/17/00		5/25/00		2/27/02		6/27/02	
86	80	**FIELD PARAMETERS**												
87	81	pH (avg)	6.01		NM		6.66		6.45		6.09		6.44	
88	82	Temperature (° C) (avg)	13.6		NM		13.4		13.0		12.6		14.3	
89	83	Conductivity (um/hos)	93		NM		111		129		109		149	
90	84	Dissolved oxygen (mg/L) (avg)	5.76		NM		2.87		4.30		8.85		7.22	
91	85													
92	86	**DIOXINS AND FURANS (ng/L)**												
93	87	**Method 8290**												
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA	
119														
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA	
121														

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3			LW10S		LW10S		LW10S		LW10S		LW10S		LW10S	
4			AH76O		BC30A		BH96G		BR64K		ED30B		EN00B	
5			5/19/99		12/8/99		2/17/00		5/25/00		2/27/02		6/27/02	
122		**PAHs (µg/L)**												
123		**EPA Method SW8270 SIM**												
124		Naphthalene	NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of LW11S												Dup of LW11S							
3			LW11S		LW110S		LW11S		LW11S		LW11S		LW11S		LW11S		X		LW11S		LW11S		LW11S	
4			AH76E		AH76D		AU36F		BC27J		9912050-06A		BH96U		BR55L		BR55K		CB49J		CK77K		CT55H	
5			5/20/99		5/20/99		9/21/99		12/8/99		12/8/1999 (d)		2/17/00		5/23/00		5/23/00		8/28/00		11/8/00		2/14/01	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	**15000**		**15000**		**9400**		**7200**		NA		**9700**		**7700**	J2	**7600**	J2	**3900**		NA		**320**	J
10	4	2,4,6-Trichlorophenol	**2.9**		**2.8**		**1.3**		**1.0**		NA		**1.8**		**1.4**		**1.2**		**0.68**		NA		NA	
11	5	2,3,6-Trichlorophenol	**0.13**	J1	0.25	U	0.25	U	**0.12**	J1	NA		**0.13**	J1	0.25	U	0.25	U	0.25	U	NA		NA	
12	6	2,4,5-Trichlorophenol	1.0	U	0.25	U	**0.32**		0.25	U	NA		**0.61**		**0.96**		**0.95**		0.72	U	NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		0.25	U	0.25	U	0.25	U	0.32	U	NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**750**		**750**		**450**		**360**		NA		**560**		**940**		**850**		**250**		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	**7.5**		**6.8**		**3.7**		**2.4**		NA		**6.2**		**4.2**		**4.4**		**2.5**		NA		NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	NA		2.0	U	2.0	U	2.0	U	2.0	U	NA		**10**	
20	14	4-Methylphenol	**3.5**	M	**2.8**	M	1.0	U	**1.4**	MJ1	NA		1.0	U	1.0	U	1.0	U	**3.5**		NA		**3.7**	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	NA		3.0	U	3.0	U	3.0	U	3.0	U	NA		3.0	U
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		10	U	10	U	10	U	10	U	NA		10	U
24	18	Naphthalene	**41**		**38**		**20**		**12**		NA		**23**		**22**		**20**		**13**		NA		**5.7**	
25	19	2-Methylnaphthalene	**14**		**13**		**8.9**		**5.7**		NA		**9.0**		**9.0**		**9.4**		**4.9**		NA		**3.9**	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U
31	25	Pentachlorophenol	**24000**		**20000**		**8000**		**5400**		NA		**11000**		**6800**	J2	**6500**	J2	**3600**		NA		**460**	J
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	1.0	U	**0.8**	J1	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	**18**		**21**		5.0	U	**29**		NA		11	U	9.8	U	5.0	U	**11**		NA			R
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		2.0	U
38	32	2-Butanone	**6.1**		**6.3**		**27**		5.0	U	NA		**40**	M	5.0	U	5.0	U	5.0	U	NA		10	U
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		2.0	U
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		2.0	U
41	35	Toluene	**51**		**48**		**23**		**14**		NA		**17**		**37**		**36**		**15**		NA		**2.4**	
42	36	Ethylbenzene	**160**		**150**		**86**		**54**		NA		**75**		**110**		**110**		**69**		NA		**24**	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		2.0	U
44	38	m,p-Xylene	**360**		**350**		**160**		**96**		NA		**140**		**220**		**210**		**120**		NA		**53**	
45	39	o-Xylene	**300**		**290**		**170**		**96**		NA		**130**		**240**		**210**		**120**		NA		**40**	
46	40	1,3,5-Trimethylbenzene	**100**		**92**		**68**		**43**		NA		**62**		**88**		**89**		**53**		NA		**48**	
47	41	1,2,4-Trimethylbenzene	**410**		**430**		**180**		**130**		NA		**200**		**370**		**320**		**180**		NA		**150**	
48	42	Isopropylbenzene	**50**	J2	**40**	J2	**27**		**18**		NA		**27**		**40**		**38**		**22**		NA		**13**	
49	43	n-Propylbenzene	**66**		**56**		**40**		**26**		NA		**42**		**53**		**52**		**32**		NA		**24**	
50	44	tert-Butylbenzene	**2.8**		**2.3**		1.0	U	1.0	U	NA		**1.9**	M	2.3	U	2.2	U	**1.5**	M	NA		2.0	U
51	45	sec-Butylbenzene	**15**		**13**		**10**		**9.1**		NA		**14**		**14**		**13**		**8.8**		NA		**7.5**	
52	46	4-Isopropyltoluene	**11**		**9.9**		1.0	U	1.0	U	NA		**10**		**9.8**		**9.4**		**5.9**		NA		**7.1**	
53	47	n-Butylbenzene	**12**		**10**		**8.0**		5.3	U	NA		**11**		10	U	9.9	U	**7.0**	M	NA		**8.4**	M
54	48	Naphthalene	**46**		**38**		**19**		**15**		NA		**25**		**45**		**44**		**22**		NA		10	U
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	**14**		**13**		**10**		**8.8**		NA		**12**		**10**		**9.6**		**5.9**		NA		**2.2**	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		**1.1**		**0.50**		**0.77**		NA		NA		0.50	U
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		**11**		**24**		**20**		**14**		NA		**4.8**	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	**0.007**		**0.008**		**0.006**		**0.007**		NA		**0.007**		**0.008**		**0.008**		**0.007**		NA		**0.007**	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U	NA		0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
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DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
1															
2												Dup of LW11S			
3		LW11S		LW11S		LW11S		LW11S		LW11S		OX005S		LW11S	
4		DE68M		ED34D		EM66C		ES04D		EX87C		EX87A		EZ03I	
5		6/4/01		2/28/02		6/24/02		08/28/02		10/29/02		10/29/02		11/12/02	
7	**CHLORINATED PHENOLS (µg/L)**														
8	**EPA Method SW8040**														
9	Pentachlorophenol	NA		NA		NA		NA		**3600**		**3700**		NA	
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		**1.3**		**1.3**		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		**0.4**		**0.37**		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		0.58	U	0.6	U	NA	
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		0.25	U	0.29	U	NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		**380**		**380**		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		**3.2**	J	**4.2**	J	NA	
16															
17	**SEMIVOLATILES (µg/L)**														
18	**EPA Method SW8270**														
19	Phenol	**2.6**		2.0	U	2.0	U	2.2	U	NA		NA		2.2	U
20	4-Methylphenol	**2.3**		**1.9**		**1.0**		1.1	U	NA		NA		1.1	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.1	U	NA		NA		1.1	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.3	U	NA		NA		3.3	U
23	Benzoic Acid	10	U	50	U	50	U	54	U	NA		NA		56	U
24	Naphthalene	**3.1**		**5.3**		**6.7**		**4.9**		NA		NA		**4.7**	
25	2-Methylnaphthalene	**2.0**		**1.7**		**2.6**		**1.7**		NA		NA		**2.8**	
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.4	U	NA		NA		5.6	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.4	U	NA		NA		5.6	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.1	U	NA		NA		1.1	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.1	U	NA		NA		1.1	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.1	U	NA		NA		1.1	U
31	Pentachlorophenol	**560**		**4700**		**4000**		**2600**		NA		NA		**2200**	
32	bis(2-Ethylhexyl)phthalate	1.0	U	4.0	U	4.0	U	4.3	U	NA		NA		4.4	U
33															
34	**VOLATILES (µg/L)**														
35	**EPA Method SW8260**														
36	Acetone	**17**		**28**		5.0	U	11	UJ	**99**	M	**110**		**46**	M
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1	UJ	1	U	1	U	1	U
38	2-Butanone	5.0	U	**13**		5.0	U	**23**	J	**12**		**14**		**7.4**	
39	Benzene	**1.7**		**6.6**		**12**		**9.1**		**2.9**		**2.6**		**2.7**	
40	Bromoform	1.0	U	1.0	U	1.0	U	1	UJ	1	U	1	U	1	U
41	Toluene	**5.3**		**9.1**		**10**		**3.6**	J	**3**		**2.8**		**1.3**	
42	Ethylbenzene	**33**		**36**		**56**		**44**		**56**		**55**		**25**	
43	Styrene	1.0	U	1.0	U	1.0	U	1	UJ	1	U	1	U	1	U
44	m,p-Xylene	**57**		**71**		**100**		**69**	J	**67**		**67**		**26**	
45	o-Xylene	**50**		**77**		**94**		**68**	J	**88**		**83**		**37**	
46	1,3,5-Trimethylbenzene	**32**		**29**		**35**		**28**		**28**	J	**22**	J	**8.3**	
47	1,2,4-Trimethylbenzene	**120**		**140**		**150**		**120**		**160**		**150**		**84**	
48	Isopropylbenzene	**12**		**14**		**16**		**16**		**22**		**18**		**10**	
49	n-Propylbenzene	**21**		**20**		**24**		**24**		**31**		**27**		**15**	
50	tert-Butylbenzene	**1.3**	M	**1.4**		**2.8**	J	**1.8**		**2**		**1.8**		**1.3**	M
51	sec-Butylbenzene	**7.3**		**6.9**		**7.4**		**5.8**		**10**		**9.3**		**5.6**	
52	4-Isopropyltoluene	**6.6**		**3.9**		**6.0**		**5.8**	J	**7**		**6.4**		**3.2**	
53	n-Butylbenzene	7.6	U	**4.1**		5.0	U	**6.8**	M	**7.6**	M	**7.2**	M	**3.8**	M
54	Naphthalene	**11**		**12**		**17**		**15**	J	**22**		**19**		**7.8**	
55															
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**														
57	**Method OR-DEQ**														
58	**TPH-Diesel**	**1.7**		**7.4**		**8.0**		**7.9**		NA		NA		**4.7**	
59	**TPH-D Motor Oil**	0.50	U	0.50	U	0.50	U	0.5	U	NA		NA		0.5	U
60	**TPH-Gasoline**	**2.9**		8.9		**9.7**		**7.3**		NA		NA		**6.1**	
61															
62	**PRIORITY POLLUTANT**														
63	**METALS (mg/L)**														
64	Arsenic (7060)	**0.007**		**0.006**		**0.006**		**0.006**		NA		NA		0.05	U
65	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	NA		NA		0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of LW11S												Dup of LW11S							
3			LW11S		LW110S		LW11S		LW11S		LW11S		LW11S		LW11S		X		LW11S		LW11S		LW11S	
4			AH76E		AH76D		AU36F		BC27J		9912050-06A		BH96U		BR55L		BR55K		CB49J		CK77K		CT55H	
5			5/20/99		5/20/99		9/21/99		12/8/99		12/8/1999 (d)		2/17/00		5/23/00		5/23/00		8/28/00		11/8/00		2/14/01	
66	60	Copper (6010)	**0.002**		**0.003**		0.002	U	0.002	U	NA		**0.005**		0.002	U	0.002	U	0.002	U	NA		0.002	U
67	61	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	NA		**0.002**		0.001	U	0.001	U	0.001	U	NA		0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	NA		0.01	U	0.01	U	0.01	U	0.01	U	NA		0.01	U
69	63	Zinc (6010)	**0.010**		**0.010**		0.004	U	0.006	U	NA		**0.011**		0.006	U	0.006	U	0.006	U	NA		0.006	U
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**20.3**	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**6.41**	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**1.6**	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**4.03**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**140**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		1.0	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**140**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**230**		**240**		**150**		**200**		NA		**160**		**160**		**170**		**220**		NA		**190**	
80	74	Chloride (mg/L) (EPA 325.2)	**2.3**		**2.2**		**3.3**		**5.3**		NA		**5.2**		**5.8**	J2	**12**	J2	**6.5**		NA		**3.1**	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		0.010	U
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		**5.6**	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
1															
2												Dup of LW11S			
3		LW11S		LW11S		LW11S		LW11S		LW11S		OX005S		LW11S	
4		DE68M		ED34D		EM66C		ES04D		EX87C		EX87A		EZ03I	
5		6/4/01		2/28/02		6/24/02		08/28/02		10/29/02		10/29/02		11/12/02	
66	Copper (6010)	0.002	U	**0.003**		0.002	U	0.002	U	NA		NA		0.002	U
67	Lead (7421)	0.001	U	0.001	U	0.001	U	0.001	U	NA		NA		0.02	U
68	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	NA		NA		**0.12**	
69	Zinc (6010)	0.006	U	0.006	U	0.006	U	0.006	U	NA		NA		**0.019**	
70															
71	**MAJOR IONS AND CONVENTIONALS**														
72	Calcium (mg/L) (6010)	**28.6**		**59.0**		NA		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)	**9.34**		**18.2**		NA		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)	**2.7**		**4.0**		NA		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)	**6.10**		**8.55**		NA		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		**230**		NA		NA		140		**140**		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		1.0	U	NA		NA		1	U	1	U	NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		**230**		NA		NA		140		**140**		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**190**		**410**		**180**		**160**		NA		NA		**560**	
80	Chloride (mg/L) (EPA 325.2)	**3.2**		**58**		**2.7**		**3.8**		NA		NA		**4.7**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		0.010	U	NA		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		**0.031**		NA		NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		**0.040**		NA		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		**13**		NA		NA		NA		NA		NA	
85															

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of LW11S												Dup of LW11S							
3			LW11S		LW110S		LW11S		LW11S		LW11S		LW11S		LW11S		X		LW11S		LW11S		LW11S	
4			AH76E		AH76D		AU36F		BC27J		9912050-06A		BH96U		BR55L		BR55K		CB49J		CK77K		CT55H	
5			5/20/99		5/20/99		9/21/99		12/8/99		12/8/1999 (d)		2/17/00		5/23/00		5/23/00		8/28/00		11/8/00		2/14/01	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.55		6.56		5.83		6.50		NM		6.52		6.52		6.53		6.27		NM		6.25	
88	82	Temperature (° C) (avg)	14.1		14.1		15.0		12.2		NM		15.0		14.0		14.0		15.1		NM		13.2	
89	83	Conductivity (um/hos)	285		286		226		323		NM		291		234		234		346		NM		296	
90	84	Dissolved oxygen (mg/L) (avg)	2.09		2.21		2.45		2.72		NM		0.11		2.02		2.02		1.37		NM		0.61	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	NA		NA		0.0055	U	0.00130	U	NA		0.0025	U	NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		**0.018**		**0.0011**	J1	NA		**0.0064**		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		0.0056	U	0.00130	U	NA		0.0044	U	NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		0.0056	U	0.00130	U	NA		0.0044	U	NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		0.0320	UE	0.00160	U	NA		0.11	U	NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		0.0120	U	0.00130	U	NA		0.0026	U	NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		0.0220	U	0.00140	U	NA		0.0034	U	NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		0.0061	U	0.00160	U	NA		0.0044	U	NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		0.0061	U	0.00160	U	NA		0.0044	U	NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		0.0083	U	0.00120	U	NA		0.54	U	NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		0.0079	U	0.018	U	NA		0.0036	U	NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		0.0067	U	0.0032	U	NA		0.0038	U	NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		0.0130	U	0.00140	U	NA		0.0058	U	NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		**0.015**		0.0170	U	NA		**0.1600**		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		0.0076	U	0.00260	U	NA		0.0069	U	NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		**0.015**		**0.0025**	J1	NA		**0.0230**	J1	NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		0.0100	U	0.00130	U	NA		0.0078	U	NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		**0.035**		**0.0068**	J1	NA		**0.0310**		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		**0.043**		**0.0071**	J1	NA		0.14	U	NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		0.0094	U	0.00200	U	NA		0.0120	U	NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		**0.043**		**0.0320**	J1	NA		**0.3800**		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		**0.270**		**0.0500**	J1	NA		**0.6900**		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		**0.410**		**0.0780**		NA		**1.1000**		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		0.220	U	**0.0280**	J1	NA		**0.5100**		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		**1.900**		**0.2800**		NA		**5.3000**		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		10	U	**11**		5.0	U	5.0	U	5.0	U	NA		5.0	U
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
1															
2												Dup of LW11S			
3		LW11S		LW11S		LW11S		LW11S		LW11S		OX005S		LW11S	
4		DE68M		ED34D		EM66C		ES04D		EX87C		EX87A		EZ03I	
5		6/4/01		2/28/02		6/24/02		08/28/02		10/29/02		10/29/02		11/12/02	
86	**FIELD PARAMETERS**														
87	pH (avg)	6.50		6.29		6.14		6.44		6.47		6.48		6.21	
88	Temperature (° C) (avg)	14.1		13.6		15.6		16.4		16.4		16.4		15.5	
89	Conductivity (um/hos)	270		460		205		218		554		554		528	
90	Dissolved oxygen (mg/L) (avg)	0.96		7.46		4.17		1.31		0		0		0	
91															
92	**DIOXINS AND FURANS (ng/L)**														
93	**Method 8290**														
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA	
119															
120	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA	
121															

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2					Dup of LW11S												Dup of LW11S							
3			LW11S		LW110S		LW11S		LW11S		LW11S		LW11S		LW11S		X		LW11S		LW11S		LW11S	
4			AH76E		AH76D		AU36F		BC27J		9912050-06A		BH96U		BR55L		BR55K		CB49J		CK77K		CT55H	
5			5/20/99		5/20/99		9/21/99		12/8/99		12/8/1999 (d)		2/17/00		5/23/00		5/23/00		8/28/00		11/8/00		2/14/01	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
1															
2												Dup of LW11S			
3		LW11S		LW11S		LW11S		LW11S		LW11S		OX005S		LW11S	
4		DE68M		ED34D		EM66C		ES04D		EX87C		EX87A		EZ03I	
5		6/4/01		2/28/02		6/24/02		08/28/02		10/29/02		10/29/02		11/12/02	
122	**PAHs (µg/L)**														
123	**EPA Method SW8270 SIM**														
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S	
4			BR64S		CB68A		CL03U		CT67O		DE87F		DM30R		DW29K		ED30F		EN00F		ER93H		EZ03N	
5			5/25/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/12/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	**0.60**		**0.89**		**1.4**		**9.3**		**4.4**		**6.9**		0.25	U	0.26	U	0.25	U	0.26	U	**0.49**	
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		NA		NA		NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
20	14	4-Methylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
21	15	Isophorone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
22	16	2,4-Dimethylphenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
23	17	Benzoic Acid	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
24	18	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
25	19	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
28	22	Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
29	23	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
30	24	Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
31	25	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
37	31	Carbon Disulfide	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
38	32	2-Butanone	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
39	33	Benzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
40	34	Bromoform	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
41	35	Toluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
42	36	Ethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
43	37	Styrene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
44	38	m,p-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
45	39	o-Xylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
46	40	1,3,5-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
47	41	1,2,4-Trimethylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
48	42	Isopropylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
49	43	n-Propylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
50	44	tert-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
51	45	sec-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
52	46	4-Isopropyltoluene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
53	47	n-Butylbenzene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
54	48	Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
65	59	Chromium (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S	
4			BR64S		CB68A		CL03U		CT67O		DE87F		DM30R		DW29K		ED30F		EN00F		ER93H		EZ03N	
5			5/25/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/12/02	
66	60	Copper (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
67	61	Lead (7421)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
68	62	Nickel (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
69	63	Zinc (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S	
4			BR64S		CB68A		CL03U		CT67O		DE87F		DM30R		DW29K		ED30F		EN00F		ER93H		EZ03N	
5			5/25/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/12/02	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.22		5.57		5.62		6.34		6.54		6.82		6.56		6.35		6.43		6.32		6.43	
88	82	Temperature (° C) (avg)	12.0		13.5		10.7		12.2		12.8		15.2		13.8		11.2		12.7		14.1		14.1	
89	83	Conductivity (um/hos)	128		149		272		149		336		383		214		89		180		146		141	
90	84	Dissolved oxygen (mg/L) (avg)	5.81		3.67		1.47		0.94		2.62		1.49		5.86		9.57		7.00		2.31		2.27	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S		LW13S	
4			BR64S		CB68A		CL03U		CT67O		DE87F		DM30R		DW29K		ED30F		EN00F		ER93H		EZ03N	
5			5/25/00		8/30/00		11/9/00		2/15/01		6/6/01		8/13/01		11/27/01		2/27/02		6/27/02		08/27/02		11/12/02	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S	
4			S167C		T160D		U235C		V208B		W371C		Z960T		AH76M		BH75A		CT37J		ED16C		EM75C	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	**0.86**		0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	NA		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	NA	
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	NA		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	NA	
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		10	U	10	U	10	U	10	U	50	U	NA	
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		1.0	U	1.0	U	1.0	U	1.0	U	4.0	U	NA	
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	14	U	5.0	U	NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	**5.7**		NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	0.25	U	NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	**0.001**		**0.002**		0.05	U	0.05	U	**0.002**		0.001	U	0.001	U	0.001	U	**0.002**		**0.005**		NA	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S	
4			S167C		T160D		U235C		V208B		W371C		Z960T		AH76M		BH75A		CT37J		ED16C		EM75C	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
66	60	Copper (6010)	**0.002**		**0.002**		0.002	U	**0.003**		**0.004**		**0.002**		**0.003**		**0.003**		0.002	U	**0.008**		NA	
67	61	Lead (7421)	**0.001**		**0.002**		0.02	U	0.02	U	**0.002**		0.001	U	**0.001**		**0.001**		0.001	U	**0.002**		NA	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA	
69	63	Zinc (6010)	**0.006**		**0.012**		**0.004**		**0.007**		**0.012**	J2	**0.017**	J	**0.010**		**0.006**		0.006	U	**0.017**		NA	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	**12.5**		**12.8**		**12.0**		**5.13**		NA		NA		NA		NA		NA		**7.22**		NA	
73	67	Magnesium (mg/L) (6010)	**3.83**		**3.71**		**2.94**		**1.64**		NA		NA		NA		NA		NA		**2.44**		NA	
74	68	Potassium (mg/L) (6010)	**2.2**		**3.0**		**3.1**		**1.4**		NA		NA		NA		NA		NA		**1.7**		NA	
75	69	Sodium (mg/L) (6010)	**7.77**		**4.6**		**4.80**		**4.86**		NA		NA		NA		NA		NA		**7.44**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**46**		**39**		**34**		**28**		NA		NA		NA		NA		NA		**38**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**46**		**39**		**34**		**28**		NA		NA		NA		NA		NA		**38**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**110**		**94**		**61**	J2	NA		NA		**75**		**67**		**100**		**72**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**2.1**	J	**2.1**		**1.2**		**1.0**		NA		NA		**1.7**		**1.6**		**1.8**		**1.0**		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	**1.3**	J	**2.2**		**1.8**		**0.17**		NA		NA		NA		NA		NA		**0.098**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	**0.016**	J	**0.021**		0.010	U	**0.013**		NA		NA		NA		NA		NA		0.010	U	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**1.3**	J	**2.2**		**1.8**		**0.18**		NA		NA		NA		NA		NA		**0.098**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**19**	J	**14**		**14**		**3.4**		NA		NA		NA		NA		NA		**5.2**		NA	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S	
4			S167C		T160D		U235C		V208B		W371C		Z960T		AH76M		BH75A		CT37J		ED16C		EM75C	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.75		6.44		6.52		6.89		5.89		6.61		5.91		6.69		6.36		6.00		5.43	
88	82	Temperature (° C) (avg)	10.5		18.4		16.1		9.5		11.9		8.6		13.1		9.8		10.6		9.0		13.6	
89	83	Conductivity (um/hos)	138		147		115		0.63		93		78		64		66		133		73		174	
90	84	Dissolved oxygen (mg/L) (avg)									4.88		5.21		3.12		4.83		3.47		5.49		4.62	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	**0.0088**		0.0025	U	0.0066	U	0.0017	U	NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	0.0044-0.016	U	0.0011-0.0037	U	0.0025-0.0081	U	0.0017	U	NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	0.0160	U	0.0023	U	0.0074	U	0.0023	U	NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	0.0032-0.025	U	0.0012-0.0052	U	0.0018-0.0099	U	**0.0035**		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	0.0083	U	0.0058	U	**0.0100**		0.0015	U	NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	0.0120	U	0.0021	U	0.0062	U	0.0017	U	NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	0.0026-0.018	U	0.0015-0.0064	U	**0.0960**		0.0016	U	NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	0.0260	U	0.0100	U	0.0120	U	0.0030	U	NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	0.010-0.034	U	0.0020-0.0100	U	0.0056-0.013	U	0.0030	U	NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	0.0044	U	0.0017	U	0.0083	U	0.0018	U	NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	0.0057	U	0.0034	U	0.0049	U	0.0021	U	NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	0.0080	U	0.0076	U	0.0064	U	0.0041	U	NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	0.0160	U	0.0045	U	0.0068	U	0.0020	U	NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	0.0048-0.017	U	0.0017-0.0076	U	0.0270	U	0.0041	U	NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	0.0250	U	0.0078	U	0.0080	U	0.0025	U	NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	0.0180	U	0.0072	U	**0.0089**		0.0041	U	NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	0.0160	U	0.0032	U	0.0120	U	0.0030	U	NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	0.011-0.031	U	0.0025-0.0078	U	**0.0230**		0.0032	U	NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	0.0160	U	0.0046	U	**0.0240**		0.0130	U	NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	0.0280	U	0.0057	U	0.0039	U	0.0035	U	NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	0.012-0.028	U	0.0014-0.0058	U	0.0280	U	0.0083	U	NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	0.0230	U	0.0068	U	**0.3000**		0.0064	U	NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	0.013-0.038	U	0.0021-0.0080	U	**0.4400**		0.0064	U	NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	0.0520	U	0.0079	U	**0.1800**		0.0041	U	NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	0.0500	U	0.0300	U	**1.2000**		0.0210	U	NA		NA		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S		LW101S	
4			S167C		T160D		U235C		V208B		W371C		Z960T		AH76M		BH75A		CT37J		ED16C		EM75C	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		0.10	U	NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S	
4			S167D		T160E		U235B		V211B		W371B		Z960S		AH76L		BH75B		CT37H		ED16B		EM75B	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		**0.66**		**0.31**		0.25	U	**0.28**		0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	2.0	U	2.0	U	2.0	UJ	2.0	U	NA		NA		2.0	U	2.0	U	2.0	U	2.0	U	NA	
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	**3.5**		1.0	U	NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	UJ	3.0	U	NA		NA		3.0	U	3.0	U	3.0	U	3.0	U	NA	
23	17	Benzoic Acid	10	U	10	U	10	UJ	10	U	NA		NA		10	U	10	U	10	U	50	U	NA	
24	18	Naphthalene	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	UJ	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	UJ	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	UJ	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.3	UJ	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	4.0	U	NA	
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	160	U	**7.9**		NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	0.25	U	NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	0.001	U	**0.002**		0.05	U	0.05	U	**0.001**		0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	NA	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S	
4			S167D		T160E		U235B		V211B		W371B		Z960S		AH76L		BH75B		CT37H		ED16B		EM75B	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
66	60	Copper (6010)	**0.003**		**0.002**		0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.002**		0.002	U	0.002	U	NA	
67	61	Lead (7421)	0.001	U	**0.002**		0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA	
69	63	Zinc (6010)	**0.008**		**0.009**		0.004	U	0.004	U	**0.014**	J2	**0.008**	J	0.004	U	0.006	U	0.006	U	0.006	U	NA	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	**14.6**		**14.1**		**12.6**		**18.5**		NA		NA		NA		NA		NA		**8.93**		NA	
73	67	Magnesium (mg/L) (6010)	**5.39**		**5.64**		**4.87**		**6.76**		NA		NA		NA		NA		NA		**3.65**		NA	
74	68	Potassium (mg/L) (6010)	**2.4**		**2.6**		**2.5**		**2.0**		NA		NA		NA		NA		NA		**1.6**		NA	
75	69	Sodium (mg/L) (6010)	**6.16**		**5.94**		**6.18**		**7.92**		NA		NA		NA		NA		NA		**5.36**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**62**		**67**		**61**		**110**		NA		NA		NA		NA		NA		**46**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**62**		**67**		**61**		**110**		NA		NA		NA		NA		NA		**46**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**110**		**120**		**120**		NA		NA		**83**		**72**		**120**		**80**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**4.2**	J	**3.0**		**1.9**		**4.4**		NA		NA		**1.6**		**1.5**		**1.3**		**2.5**		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	**0.12**	J	**0.083**		**0.023**		**0.78**	J2	NA		NA		NA		NA		NA		**0.21**		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	0.010	U	0.010	U	0.010	UJ	NA		NA		NA		NA		NA		0.010	U	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	**0.12**	J	**0.083**		**0.023**		**0.78**	J2	NA		NA		NA		NA		NA		**0.21**		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**4.5**	J	**4.7**		**3.2**		**6.0**		NA		NA		NA		NA		NA		**5.1**		NA	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S	
4			S167D		T160E		U235B		V211B		W371B		Z960S		AH76L		BH75B		CT37H		ED16B		EM75B	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.63		6.60		6.76		6.60		6.06		6.71		6.04		6.59		5.63		6.13		5.24	
88	82	Temperature (° C) (avg)	10.6		19.0		16.8		9.8		14.4		9.3		13.5		10.0		9.5		9.1		14.5	
89	83	Conductivity (um/hos)	136		158		133		188		129		100		87		94		127		90		91	
90	84	Dissolved oxygen (mg/L) (avg)									2.82		5.70		3.14		3.51		1.74		7.06		4.96	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	0.0026	U	0.0011	U	0.0024	U	0.0018	U	NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	0.0013-0.0048	U	0.0006-0.0058	U	0.0012-0.0052	U	0.0018	U	NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	0.0033	U	0.0023	U	0.0055	U	0.0037	U	NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	0.0023-0.0075	U	0.008-0.0068	U	0.0018-0.0090	U	0.0037	U	NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	0.0027	U	0.0045	U	0.0020	U	0.0018	U	NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	0.0025	U	0.0031	U	0.0021	U	0.0024	U	NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	0.0013-0.0078	U	0.0014-0.0088	U	0.0015-0.0068	U	0.0021	U	NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	0.0061	U	0.0077	U	0.0040	U	0.0057	U	NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	0.0030-0.011	U	0.0023-0.0093	U	0.0016-0.0092	U	0.0057	U	NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	0.0031	U	0.0034	U	0.0067	U	0.0021	U	NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	0.0043	U	0.0031	U	0.0048	U	0.0019	U	NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	0.0053	U	0.0031	U	0.0048	U	0.0036	U	NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	0.0049	U	0.0049	U	0.0020	U	0.0031	U	NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	0.0053	U	0.0020-0.0066	U	0.0048	U	0.0057	U	NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	0.0054	U	0.0030	U	0.0073	U	0.0034	U	NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	0.0068	U	0.0056	U	0.0084	U	0.0041	U	NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	0.0073	U	0.0084	U	0.0039	U	0.0019	U	NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	0.0030-0.010	U	0.0023-0.0084	U	0.0029-0.013	U	0.0031	U	NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	0.0044	U	**0.0016**		0.0047	U	0.0160	U	NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	0.0073	U	0.0063	U	0.0077	U	0.0052	U	NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	**0.0062**		**0.0043**		0.0150	U	0.0106	U	NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	0.0110	U	0.0065	U	**0.0180**		0.0070	U	NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	0.0170	U	0.0024-0.0092	U	**0.0310**		0.0070	U	NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	**0.0100**		**0.0062**		0.0170	U	**0.0074**		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	0.0710	U	0.0280	U	**0.1200**		0.0390	U	NA		NA		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S		LW102S	
4			S167D		T160E		U235B		V211B		W371B		Z960S		AH76L		BH75B		CT37H		ED16B		EM75B	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW103S	
3			LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW13D	
4			S167B		T160C		U235D		V211A		W371D		Z960U		AH76N		BH75C		CT37K		ED16D		EM75D		EM75I	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02		6/25/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	**0.58**		0.25	U	0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA		NA	
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	NA		NA		2.0	U	2.0	U	2.0	U	2.0	U	NA		NA	
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	NA		NA		3.0	U	3.0	U	3.0	U	3.0	U	NA		NA	
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		NA		10	U	10	U	10	U	50	U	NA		NA	
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	4.0	U	NA		NA	
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	9.1	U	5.0	U	NA		NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA		NA	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA		NA	
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.007**		**0.011**		0.05	U	0.05	U	**0.010**		**0.009**		**0.011**		**0.019**		**0.008**		**0.013**		NA		NA	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW103S	
3			LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW13D	
4			S167B		T160C		U235D		V211A		W371D		Z960U		AH76N		BH75C		CT37K		ED16D		EM75D		EM75I	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02		6/25/02	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	**0.007**		0.002	U	**0.003**		NA		NA	
67	61	Lead (7421)	0.001	U	**0.001**		0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	**0.003**		0.001	U	0.001	U	NA		NA	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA		NA	
69	63	Zinc (6010)	**0.005**		**0.008**		**0.004**		**0.005**		**0.006**	J2	**0.007**	J	0.004	U	**0.010**		0.006	U	0.006	U	NA		NA	
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**13.5**		**19**		**15.6**		**16.0**		NA		NA		NA		NA		NA		**17.0**		NA		NA	
73	67	Magnesium (mg/L) (6010)	**5.02**		**6.95**		**5.65**		**5.89**		NA		NA		NA		NA		NA		**6.51**		NA		NA	
74	68	Potassium (mg/L) (6010)	**1.8**		**2.0**		**2.0**		**1.3**		NA		NA		NA		NA		NA		**1.7**		NA		NA	
75	69	Sodium (mg/L) (6010)	**4.93**		**5.35**		**5.11**		**5.99**		NA		NA		NA		NA		NA		**5.57**		NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**95**		**84**		**71**		**84**		NA		NA		NA		NA		NA		**83**		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		1.0	U	NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**95**		**84**		**71**		**84**		NA		NA		NA		NA		NA		**83**		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**130**		**100**		**110**		NA		NA		**110**		**97**		**130**		**110**		NA		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**2.2**	J	**2.5**		**1.7**		**1.3**		NA		NA		**1.7**		**2.3**		**2.5**		**2.3**		NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	**0.036**		**0.057**	J2	NA		NA		NA		NA		NA		**0.093**		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	**0.017**		**0.016**		0.010	UJ	NA		NA		NA		NA		NA		0.010	U	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.010	U	0.010	U	**0.052**		**0.057**	J2	NA		NA		NA		NA		NA		**0.093**		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**5.5**	J	**4.6**		**2.6**		2.5	U	NA		NA		NA		NA		NA		**2.9**		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW103S	
3			LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW13D	
4			S167B		T160C		U235D		V211A		W371D		Z960U		AH76N		BH75C		CT37K		ED16D		EM75D		EM75I	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02		6/25/02	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.74		6.75		6.77		6.73		6.37		7.02		6.14		6.74		6.52		6.17		6.47		6.47	
88	82	Temperature (° C) (avg)	10.9		14.6		14.7		12.2		13.2		10.8		12.4		11.0		11.5		10.7		13.5		13.5	
89	83	Conductivity (um/hos)	157		222		180		198		214		128		174		135		160		170		187		188	
90	84	Dissolved oxygen (mg/L) (avg)									1.47		2.98		2.79		2.56		3.55		5.73		5.70		5.74	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																									Dup of LW103S	
3			LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW103S		LW13D	
4			S167B		T160C		U235D		V211A		W371D		Z960U		AH76N		BH75C		CT37K		ED16D		EM75D		EM75I	
5			3/31/97		7/14/97		10/21/97		1/27/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02		6/25/02	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S	
4			S167A		T160B		U235A		V208A		W371A		Z960R		AH76K		BH75D		CT37G		ED16A		EM75A	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
7	1	**CHLORINATED PHENOLS (µg/L)**																						
8	2	**EPA Method SW8040**																						
9	3	Pentachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	0.25	U	**0.77**		0.25	U
10	4	2,4,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
11	5	2,3,6-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
12	6	2,4,5-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	NA		NA		NA	
16	10																							
17	11	**SEMIVOLATILES (µg/L)**																						
18	12	**EPA Method SW8270**																						
19	13	Phenol	2.0	U	2.0	U	2.0	U	2.0	U	NA		NA		2.0	U	2.0	U	2.0	U	2.0	U	NA	
20	14	4-Methylphenol	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
21	15	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	NA		NA		3.0	U	3.0	U	3.0	U	3.0	U	NA	
23	17	Benzoic Acid	10	U	10	U	10	U	10	U	NA		NA		10	U	10	U	10	U	50	U	NA	
24	18	Naphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
28	22	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
29	23	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
30	24	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
31	25	Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
32	26	bis(2-Ethylhexyl)phthalate	1.0	UJ	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	**2.0**		**10**		NA	
33	27																							
34	28	**VOLATILES (µg/L)**																						
35	29	**EPA Method SW8260**																						
36	30	Acetone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	8.9	U	5.0	U	NA	
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
38	32	2-Butanone	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
41	35	Toluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
42	36	Ethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
44	38	m,p-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
45	39	o-Xylene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
46	40	1,3,5-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
47	41	1,2,4-Trimethylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
48	42	Isopropylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
49	43	n-Propylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
50	44	tert-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
51	45	sec-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
53	47	n-Butylbenzene	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	1.0	U	1.0	U	NA	
54	48	Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	NA	
55	49																							
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																						
57	51	**Method OR-DEQ**																						
58	52	**TPH-Diesel**	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA		0.25	U	0.25	U	**0.32**		0.25	U	NA	
59	53	**TPH-D Motor Oil**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
60	54	**TPH-Gasoline**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
61	55																							
62	56	**PRIORITY POLLUTANT**																						
63	57	**METALS (mg/L)**																						
64	58	Arsenic (7060)	**0.002**		**0.003**		0.05	U	0.05	U	**0.002**		**0.002**		**0.001**		**0.002**		**0.002**		**0.002**		NA	
65	59	Chromium (6010)	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S	
4			S167A		T160B		U235A		V208A		W371A		Z960R		AH76K		BH75D		CT37G		ED16A		EM75A	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
66	60	Copper (6010)	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	0.002	U	NA	
67	61	Lead (7421)	0.001	U	0.001	U	0.02	U	0.02	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	NA	
69	63	Zinc (6010)	0.004	U	**0.005**		0.004	U	0.004	U	0.004	U	**0.019**	J	0.004	U	**0.008**		0.006	U	0.006	U	NA	
70	64																							
71	65	**MAJOR IONS AND CONVENTIONALS**																						
72	66	Calcium (mg/L) (6010)	**17.6**		**16.1**		**20.9**		**13.0**		NA		NA		NA		NA		NA		**9.25**		NA	
73	67	Magnesium (mg/L) (6010)	**4.63**		**4.26**		**5.48**		**3.66**		NA		NA		NA		NA		NA		**2.88**		NA	
74	68	Potassium (mg/L) (6010)	**2.5**		**2.8**		**3.4**		**1.8**		NA		NA		NA		NA		NA		**1.8**		NA	
75	69	Sodium (mg/L) (6010)	**11.4**		**12.1**		**12.6**		**9.60**		NA		NA		NA		NA		NA		**7.09**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**92**		**86**		**100**		**81**		NA		NA		NA		NA		NA		**53**		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1.0	U	1.0	U	1.0	U	NA		NA		NA		NA		NA		1.0	U	NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**92**		**86**		**100**		**81**		NA		NA		NA		NA		NA		**53**		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	NT		**140**		**160**	J2	**110**		NA		NA		**110**		**83**		**160**		**99**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**3.8**	J	**2.8**		**2.5**		**2.2**		NA		NA		**2.1**		**1.9**		**1.4**		**2.8**		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	0.010	U	**0.031**		**0.011**		NA		NA		NA		NA		NA		0.010	U	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	**0.019**		0.010	U	0.010	U	NA		NA		NA		NA		NA		0.010	U	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.010	U	**0.011**		**0.031**		**0.011**		NA		NA		NA		NA		NA		0.010	U	NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**4.2**	J	**5.7**		2.5	U	**8.0**		NA		NA		NA		NA		NA		**9.3**		NA	
85	79																							

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S	
4			S167A		T160B		U235A		V208A		W371A		Z960R		AH76K		BH75D		CT37G		ED16A		EM75A	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
86	80	**FIELD PARAMETERS**																						
87	81	pH (avg)	6.75		6.80		6.77		6.85		6.39		7.19		6.32		6.88		6.05		6.15		5.43	
88	82	Temperature (° C) (avg)	9.7		15.1		15.9		11.9		12.1		10.7		12.4		10.5		11.4		11.1		13.8	
89	83	Conductivity (um/hos)	198		223		228		185		197		131		167		99		238		111		123	
90	84	Dissolved oxygen (mg/L) (avg)									1.75		1.45		1.45		2.00		1.48		5.18		4.26	
91	85																							
92	86	**DIOXINS AND FURANS (ng/L)**																						
93	87	**Method 8290**																						
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																								
120		**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
121																								

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2																								
3			LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S		LW104S	
4			S167A		T160B		U235A		V208A		W371A		Z960R		AH76K		BH75D		CT37G		ED16A		EM75A	
5			3/31/97		7/14/97		10/21/97		1/28/98		5/18/98		2/16/99		5/19/99		2/15/00		2/13/01		2/25/02		6/25/02	
122		**PAHs (µg/L)**																						
123		**EPA Method SW8270 SIM**																						
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																	Dup of RW1						Dup of RW1			
3			RW1		RW1		RW1		RW1		RW1		RW1		RW1		W		RW1		RW1		W		RW1	
4			AH76F		AU36E		BC21U		BH96X		BR64O		CB68G		CK77B		CK77A		CT67K		DE87Q		DE87M		DM30G	
5			5/20/99		9/21/99		12/7/99		2/16/00		5/25/00		8/30/00		11/7/00		11/7/00		2/15/01		6/6/01		6/6/01		8/13/01	
7	1	**CHLORINATED PHENOLS (µg/L)**																								
8	2	**EPA Method SW8040**																								
9	3	Pentachlorophenol	**130**		**3100**		**3400**		**6400**		**11000**		**6300**		**3400**		**3400**		**11000**	J	NA		NA		NA	
10	4	2,4,6-Trichlorophenol	**0.22**	J1	**0.77**		**1.7**		**3.1**		**2.4**		**2.3**		**1.1**		**1.1**		NA		NA		NA		NA	
11	5	2,3,6-Trichlorophenol	**0.12**	J1	0.25	U	**0.33**		**0.54**		0.53	U	**0.53**		0.44	U	0.48	U	NA		NA		NA		NA	
12	6	2,4,5-Trichlorophenol	3.1	U	14	U	20	U	3.0	U	6.2	U	22	U	30	U	32	U	NA		NA		NA		NA	
13	7	2,3,4-Trichlorophenol	0.25	U	0.27	U	0.25	U	0.25	U	0.25	U	**0.79**		0.25	U	0.25	U	NA		NA		NA		NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**48**		**250**		**620**		**530**		**580**		**1100**		**630**		**640**		NA		NA		NA		NA	
15	9	2,3,4,5-Tetrachlorophenol	**1.1**		**7.3**		**9.3**		**9.3**		**21**		**24**		**16**		**16**		NA		NA		NA		NA	
16	10																									
17	11	**SEMIVOLATILES (µg/L)**																								
18	12	**EPA Method SW8270**																								
19	13	Phenol	2.0	U	**5.7**		**4.0**		**6.5**		2.0	U	**15**		**8.2**	J2	**14**	J2	**60**		**12**		**12**		**32**	
20	14	4-Methylphenol	1.0	U	**1.4**		2.0	U	**7.0**		1.0	U	**1.6**	M	1.0	U	1.0	U	**16**		**1.7**		**1.8**		**2.1**	
21	15	Isophorone	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
22	16	2,4-Dimethylphenol	3.0	U	3.0	U	6.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
23	17	Benzoic Acid	10	U	10	U	20	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
24	18	Naphthalene	1.0	U	**2.5**		**4.2**		**2.8**		**12**		**12**		**7.1**		**5.8**		**13**		**9.3**		**9.8**		**2.7**	
25	19	2-Methylnaphthalene	1.0	U	1.0	U	2.0	U	1.0	U	**2.0**		**3.4**		**2.2**		**1.7**		**5.2**		**3.7**		**4.0**		1.0	U
26	20	2,4,6-Trichlorophenol	5.0	U	5.0	U	10	U	5.0	U	**6.2**		**6.8**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
27	21	2,4,5-Trichlorophenol	5.0	U	5.0	U	**35**		5.0	U	5.0	U	5.0	U	**40**		**31**		**17**		**13**		**13**		**6.9**	
28	22	Acenaphthene	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
29	23	Dibenzofuran	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
30	24	Fluorene	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
31	25	Pentachlorophenol	**150**		**3100**		**4100**		**2800**		**7300**		**5400**		**4000**		**3900**		**1400**	J	**1900**		**2000**		**410**	
32	26	bis(2-Ethylhexyl)phthalate	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U	1.0	U	**1.1**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
33	27																									
34	28	**VOLATILES (µg/L)**																								
35	29	**EPA Method SW8260**																								
36	30	Acetone	5.0	U	5.0	U	**30**		5.0	U	**39**	M	30	U	**16**		**14**		**28**		**13**		**13**		**7.2**	M
37	31	Carbon Disulfide	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	6.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
38	32	2-Butanone	**7.9**		**29**		**47**		**80**		25	U	30	U	**7.4**	J2	**41**	J2	5.0	U	**5.7**		**6.4**		**5.6**	
39	33	Benzene	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	6.0	U	**1.0**		1.0	U	**9.0**		**3.4**		**3.4**		**11**	
40	34	Bromoform	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	6.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
41	35	Toluene	1.0	U	**6.6**		**1.8**		**1.1**		**20**		**14**		**9.1**		**8.2**		**18**		**14**		**15**		**18**	
42	36	Ethylbenzene	**1.3**		**51**		**34**		**31**		**130**		**120**		**96**		**86**		**80**		**71**		**72**		**82**	
43	37	Styrene	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U	6.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
44	38	m,p-Xylene	**1.6**		**52**		**23**		**32**		**170**		**150**		**92**		**82**		**160**		**140**		**140**		**200**	
45	39	o-Xylene	**1.6**		**130**		**71**		**73**		**250**		**240**		**160**		**150**		**110**		**100**		**100**		**120**	
46	40	1,3,5-Trimethylbenzene	1.0	U	**41**		**12**		**38**		**120**		**64**		**29**		**25**		**58**		**37**		**38**		**40**	
47	41	1,2,4-Trimethylbenzene	**2.2**		**160**		**75**		**170**		**500**		**320**		**240**		**250**		**160**		**160**		**160**		**150**	
48	42	Isopropylbenzene	**3.5**		**36**		**23**		**21**		**58**		**47**		**26**		**21**		**28**		**28**		**28**		**29**	
49	43	n-Propylbenzene	**1.5**		**37**		**24**		**35**		**82**		**61**		**36**		**31**		**45**		**34**		**36**		**36**	
50	44	tert-Butylbenzene	1.0	U	**2.6**		**1.6**		**2.0**	M	5.0	U	6.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
51	45	sec-Butylbenzene	**3.2**		**17**		**8.6**		**14**		**21**		**16**		**11**		**10**		**10**		**7.7**		**7.8**		**6.8**	
52	46	4-Isopropyltoluene	1.0	U	1.0	U	**1.6**		**7.2**		**13**		**8.6**		**5.2**		**4.6**		**5.9**		**4.1**		**4.2**		**3.8**	
53	47	n-Butylbenzene	1.0	U	**4.7**		2.3	U	**5.8**	M	5.0	U	7.7	U	**6.0**		**6.0**		**9.2**	M	6.0	U	6.2	U	4.8	U
54	48	Naphthalene	5.0	U	**7.1**		**7.3**		**8.9**		25	U	30	U	**11**		**12**		**29**		**25**		**28**		**14**	
55	49																									
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**																								
57	51	**Method OR-DEQ**																								
58	52	**TPH-Diesel**	**1.0**		**7.5**		**5.7**		**5.1**		**12**		**13**		**6.4**		**5.7**		**4.1**		**4.9**		**4.5**		**4.3**	
59	53	**TPH-D Motor Oil**	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	2.0	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	2.5	U
60	54	**TPH-Gasoline**	**0.63**		**6.6**		**5.1**		**4.5**		**29**		**26**		**9.7**		**9.9**		**7.1**		**5.4**		**5.3**		**7.7**	
61	55																									
62	56	**PRIORITY POLLUTANT**																								
63	57	**METALS (mg/L)**																								
64	58	Arsenic (7060)	**0.002**		**0.005**		**0.006**		**0.004**		**0.004**		**0.006**		**0.006**		**0.006**		**0.007**		**0.007**		**0.007**		**0.008**	
65	59	Chromium (6010)	0.005	U	0.005	U	**0.007**		**0.011**		0.005	U	0.005	U	**0.015**		**0.010**		0.005	U	0.005	U	0.005	U	0.005	U

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1															
2				Dup of RW1						Dup of RW1					
3		RW1		X		RW1		RW1		X		RW1		RW1	
4		DW37D		DW37A		ED34A		EM66B		EM66A		ER93J		EZ17H	
5		11/28/01		11/28/01		2/28/02		6/24/02		6/24/02		08/27/02		11/13/02	
7	**CHLORINATED PHENOLS (µg/L)**														
8	**EPA Method SW8040**														
9	Pentachlorophenol	NA		NA		NA		NA		NA		NA		NA	
10	2,4,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA	
11	2,3,6-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA	
12	2,4,5-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA	
13	2,3,4-Trichlorophenol	NA		NA		NA		NA		NA		NA		NA	
14	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA	
15	2,3,4,5-Tetrachlorophenol	NA		NA		NA		NA		NA		NA		NA	
16															
17	**SEMIVOLATILES (µg/L)**														
18	**EPA Method SW8270**														
19	Phenol	**2.1**		2.0	U	**66**		**57**	J	**76**	J	**16**		**10**	
20	4-Methylphenol	1.0	U	1.0	U	**4.6**		**21**		**25**		**5.4**		1.2	U
21	Isophorone	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U
22	2,4-Dimethylphenol	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	**53**		3.5	U
23	Benzoic Acid	50	U	50	U	50	U	50	U	50	U	54	U	58	U
24	Naphthalene	**13**		**12**		**6.9**		**11**	J	**15**	J	**16**		**8.6**	
25	2-Methylnaphthalene	**3.7**		**3.3**		**2.3**		**5.1**		**6.1**		**6**		**4.4**	
26	2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.4	U	5.8	U
27	2,4,5-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	**5.8**	M	**20**		5.8	U
28	Acenaphthene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U
29	Dibenzofuran	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U
30	Fluorene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.1	U	1.2	U
31	Pentachlorophenol	**17**		**17**		**1200**		**880**	J	**1100**	J	**2600**		**5400**	
32	bis(2-Ethylhexyl)phthalate	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.3	U	4.7	U
33															
34	**VOLATILES (µg/L)**														
35	**EPA Method SW8260**														
36	Acetone	**8.4**		**7.6**		**110**	J	50	U	48	U	15	U	5	U
37	Carbon Disulfide	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	3	U	1	U
38	2-Butanone	**30**		**30**	M	**47**	J	15	U	**16**	J	**32**	M	5	U
39	Benzene	**24**		**23**		**1.9**	J	3.0	U	3.0	U	**4.8**		**22**	
40	Bromoform	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	3	U	1	U
41	Toluene	**5.7**		**5.3**		**12**	J	**16**		**14**	J	**15**		**13**	
42	Ethylbenzene	**74**		**74**		**81**	J	**140**		**120**	J	**120**		**130**	
43	Styrene	1.0	U	1.0	U	1.0	U	3.0	U	1.0	U	3	U	1	U
44	m,p-Xylene	**270**		**280**		**97**	J	**310**		**250**	J	**230**		**160**	
45	o-Xylene	**87**		**87**		**170**	J	**220**		**190**	J	**200**		**200**	
46	1,3,5-Trimethylbenzene	**53**		**52**		**40**	J	**100**		**100**	J	**97**		**87**	
47	1,2,4-Trimethylbenzene	**200**		**200**		**170**	J	**370**		**310**	J	**380**		**410**	
48	Isopropylbenzene	**26**		**26**		**29**	J	**42**		**47**	J	**53**		**60**	
49	n-Propylbenzene	**32**		**31**		**34**	J	**63**		**64**	J	**72**		**80**	
50	tert-Butylbenzene	1.0	U	1.0	U	**1.8**	J	3.0	U	3.0	U	3	U	**3**	
51	sec-Butylbenzene	1.0	U	1.0	U	**8.9**	J	3.0	U	3.0	U	3	U	**16**	
52	4-Isopropyltoluene	**5.5**		**5.4**		4.5	U	**9.3**		**8.8**	J	**11**		**9.5**	
53	n-Butylbenzene	**4.7**	M	**4.7**	M	**6.8**	J	10	U	8.2	U	**14**	M	**9**	
54	Naphthalene	**24**		**22**		**21**	J	**19**		**20**	J	**45**		**19**	
55															
56	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**														
57	**Method OR-DEQ**														
58	**TPH-Diesel**	**4.7**		**5.0**		**4.9**		**6.8**	J	**17**	J	**9.4**		**13**	
59	**TPH-D Motor Oil**	2.0	U	0.50	U	0.50	U	0.50	U	0.50	U	0.5	U	0.5	U
60	**TPH-Gasoline**	**5.2**		**5.3**		12		**13**		**14**		**14**		**18**	
61															
62	**PRIORITY POLLUTANT**														
63	**METALS (mg/L)**														
64	Arsenic (7060)	**0.009**		**0.008**		**0.008**		**0.006**		**0.006**		**0.008**		0.05	U
65	Chromium (6010)	**0.008**	J	**0.014**	J	**0.015**		0.005	U	0.005	U	0.005	U	**0.013**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																	Dup of RW1						Dup of RW1			
3			RW1		RW1		RW1		RW1		RW1		RW1		RW1		W		RW1		RW1		W		RW1	
4			AH76F		AU36E		BC21U		BH96X		BR64O		CB68G		CK77B		CK77A		CT67K		DE87Q		DE87M		DM30G	
5			5/20/99		9/21/99		12/7/99		2/16/00		5/25/00		8/30/00		11/7/00		11/7/00		2/15/01		6/6/01		6/6/01		8/13/01	
66	60	Copper (6010)	**0.018**		**0.003**		**0.013**		**0.024**		**0.005**		0.002	U	**0.020**	J2	**0.016**	J2	0.002	U	0.002	U	0.002	U	0.002	U
67	61	Lead (7421)	**0.003**		0.001	U	**0.004**		**0.005**		0.001	U	0.001	U	**0.006**		**0.004**		0.001	U	0.001	U	0.001	U	0.001	U
68	62	Nickel (6010)	0.01	U	0.01	U	0.01	U	**0.02**		0.01	U	0.01	U	**0.01**		**0.01**		0.01	U	0.01	U	0.01	U	0.01	U
69	63	Zinc (6010)	**0.020**		0.004	U	**0.028**		**0.046**		0.006	U	0.006	U	**0.054**		**0.048**		**0.017**		0.006	U	0.006	U	0.006	U
70	64																									
71	65	**MAJOR IONS AND CONVENTIONALS**																								
72	66	Calcium (mg/L) (6010)	**37.3**		NA		NA		NA		NA		NA		NA		NA		**49.1**		**36.1**		**37.3**		**45.3**	
73	67	Magnesium (mg/L) (6010)	**11.7**		NA		NA		NA		NA		NA		NA		NA		**15.2**		**11.9**		**12.2**		**15.2**	
74	68	Potassium (mg/L) (6010)	**4.0**		NA		NA		NA		NA		NA		NA		NA		**4.0**		**2.8**		**3.4**		**3.5**	
75	69	Sodium (mg/L) (6010)	**6.03**		NA		NA		NA		NA		NA		NA		NA		**6.67**		**6.01**		**5.59**		**6.62**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**140**		NA		NA		NA		NA		NA		NA		NA		**230**		NA		NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	NA		NA		NA		NA		NA		NA		NA		1.0	U	NA		NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**140**		NA		NA		NA		NA		NA		NA		NA		**230**		NA		NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**180**		**210**		**170**		**200**		**350**		**240**		**220**		**230**		**320**		**220**	J	**220**	J	**220**	J
80	74	Chloride (mg/L) (EPA 325.2)	**2.9**		**3.8**		**6.7**		**12**		**4.2**		**13**		**7.3**		**6.2**		**5.9**	J	**4.7**		**5.1**		**7.6**	
81	75	N-Nitrate (mg-N/L) (Calculated)	0.010	U	NA		NA		NA		NA		NA		NA		NA		0.010	U	NA		NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	0.010	U	NA		NA		NA		NA		NA		NA		NA		**0.023**	J	NA		NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.010	U	NA		NA		NA		NA		NA		NA		NA		**0.030**		NA		NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	**3.8**		NA		NA		NA		NA		NA		NA		NA		**3.0**		NA		NA		NA	
85	79																									

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1															
2				Dup of RW1						Dup of RW1					
3		RW1		X		RW1		RW1		X		RW1		RW1	
4		DW37D		DW37A		ED34A		EM66B		EM66A		ER93J		EZ17H	
5		11/28/01		11/28/01		2/28/02		6/24/02		6/24/02		08/27/02		11/13/02	
66	Copper (6010)	**0.008**	J	**0.013**	J	**0.028**		**0.005**		**0.006**		**0.004**		**0.018**	
67	Lead (7421)	**0.002**	J	**0.004**	J	**0.006**		**0.001**		0.001	U	**0.001**		0.02	U
68	Nickel (6010)	0.01	U	**0.01**		**0.02**		0.01	U	0.01	U	0.01	U	**0.02**	
69	Zinc (6010)	**0.026**	J	**0.038**	J	**0.054**		**0.016**		**0.020**		0.006	U	**0.055**	
70															
71	**MAJOR IONS AND CONVENTIONALS**														
72	Calcium (mg/L) (6010)	**58.7**	J	**65.4**	J	**152**		NA		NA		NA		NA	
73	Magnesium (mg/L) (6010)	**19.5**	J	**21.8**	J	**51.9**		NA		NA		NA		NA	
74	Potassium (mg/L) (6010)	**4.2**		**5.1**		**6.7**		NA		NA		NA		NA	
75	Sodium (mg/L) (6010)	**8.18**		**9.48**		**12.0**		NA		NA		NA		NA	
76	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA		**480**		NA		NA		NA		NA	
77	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		1.0	U	NA		NA		NA		NA	
78	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA		**480**		NA		NA		NA		NA	
79	Total Dissolved Solids (mg/L) (EPA 160.1)	**290**		**280**		**1100**		**1900**		**2000**		**230**		**260**	
80	Chloride (mg/L) (EPA 325.2)	**8.4**		**8.3**		**11**		**8.8**		**8.0**		**6.4**		**7.0**	
81	N-Nitrate (mg-N/L) (Calculated)	NA		NA		**0.044**		NA		NA		NA		NA	
82	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA		0.010	U	NA		NA		NA		NA	
83	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA		**0.044**		NA		NA		NA		NA	
84	Sulfate (mg/L) (EPA 375.2)	NA		NA		**5.7**		NA		NA		NA		NA	
85															

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																	Dup of RW1						Dup of RW1			
3			RW1		RW1		RW1		RW1		RW1		RW1		RW1		W		RW1		RW1		W		RW1	
4			AH76F		AU36E		BC21U		BH96X		BR64O		CB68G		CK77B		CK77A		CT67K		DE87Q		DE87M		DM30G	
5			5/20/99		9/21/99		12/7/99		2/16/00		5/25/00		8/30/00		11/7/00		11/7/00		2/15/01		6/6/01		6/6/01		8/13/01	
86	80	**FIELD PARAMETERS**																								
87	81	pH (avg)	6.54		6.14		6.18		6.44		6.46		5.69		5.28		5.27		6.35		6.62		6.61		6.54	
88	82	Temperature (° C) (avg)	14.0		17.3		17.2		14.6		13.2		14.8		14.2		14.1		12.7		14.4		14.4		16.4	
89	83	Conductivity (um/hos)	244		271		273		211		440		314		305		303		506		377		377		389	
90	84	Dissolved oxygen (mg/L) (avg)	1.52		2.09		1.72		0.76		1.00		0.87		0.69		0.72		0.32		0.97		0.94		1.10	
91	85																									
92	86	**DIOXINS AND FURANS (ng/L)**																								
93	87	**Method 8290**																								
94	88	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
95	89	Total TCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
96	90	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
97	91	Total TCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
100	94	Total PeCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
102	96	Total PeCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
107	101	Total HxCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
111	105	Total HxCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
114	108	Total HpCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
116	110	Total HpCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
117	111	OCDF	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
118	112	OCDD	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
119																										
120		**ETHANOL (mg/L)**	NA		NA		NA		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA		NA		NA	
121																										

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1															
2				Dup of RW1						Dup of RW1					
3		RW1		X		RW1		RW1		X		RW1		RW1	
4		DW37D		DW37A		ED34A		EM66B		EM66A		ER93J		EZ17H	
5		11/28/01		11/28/01		2/28/02		6/24/02		6/24/02		08/27/02		11/13/02	
86	**FIELD PARAMETERS**														
87	pH (avg)	6.51		6.5		6.15		6.16		6.14		6.71		6.03	
88	Temperature (° C) (avg)	13.7		13.5		12.8		15.6		15.6		15.6		17.3	
89	Conductivity (um/hos)	584		583		878		803		805		291		394	
90	Dissolved oxygen (mg/L) (avg)	3.36		3.43		7.27		3.86		3.54		0.00		0.00	
91															
92	**DIOXINS AND FURANS (ng/L)**														
93	**Method 8290**														
94	2,3,7,8-TCDF	NA		NA		NA		NA		NA		NA		NA	
95	Total TCDF	NA		NA		NA		NA		NA		NA		NA	
96	2,3,7,8-TCDD	NA		NA		NA		NA		NA		NA		NA	
97	Total TCDD	NA		NA		NA		NA		NA		NA		NA	
98	1,2,3,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
99	2,3,4,7,8-PeCDF	NA		NA		NA		NA		NA		NA		NA	
100	Total PeCDF	NA		NA		NA		NA		NA		NA		NA	
101	1,2,3,7,8-PeCDD	NA		NA		NA		NA		NA		NA		NA	
102	Total PeCDD	NA		NA		NA		NA		NA		NA		NA	
103	1,2,3,4,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
104	1,2,3,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
105	2,3,4,6,7,8-HxCDF	NA		NA		NA		NA		NA		NA		NA	
106	1,2,3,7,8,9-HxCDF	NA		NA		NA		NA		NA		NA		NA	
107	Total HxCDF	NA		NA		NA		NA		NA		NA		NA	
108	1,2,3,4,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
109	1,2,3,6,7,8-HxCDD	NA		NA		NA		NA		NA		NA		NA	
110	1,2,3,7,8,9-HxCDD	NA		NA		NA		NA		NA		NA		NA	
111	Total HxCDD	NA		NA		NA		NA		NA		NA		NA	
112	1,2,3,4,6,7,8-HpCDF	NA		NA		NA		NA		NA		NA		NA	
113	1,2,3,4,7,8,9-HpCDF	NA		NA		NA		NA		NA		NA		NA	
114	Total HpCDF	NA		NA		NA		NA		NA		NA		NA	
115	1,2,3,4,6,7,8-HpCDD	NA		NA		NA		NA		NA		NA		NA	
116	Total HpCDD	NA		NA		NA		NA		NA		NA		NA	
117	OCDF	NA		NA		NA		NA		NA		NA		NA	
118	OCDD	NA		NA		NA		NA		NA		NA		NA	
119															
120	**ETHANOL (mg/L)**	NA		NA		NA		NA		NA		NA		NA	
121															

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																	Dup of RW1						Dup of RW1			
3			RW1		RW1		RW1		RW1		RW1		RW1		RW1		W		RW1		RW1		W		RW1	
4			AH76F		AU36E		BC21U		BH96X		BR64O		CB68G		CK77B		CK77A		CT67K		DE87Q		DE87M		DM30G	
5			5/20/99		9/21/99		12/7/99		2/16/00		5/25/00		8/30/00		11/7/00		11/7/00		2/15/01		6/6/01		6/6/01		8/13/01	
122		**PAHs (µg/L)**																								
123		**EPA Method SW8270 SIM**																								
124		Naphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
125		2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
126		Acenaphthylene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
127		Acenaphthene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
128		Fluorene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
129		Anthracene	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
130		Dibenzofuran	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	B	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1															
2				Dup of RW1						Dup of RW1					
3		RW1		X		RW1		RW1		X		RW1		RW1	
4		DW37D		DW37A		ED34A		EM66B		EM66A		ER93J		EZ17H	
5		11/28/01		11/28/01		2/28/02		6/24/02		6/24/02		08/27/02		11/13/02	
122	**PAHs (µg/L)**														
123	**EPA Method SW8270 SIM**														
124	Naphthalene	NA		NA		NA		NA		NA		NA		NA	
125	2-Methylnaphthalene	NA		NA		NA		NA		NA		NA		NA	
126	Acenaphthylene	NA		NA		NA		NA		NA		NA		NA	
127	Acenaphthene	NA		NA		NA		NA		NA		NA		NA	
128	Fluorene	NA		NA		NA		NA		NA		NA		NA	
129	Anthracene	NA		NA		NA		NA		NA		NA		NA	
130	Dibenzofuran	NA		NA		NA		NA		NA		NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			RW3		RW3	
4			BC30H		9912050-07A	
5			12/8/99		12/8/1999 (d)	
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	**590**		NA	
10	4	2,4,6-Trichlorophenol	**0.19**	J1	NA	
11	5	2,3,6-Trichlorophenol	**0.13**	J1	NA	
12	6	2,4,5-Trichlorophenol	0.25	U	NA	
13	7	2,3,4-Trichlorophenol	0.25	U	NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	**110**		NA	
15	9	2,3,4,5-Tetrachlorophenol	**3.0**		NA	
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	2.0	U	NA	
20	14	4-Methylphenol	1.0	U	NA	
21	15	Isophorone	1.0	U	NA	
22	16	2,4-Dimethylphenol	3.0	U	NA	
23	17	Benzoic Acid	10	U	NA	
24	18	Naphthalene	**14**		NA	
25	19	2-Methylnaphthalene	1.0	U	NA	
26	20	2,4,6-Trichlorophenol	5.0	U	NA	
27	21	2,4,5-Trichlorophenol	5.0	U	NA	
28	22	Acenaphthene	1.0	U	NA	
29	23	Dibenzofuran	1.0	U	NA	
30	24	Fluorene	1.0	U	NA	
31	25	Pentachlorophenol	**720**		NA	
32	26	bis(2-Ethylhexyl)phthalate	**1.4**		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	5.0	U	NA	
37	31	Carbon Disulfide	1.0	U	NA	
38	32	2-Butanone	**9.1**		NA	
39	33	Benzene	1.0	U	NA	
40	34	Bromoform	1.0	U	NA	
41	35	Toluene	1.0	U	NA	
42	36	Ethylbenzene	**8.3**		NA	
43	37	Styrene	1.0	U	NA	
44	38	m,p-Xylene	**12**		NA	
45	39	o-Xylene	**34**		NA	
46	40	1,3,5-Trimethylbenzene	**57**		NA	
47	41	1,2,4-Trimethylbenzene	**160**		NA	
48	42	Isopropylbenzene	**10**		NA	
49	43	n-Propylbenzene	**19**		NA	
50	44	tert-Butylbenzene	1.0	U	NA	
51	45	sec-Butylbenzene	**9.2**		NA	
52	46	4-Isopropyltoluene	**9.8**		NA	
53	47	n-Butylbenzene	8.9	U	NA	
54	48	Naphthalene	**15**		NA	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	**3.5**		NA	
59	53	**TPH-D Motor Oil**	0.50	U	NA	
60	54	**TPH-Gasoline**	**2.5**		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	**0.014**		NA	
65	59	Chromium (6010)	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			RW3		RW3	
4			BC30H		9912050-07A	
5			12/8/99		12/8/1999 (d)	
66	60	Copper (6010)	0.002	U	NA	
67	61	Lead (7421)	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	NA	
69	63	Zinc (6010)	0.006	U	NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	NA		NA	
73	67	Magnesium (mg/L) (6010)	NA		NA	
74	68	Potassium (mg/L) (6010)	NA		NA	
75	69	Sodium (mg/L) (6010)	NA		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	NA		NA	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA		NA	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**150**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	**3.9**		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			RW3		RW3	
4			BC30H		9912050-07A	
5			12/8/99		12/8/1999 (d)	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	6.52		NM	
88	82	Temperature (° C) (avg)	12.9		NM	
89	83	Conductivity (um/hos)	231		NM	
90	84	Dissolved oxygen (mg/L) (avg)	1.76		NM	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120		**ETHANOL (mg/L)**	5.0	U	10	U
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			RW3		RW3	
4			BC30H		9912050-07A	
5			12/8/99		12/8/1999 (d)	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-1S		OX-1S	
4			EM65A		EX87D	
5			6/24/02		10/29/02	
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	NA		**200**	
10	4	2,4,6-Trichlorophenol	NA		**1.1**	
11	5	2,3,6-Trichlorophenol	NA		**0.56**	
12	6	2,4,5-Trichlorophenol	NA		25	U
13	7	2,3,4-Trichlorophenol	NA		0.25	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		**70**	
15	9	2,3,4,5-Tetrachlorophenol	NA		**6.9**	
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	NA		NA	
20	14	4-Methylphenol	NA		NA	
21	15	Isophorone	NA		NA	
22	16	2,4-Dimethylphenol	NA		NA	
23	17	Benzoic Acid	NA		NA	
24	18	Naphthalene	NA		NA	
25	19	2-Methylnaphthalene	NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA	
28	22	Acenaphthene	NA		NA	
29	23	Dibenzofuran	NA		NA	
30	24	Fluorene	NA		NA	
31	25	Pentachlorophenol	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	**19**		**56**	
37	31	Carbon Disulfide	1.0	U	1	U
38	32	2-Butanone	6.8	U	**5.4**	
39	33	Benzene	**320**		**65**	
40	34	Bromoform	1.0	U	1	U
41	35	Toluene	**29**		**3.9**	
42	36	Ethylbenzene	**180**		**43**	
43	37	Styrene	1.0	U	1	U
44	38	m,p-Xylene	**740**		**110**	
45	39	o-Xylene	**280**		**42**	
46	40	1,3,5-Trimethylbenzene	**160**		**54**	
47	41	1,2,4-Trimethylbenzene	**460**		**160**	
48	42	Isopropylbenzene	**140**		**27**	
49	43	n-Propylbenzene	1.0	U	**38**	
50	44	tert-Butylbenzene	**100**		1	U
51	45	sec-Butylbenzene	1.0	U	**6.8**	
52	46	4-Isopropyltoluene	**29**		**6.9**	
53	47	n-Butylbenzene	28	U	**6.1**	M
54	48	Naphthalene	**83**		**15**	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA	
60	54	**TPH-Gasoline**	NA		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	**0.02**		NA	
65	59	Chromium (6010)	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-1S		OX-1S	
4			EM65A		EX87D	
5			6/24/02		10/29/02	
66	60	Copper (6010)	0.002	U	NA	
67	61	Lead (7421)	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	NA	
69	63	Zinc (6010)	**0.009**		NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	**32.4**		NA	
73	67	Magnesium (mg/L) (6010)	**8.55**		NA	
74	68	Potassium (mg/L) (6010)	**3.4**		NA	
75	69	Sodium (mg/L) (6010)	**7.45**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**160**		**190**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**160**		**190**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**240**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-1S		OX-1S	
4			EM65A		EX87D	
5			6/24/02		10/29/02	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	5.99		6.52	
88	82	Temperature (° C) (avg)	14.3		16.4	
89	83	Conductivity (um/hos)	302		427	
90	84	Dissolved oxygen (mg/L) (avg)	3.97		0.7	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120		**ETHANOL (mg/L)**	NA		NA	
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-1S		OX-1S	
4			EM65A		EX87D	
5			6/24/02		10/29/02	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-2S		OX-2S	
4			EM65B		EX87B	
5			6/24/02		10/29/02	
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	NA		**1200**	
10	4	2,4,6-Trichlorophenol	NA		0.26	U
11	5	2,3,6-Trichlorophenol	NA		**0.28**	
12	6	2,4,5-Trichlorophenol	NA		0.94	U
13	7	2,3,4-Trichlorophenol	NA		0.26	U
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		**110**	
15	9	2,3,4,5-Tetrachlorophenol	NA		**6.5**	
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	NA		NA	
20	14	4-Methylphenol	NA		NA	
21	15	Isophorone	NA		NA	
22	16	2,4-Dimethylphenol	NA		NA	
23	17	Benzoic Acid	NA		NA	
24	18	Naphthalene	NA		NA	
25	19	2-Methylnaphthalene	NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA	
28	22	Acenaphthene	NA		NA	
29	23	Dibenzofuran	NA		NA	
30	24	Fluorene	NA		NA	
31	25	Pentachlorophenol	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	**16**		**22**	M
37	31	Carbon Disulfide	3.0	U	1	U
38	32	2-Butanone	15	U	5	U
39	33	Benzene	3.0	U	**1.1**	
40	34	Bromoform	3.0	U	1	U
41	35	Toluene	**6.7**		1	U
42	36	Ethylbenzene	**43**		**24**	
43	37	Styrene	3.0	U	1	U
44	38	m,p-Xylene	**72**		**29**	
45	39	o-Xylene	**79**		**36**	
46	40	1,3,5-Trimethylbenzene	**46**		**21**	
47	41	1,2,4-Trimethylbenzene	**190**		**110**	
48	42	Isopropylbenzene	**18**		**14**	
49	43	n-Propylbenzene	**28**		**25**	
50	44	tert-Butylbenzene	3.0	U	**1.8**	
51	45	sec-Butylbenzene	3.0	U	**8.4**	
52	46	4-Isopropyltoluene	**5.2**		**6.3**	
53	47	n-Butylbenzene	5.8	U	**6.7**	M
54	48	Naphthalene	15	U	**11**	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA	
60	54	**TPH-Gasoline**	NA		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	**0.01**		NA	
65	59	Chromium (6010)	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-2S		OX-2S	
4			EM65B		EX87B	
5			6/24/02		10/29/02	
66	60	Copper (6010)	0.002	U	NA	
67	61	Lead (7421)	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	NA	
69	63	Zinc (6010)	**0.009**		NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	**33**		NA	
73	67	Magnesium (mg/L) (6010)	**10.7**		NA	
74	68	Potassium (mg/L) (6010)	**2.7**		NA	
75	69	Sodium (mg/L) (6010)	**6.06**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**120**		**200**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**120**		**200**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**220**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-2S		OX-2S	
4			EM65B		EX87B	
5			6/24/02		10/29/02	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	6.15		6.40	
88	82	Temperature (° C) (avg)	15.5		15.9	
89	83	Conductivity (um/hos)	249		599	
90	84	Dissolved oxygen (mg/L) (avg)	4.10		0	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120		**ETHANOL (mg/L)**	NA		NA	
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-2S		OX-2S	
4			EM65B		EX87B	
5			6/24/02		10/29/02	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-3S		OX-3S	
4			EM65C		EX87E	
5			6/24/02		10/29/02	
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	NA		**1200**	J
10	4	2,4,6-Trichlorophenol	NA		**2.4**	J
11	5	2,3,6-Trichlorophenol	NA		**1.3**	J
12	6	2,4,5-Trichlorophenol	NA		9.2	UJ
13	7	2,3,4-Trichlorophenol	NA		0.25	UJ
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		**320**	J
15	9	2,3,4,5-Tetrachlorophenol	NA		**29**	J
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	NA		NA	
20	14	4-Methylphenol	NA		NA	
21	15	Isophorone	NA		NA	
22	16	2,4-Dimethylphenol	NA		NA	
23	17	Benzoic Acid	NA		NA	
24	18	Naphthalene	NA		NA	
25	19	2-Methylnaphthalene	NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA	
28	22	Acenaphthene	NA		NA	
29	23	Dibenzofuran	NA		NA	
30	24	Fluorene	NA		NA	
31	25	Pentachlorophenol	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	120	U	**240**	
37	31	Carbon Disulfide	25	U	1	U
38	32	2-Butanone	120	U	**20**	
39	33	Benzene	**66**		**94**	
40	34	Bromoform	25	U	1	U
41	35	Toluene	**63**		**31**	
42	36	Ethylbenzene	**280**		**110**	
43	37	Styrene	25	U	1	U
44	38	m,p-Xylene	**820**		**430**	
45	39	o-Xylene	**370**		**150**	
46	40	1,3,5-Trimethylbenzene	**160**		**120**	
47	41	1,2,4-Trimethylbenzene	**520**		**350**	
48	42	Isopropylbenzene	**57**		**56**	
49	43	n-Propylbenzene	**83**		**75**	
50	44	tert-Butylbenzene	25	U	1	U
51	45	sec-Butylbenzene	25	U	**13**	
52	46	4-Isopropyltoluene	25	U	**13**	
53	47	n-Butylbenzene	25	U	**11**	M
54	48	Naphthalene	120	U	**37**	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA	
60	54	**TPH-Gasoline**	NA		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	**0.02**		NA	
65	59	Chromium (6010)	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-3S		OX-3S	
4			EM65C		EX87E	
5			6/24/02		10/29/02	
66	60	Copper (6010)	**0.002**		NA	
67	61	Lead (7421)	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	NA	
69	63	Zinc (6010)	**0.012**		NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	**40.2**		NA	
73	67	Magnesium (mg/L) (6010)	**11**		NA	
74	68	Potassium (mg/L) (6010)	**3.8**		NA	
75	69	Sodium (mg/L) (6010)	**8.75**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**160**		**270**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**160**		**270**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**270**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-3S		OX-3S	
4			EM65C		EX87E	
5			6/24/02		10/29/02	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	5.94		6.44	
88	82	Temperature (° C) (avg)	14.4		15.3	
89	83	Conductivity (um/hos)	342		502	
90	84	Dissolved oxygen (mg/L) (avg)	4.34		0	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120		**ETHANOL (mg/L)**	NA		NA	
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-3S		OX-3S	
4			EM65C		EX87E	
5			6/24/02		10/29/02	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-4S		OX-4S	
4			EM65D		EX87F	
5			6/24/02		10/29/02	
7	1	**CHLORINATED PHENOLS (µg/L)**				
8	2	**EPA Method SW8040**				
9	3	Pentachlorophenol	NA		**1200**	J
10	4	2,4,6-Trichlorophenol	NA		**2.7**	J
11	5	2,3,6-Trichlorophenol	NA		**0.81**	J
12	6	2,4,5-Trichlorophenol	NA		11	UJ
13	7	2,3,4-Trichlorophenol	NA		0.25	UJ
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA		**320**	J
15	9	2,3,4,5-Tetrachlorophenol	NA		**32**	J
16	10					
17	11	**SEMIVOLATILES (µg/L)**				
18	12	**EPA Method SW8270**				
19	13	Phenol	NA		NA	
20	14	4-Methylphenol	NA		NA	
21	15	Isophorone	NA		NA	
22	16	2,4-Dimethylphenol	NA		NA	
23	17	Benzoic Acid	NA		NA	
24	18	Naphthalene	NA		NA	
25	19	2-Methylnaphthalene	NA		NA	
26	20	2,4,6-Trichlorophenol	NA		NA	
27	21	2,4,5-Trichlorophenol	NA		NA	
28	22	Acenaphthene	NA		NA	
29	23	Dibenzofuran	NA		NA	
30	24	Fluorene	NA		NA	
31	25	Pentachlorophenol	NA		NA	
32	26	bis(2-Ethylhexyl)phthalate	NA		NA	
33	27					
34	28	**VOLATILES (µg/L)**				
35	29	**EPA Method SW8260**				
36	30	Acetone	120	U	**12**	M
37	31	Carbon Disulfide	25	U	**1.3**	
38	32	2-Butanone	120	U	5	U
39	33	Benzene	25	U	**24**	
40	34	Bromoform	25	U	1	U
41	35	Toluene	**71**		**23**	
42	36	Ethylbenzene	**440**		**330**	
43	37	Styrene	25	U	1	U
44	38	m,p-Xylene	**1300**		**820**	
45	39	o-Xylene	**500**		**430**	
46	40	1,3,5-Trimethylbenzene	**220**		**200**	
47	41	1,2,4-Trimethylbenzene	**590**		**580**	
48	42	Isopropylbenzene	**86**		**120**	
49	43	n-Propylbenzene	**110**		**120**	
50	44	tert-Butylbenzene	25	U	1	U
51	45	sec-Butylbenzene	25	U	**22**	
52	46	4-Isopropyltoluene	25	U	**24**	
53	47	n-Butylbenzene	25	U	**25**	M
54	48	Naphthalene	120	U	**99**	
55	49					
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**				
57	51	**Method OR-DEQ**				
58	52	**TPH-Diesel**	NA		NA	
59	53	**TPH-D Motor Oil**	NA		NA	
60	54	**TPH-Gasoline**	NA		NA	
61	55					
62	56	**PRIORITY POLLUTANT**				
63	57	**METALS (mg/L)**				
64	58	Arsenic (7060)	**0.021**		NA	
65	59	Chromium (6010)	0.005	U	NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-4S		OX-4S	
4			EM65D		EX87F	
5			6/24/02		10/29/02	
66	60	Copper (6010)	0.002	U	NA	
67	61	Lead (7421)	0.001	U	NA	
68	62	Nickel (6010)	0.01	U	NA	
69	63	Zinc (6010)	**0.008**		NA	
70	64					
71	65	**MAJOR IONS AND CONVENTIONALS**				
72	66	Calcium (mg/L) (6010)	**37.9**		NA	
73	67	Magnesium (mg/L) (6010)	**10.4**		NA	
74	68	Potassium (mg/L) (6010)	**3.6**		NA	
75	69	Sodium (mg/L) (6010)	**8.42**		NA	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**160**		**240**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U	1	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**160**		**240**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**250**		NA	
80	74	Chloride (mg/L) (EPA 325.2)	NA		NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA		NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA		NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA		NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA		NA	
85	79					

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-4S		OX-4S	
4			EM65D		EX87F	
5			6/24/02		10/29/02	
86	80	**FIELD PARAMETERS**				
87	81	pH (avg)	6.74		NM	
88	82	Temperature (° C) (avg)	14.5		NM	
89	83	Conductivity (um/hos)	326		NM	
90	84	Dissolved oxygen (mg/L) (avg)	4.42		NM	
91	85					
92	86	**DIOXINS AND FURANS (ng/L)**				
93	87	**Method 8290**				
94	88	2,3,7,8-TCDF	NA		NA	
95	89	Total TCDF	NA		NA	
96	90	2,3,7,8-TCDD	NA		NA	
97	91	Total TCDD	NA		NA	
98	92	1,2,3,7,8-PeCDF	NA		NA	
99	93	2,3,4,7,8-PeCDF	NA		NA	
100	94	Total PeCDF	NA		NA	
101	95	1,2,3,7,8-PeCDD	NA		NA	
102	96	Total PeCDD	NA		NA	
103	97	1,2,3,4,7,8-HxCDF	NA		NA	
104	98	1,2,3,6,7,8-HxCDF	NA		NA	
105	99	2,3,4,6,7,8-HxCDF	NA		NA	
106	100	1,2,3,7,8,9-HxCDF	NA		NA	
107	101	Total HxCDF	NA		NA	
108	102	1,2,3,4,7,8-HxCDD	NA		NA	
109	103	1,2,3,6,7,8-HxCDD	NA		NA	
110	104	1,2,3,7,8,9-HxCDD	NA		NA	
111	105	Total HxCDD	NA		NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA		NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA		NA	
114	108	Total HpCDF	NA		NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA		NA	
116	110	Total HpCDD	NA		NA	
117	111	OCDF	NA		NA	
118	112	OCDD	NA		NA	
119						
120		**ETHANOL (mg/L)**	NA		NA	
121						

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D	E	F
1						
2						
3			OX-4S		OX-4S	
4			EM65D		EX87F	
5			6/24/02		10/29/02	
122		**PAHs (µg/L)**				
123		**EPA Method SW8270 SIM**				
124		Naphthalene	NA		NA	
125		2-Methylnaphthalene	NA		NA	
126		Acenaphthylene	NA		NA	
127		Acenaphthene	NA		NA	
128		Fluorene	NA		NA	
129		Anthracene	NA		NA	
130		Dibenzofuran	NA		NA	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			PZ-1	
4			EM65E	
5			6/24/02	
7	1	**CHLORINATED PHENOLS (µg/L)**		
8	2	**EPA Method SW8040**		
9	3	Pentachlorophenol	NA	
10	4	2,4,6-Trichlorophenol	NA	
11	5	2,3,6-Trichlorophenol	NA	
12	6	2,4,5-Trichlorophenol	NA	
13	7	2,3,4-Trichlorophenol	NA	
14	8	2,3,5,6- and 2,3,4,6-Tetrachlorophenol	NA	
15	9	2,3,4,5-Tetrachlorophenol	NA	
16	10			
17	11	**SEMIVOLATILES (µg/L)**		
18	12	**EPA Method SW8270**		
19	13	Phenol	NA	
20	14	4-Methylphenol	NA	
21	15	Isophorone	NA	
22	16	2,4-Dimethylphenol	NA	
23	17	Benzoic Acid	NA	
24	18	Naphthalene	NA	
25	19	2-Methylnaphthalene	NA	
26	20	2,4,6-Trichlorophenol	NA	
27	21	2,4,5-Trichlorophenol	NA	
28	22	Acenaphthene	NA	
29	23	Dibenzofuran	NA	
30	24	Fluorene	NA	
31	25	Pentachlorophenol	NA	
32	26	bis(2-Ethylhexyl)phthalate	NA	
33	27			
34	28	**VOLATILES (µg/L)**		
35	29	**EPA Method SW8260**		
36	30	Acetone	250	U
37	31	Carbon Disulfide	50	U
38	32	2-Butanone	250	U
39	33	Benzene	50	U
40	34	Bromoform	50	U
41	35	Toluene	**80**	
42	36	Ethylbenzene	**470**	
43	37	Styrene	50	U
44	38	m,p-Xylene	**1000**	
45	39	o-Xylene	**710**	
46	40	1,3,5-Trimethylbenzene	**290**	
47	41	1,2,4-Trimethylbenzene	**870**	
48	42	Isopropylbenzene	**120**	
49	43	n-Propylbenzene	**170**	
50	44	tert-Butylbenzene	50	U
51	45	sec-Butylbenzene	50	U
52	46	4-Isopropyltoluene	50	U
53	47	n-Butylbenzene	50	U
54	48	Naphthalene	250	U
56	50	**TOTAL PETROLEUM HYDROCARBONS (mg/L)**		
57	51	**Method OR-DEQ**		
58	52	**TPH-Diesel**	NA	
59	53	**TPH-D Motor Oil**	NA	
60	54	**TPH-Gasoline**	NA	
61	55			
62	56	**PRIORITY POLLUTANT**		
63	57	**METALS (mg/L)**		
64	58	Arsenic (7060)	**0.005**	
65	59	Chromium (6010)	**0.035**	

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			PZ-1	
4			EM65E	
5			6/24/02	
66	60	Copper (6010)	**0.011**	
67	61	Lead (7421)	**0.001**	
68	62	Nickel (6010)	**0.04**	
69	63	Zinc (6010)	**0.087**	
70	64			
71	65	**MAJOR IONS AND CONVENTIONALS**		
72	66	Calcium (mg/L) (6010)	**42.3**	
73	67	Magnesium (mg/L) (6010)	**13.6**	
74	68	Potassium (mg/L) (6010)	**3.3**	
75	69	Sodium (mg/L) (6010)	**5.25**	
76	70	Alkalinity (mg/L CaCO3) (SM 2320)	**180**	
77	71	Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	1.0	U
78	72	Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	**180**	
79	73	Total Dissolved Solids (mg/L) (EPA 160.1)	**250**	
80	74	Chloride (mg/L) (EPA 325.2)	NA	
81	75	N-Nitrate (mg-N/L) (Calculated)	NA	
82	76	N-Nitrite (mg-N/L) (EPA 354.1)	NA	
83	77	Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	
84	78	Sulfate (mg/L) (EPA 375.2)	NA	
85	79			

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			PZ-1	
4			EM65E	
5			6/24/02	
6				
86	80	**FIELD PARAMETERS**		
87	81	pH (avg)	6.02	
88	82	Temperature (° C) (avg)	15.3	
89	83	Conductivity (um/hos)	278	
90	84	Dissolved oxygen (mg/L) (avg)	5.09	
91	85			
92	86	**DIOXINS AND FURANS (ng/L)**		
93	87	**Method 8290**		
94	88	2,3,7,8-TCDF	NA	
95	89	Total TCDF	NA	
96	90	2,3,7,8-TCDD	NA	
97	91	Total TCDD	NA	
98	92	1,2,3,7,8-PeCDF	NA	
99	93	2,3,4,7,8-PeCDF	NA	
100	94	Total PeCDF	NA	
101	95	1,2,3,7,8-PeCDD	NA	
102	96	Total PeCDD	NA	
103	97	1,2,3,4,7,8-HxCDF	NA	
104	98	1,2,3,6,7,8-HxCDF	NA	
105	99	2,3,4,6,7,8-HxCDF	NA	
106	100	1,2,3,7,8,9-HxCDF	NA	
107	101	Total HxCDF	NA	
108	102	1,2,3,4,7,8-HxCDD	NA	
109	103	1,2,3,6,7,8-HxCDD	NA	
110	104	1,2,3,7,8,9-HxCDD	NA	
111	105	Total HxCDD	NA	
112	106	1,2,3,4,6,7,8-HpCDF	NA	
113	107	1,2,3,4,7,8,9-HpCDF	NA	
114	108	Total HpCDF	NA	
115	109	1,2,3,4,6,7,8-HpCDD	NA	
116	110	Total HpCDD	NA	
117	111	OCDF	NA	
118	112	OCDD	NA	
119				
120		**ETHANOL (mg/L)**	NA	
121				

TABLE F-10
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS - SHALLOW WELLS
DETECTED CONSTITUENTS
APRIL 1997 - AUGUST 2002
TIME OIL - NORTHWEST TERMINAL

	A	B	C	D
1				
2				
3			PZ-1	
4			EM65E	
5			6/24/02	
121				
122		**PAHs (µg/L)**		
123		**EPA Method SW8270 SIM**		
124		Naphthalene	NA	
125		2-Methylnaphthalene	NA	
126		Acenaphthylene	NA	
127		Acenaphthene	NA	
128		Fluorene	NA	
129		Anthracene	NA	
130		Dibenzofuran	NA	

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LANDAU ASSOCIATES

April 9, 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the March 2003 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rhenda J Norr

For Rebekah Brooks
Project Manager

S:\WPROC\231\001\038\DEQ-March03 ltr doc
Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
March 2003

SUMMARY OF WORK PERFORMED

- Prepared and submitted the February 2003 monthly report to DEQ.
- Continued operation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 10.3 gpm. HRW-1 did not operate during February. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 4.7 gpm. A total of approximately 10.9 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 624,800 gallons treated in February 2003.
- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system. Requested information from subcontractor regarding redevelopment of HRW-1.
- Continued internal review of the ISCO pilot study report.
- Collected semi-annual sample of treated stormwater.
- Installed spill containment berm in the bioreactor room of the wastewater treatment system building at the terminal.
- Collected baseline groundwater samples from the four lines of manifold piping installed in the former PCP mixing area. At the time of sampling, approximately 1 ft of upper zone groundwater was observed above the piping.
- Begin preparation of design for use of an air sparging system in the former PCP mixing area.
- Submitted the 3rd quarter 2002 groundwater monitoring and groundwater interim action status report to DEQ.
- Continued preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report.
- Began processing and validation of the 1st quarter 2003 groundwater data.
- Continued preparation of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report.*
- Submitted the *East Property Remedial Action Completion Report* to DEQ. At DEQ's request, provided additional backup information on statistical evaluations conducted for the completion report.
- Submitted the well abandonment work plan for the east property monitoring wells to DEQ.
- Incorporated client review comments on the draft technical memorandum for interim subsurface investigations in the Phase III study area, including the CPT investigation.

BZTO104(e)017548

RESULTS COLLECTED

- First quarter 2003 groundwater data. Laboratory data reports and data validation report will be provided to DEQ with the *First Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report.*

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- None.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and of the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Conduct redevelopment of HRW-1.
- Complete preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report and provide to client for review
- Begin preparation of the 1st quarter 2003 groundwater monitoring and groundwater interim action status report.
- Complete internal and client reviews of the ISCO pilot study report and submit to DEQ.
- Install spill collection sump, autodialer, and control modifications in the bioreactor room of the wasterwater treatment system building at the terminal.
- Complete preparation and internal reviews of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation and provide to client.
- Continue preparation of a design for an air sparging system in the former PCP mixing area.
- Complete incorporate of client comments on the Phase III CPT investigation technical memorandum and submit to DEQ.

BZTO104(e)017549

LANDAU ASSOCIATES

RECEIVED MAY 1 2 2003

May 9, 2003

Mr. Tom Roick
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil, attached is the April 2003 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
5/9/03 \\Edmnas\wproc\231\TRANSMIT FAX\Monthly Rpt_Ltr doc

Enclosure

cc: Mr. Kevin Murphy, Time Oil Co.
Ms. Patricia Dost, Schwabe Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
April 2003

SUMMARY OF WORK PERFORMED

- Prepared and submitted the March 2003 monthly report to DEQ.

- Continued operation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 10.3 gpm. HRW-1 did not operate during March. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 1.3 gpm. A total of approximately 11.4 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 481,800 gallons treated in March 2003.

- Continued review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system. Requested information from subcontractor regarding redevelopment of HRW-1.

- Contacted Barbara Priest at DEQ-UIC regarding redevelopment techniques for HRW-1. Received approval of the technique and use of a 10 ppm sodium hypochlorite solution to aid the redevelopment. Conducted redevelopment of HRW-1 using the sodium hypochlorite solution and mechanical jetting/flushing/pumping.

- Continued internal review and revision of the ISCO pilot study report.

- Completed preparation of the 4th quarter 2002 groundwater monitoring and groundwater interim action status report and provided to client for review.

- Began preparation of the 1st quarter 2003 groundwater monitoring and groundwater interim action status report.

- Continued preparation of the *Soil Stockpile and In Situ Excavation Removal Action Completion Report*.

- Provided DEQ with a well abandonment work plan for the east property monitoring wells. Received approval from DEQ on the plan.

- Incorporated client review comments on the draft technical memorandum for interim subsurface investigations in the Phase III study area, including the CPT investigation.

RESULTS COLLECTED

- Baseline groundwater data from the manifold pipe laterals in the former PCP mixing area. PCP concentrations generally ranged from 5 micrograms per liter (µg/L) to 202 µg/L. The data indicate that the highest concentration of PCP in the groundwater smear zone is likely located beneath the former PCP warehouse footprint. The validated groundwater results will be provided to DEQ with a work plan for conducting additional remediation using air sparging or soil vapor extraction (depending on groundwater conditions) and for installing monitoring wells to replace some of those abandoned for the soil removal action in the former PCP mixing area.

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PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- Following redevelopment of HRW-1 using the sodium hypochlorite solution and mechanical jetting/flushing/pumping, sand was observed in the well and pump. Because the amount of sand was not substantial, the well contractor believes that the sand is passing through the filter fabric that lines the well screen. An assessment of whether the pump is damaged due to the sand in the well is planned.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Continue implementation of the groundwater interim action in the lower zone at RW-2 and of the groundwater intercept system at the storm drain. Continue treatment and discharge to POTW. Continue review of the system operations performance for the groundwater interim action system at RW-2 and HRW-1 and the onsite wastewater treatment system.
- Assess sand in well and pump at HRW-1.
- Incorporate client comments on the 4th quarter 2002 groundwater monitoring and groundwater interim action status report and submit to DEQ.
- Continue preparation of the 1st quarter 2003 groundwater monitoring and groundwater interim action status report and provide to client.
- Complete internal and client reviews of the ISCO pilot study report and submit to DEQ.
- Install spill collection sump, autodialer, and control modifications in the bioreactor room of the wasterwater treatment system building at the terminal.
- Complete preparation and internal reviews of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation and provide to client.
- Prepare a work plan outlining a design and procedures for conducting air sparging or soil vapor extraction (SVE), depending on groundwater conditions, using the pipeline laterals in the former PCP mixing area, and for drilling and installing monitoring wells to replace some of the wells abandoned during the soil removal action in this area.
- Prepare the annual stormwater discharge monitoring report (DMR) for the terminal for submittal to DEQ and the city of Portland.
- Complete incorporation of client comments on the Phase III CPT investigation technical memorandum and submit to DEQ.
- Receive a no further action (NFA) determination from DEQ for the east property.

BZTO104(e)017552

Fourth Quarter 2002
Groundwater Monitoring and
Groundwater Interim Action Status Report
Time Oil Northwest Terminal
Portland, Oregon

May 9, 2003

Prepared for

Time Oil Co.
2737 W. Commodore Way
Seattle, WA 98199

LANDAU ASSOCIATES
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1.0 INTRODUCTION

This report provides the results of the fourth quarter 2002 groundwater sampling event and the performance and status of the groundwater interim action system at the Time Oil Northwest Terminal (terminal) in Portland, Oregon. The fourth quarter 2002 sampling event was conducted on November 11 through November 13, 2002, as part of the Phase II remedial investigation (RI) at the terminal. This report summarizes groundwater elevation and groundwater quality data, transmits analytical laboratory data packages and the associated data validation report, and presents an evaluation of the fourth quarter 2002 (October 1 – December 31, 2002) data relative to compliance with performance criteria for ongoing implementation of the groundwater interim action in the upper and lower water-bearing zones.

The terminal, located in the industrialized Rivergate area of North Portland, Oregon (Figure 1), is a former bulk petroleum storage and transfer facility owned by Time Oil Co. (Time Oil). Time Oil ceased operations at the terminal on October 31, 2001. Quarterly groundwater monitoring has been conducted at the terminal since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The groundwater monitoring locations at the terminal are shown on Figure 2. Modifications to the groundwater quality sampling and analysis requirements, as approved by the Oregon Department of Environmental Quality (DEQ), are documented and referenced in Appendix A.

The chemical analyses conducted during this sampling event for each groundwater sampling location are summarized in Appendix B, Table B-1. Groundwater level measurements collected at the terminal for the fourth quarter 2002 event and for the previous quarterly events since March 1997 are provided in Appendix B, Table B-2. Groundwater quality data for the fourth quarter 2002 event are provided in Tables B-3 and B-4 for the shallow and deep wells, respectively. A summary of the fourth quarter 2002 groundwater interim action recovery data is provided in Appendix C. The data validation report for the fourth quarter 2002 data is provided in Appendix D. Laboratory data packages for these data are provided in Appendix E.

As requested by DEQ, a summary of the quarterly water quality data (detected constituents) since March 1997 for the shallow and deep wells is provided on computer diskette in zipped format (attached). These tables will continue to be updated following each quarterly event and will be provided to DEQ electronically.

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2.0 FOURTH QUARTER 2002 GROUNDWATER SAMPLING EVENT

The fourth quarter 2002 groundwater sampling event was conducted from November 11 through November 13, 2002. The quarterly event included measurement of levels at existing monitoring wells and well points, recovery wells, and a river gauge established on the south side of the dock extending into the Willamette River (Figure 2); measurement of product thickness in wells, if observed; and collection of groundwater quality samples. The fourth quarter event included sampling of all monitoring wells routinely included in the quarterly sampling program; wells monitored as part of the groundwater interim action (LW-13S, LW-14D, LW-17D, LW-18D, and RW-2); and monitoring wells associated with the *In Situ* Chemical Oxidation (ISCO) pilot study (OX-1S, OX-2S, OX-3S, and OX-4S, and RW-1). The ISCO monitoring wells were sampled on October 29, 2002. A summary of the wells sampled for the fourth quarter 2002 event and the types of analyses conducted at each sample location are provided in Table B-1. This section presents a summary of the results for the groundwater level measurements and groundwater quality sampling, and provides an evaluation of groundwater flow and contaminant occurrence and trends. The performance and status of the groundwater interim action is discussed in Section 3.0.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the fourth quarter 2002 event on November 13, 2002. Each well was also checked for the presence of product. The measurement and evaluation procedures and the evaluation results are provided in the following sections. The groundwater measurement locations are shown on Figure 2. Groundwater level measurements conducted for the quarterly groundwater sampling events since March 1997 are provided in Table B-2. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided in the Phase II RI report (Landau Associates 2000c).

For evaluation purposes, the groundwater level measurements were converted from depth-to-water readings to groundwater elevations using the survey information for each location. At locations where product was observed (See Section 2.1.2), the groundwater elevations were adjusted to account for the presence of product using the method defined by Lenhard and Parker (1990). Groundwater elevations for the upper and lower zones were contoured using GIS/Key or manually to evaluate the capture zone of the groundwater interim action for the upper and lower zones. Groundwater elevation contour maps for the upper and lower zones are shown on Figures 3 and 4, respectively.

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2.1.1 MEASUREMENT PROCEDURES

Groundwater level measurements and the check for the presence of product were conducted using an electronic oil-water interface probe. Measurements were taken from the top of the PVC well casing at a marked survey point or at the north side of the casing, and recorded to the nearest 0.01 ft. Measurements in the Willamette River were taken from a surveyed PK nail with washer located on the south side of the dock. Surveyed reference elevations for each water level measurement location, obtained by a licensed land surveyor (ZTec Engineers, Inc., Portland, Oregon), are shown in Table B-2.

Water level measurements for the fourth quarter 2002 event were obtained over about a 2.25-hour period beginning at about 2.5 hours after a predicted mean river stage, based on predictions for the St. Johns station on the Willamette River. The timing for water level measurements was scheduled to estimate a mean water level elevation or an elevation minimally influenced by river stage, and to reduce the time-dependent variation between wells screened in the same water-bearing zone. The timing of the water level measurements was based on average time lag calculations presented in the additional groundwater investigation technical memorandum (Landau Associates 1998b), aquifer test report (Landau Associates 1999c), and previous quarterly measurements.

2.1.2 PRODUCT MEASUREMENTS AND PRODUCT RECOVERY

During the fourth quarter 2002 event, measurable product was noted at monitoring wells P, Q, and N. Product thickness measurements ranged from 0.01 ft to 0.04 ft. Recovery efforts were not performed due to the small volumes of product present in these wells. Monitoring of these wells and all site monitoring wells for the presence of product will continue for future quarterly monitoring events.

2.1.3 UPPER WATER-BEARING ZONE

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper zone. Groundwater elevation contours for the upper zone are presented on Figure 3. The groundwater elevation contours indicate that groundwater flow in the upper zone across the terminal is generally to the west-southwest toward the Willamette River. A localized shift in groundwater flow to the south in an area southwest of the former PCP mixing area may be due to the influence of the east-west trending storm drain located about 170 ft north of the southern property boundary (Figure 2). The groundwater flow pattern observed in the upper zone does not vary significantly from the patterns seen over the previous years of monitoring. As discussed in Section 3.0, HRW-1 did not operate during this quarter. Groundwater elevation decreases in the upper zone throughout the site since the first quarter of 2002 can be attributed to seasonal fluctuation of the groundwater table.

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2.1.4 LOWER WATER-BEARING ZONE

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower zone. Groundwater elevation contours for the lower zone are presented on Figure 4. RW-2 pumped continuously during the fourth quarter 2002, except for periodic shutdowns for system maintenance. The contours indicate that pumping of recovery well RW-2 for the groundwater interim action has modified groundwater flow in the lower zone in proximity to the pumping well, such that hydraulic capture extends west to the area near LW-18D and to the south to LW-10D. Groundwater flow outside the RW-2 capture zone is generally to the west toward the Willamette River. The groundwater flow observed during this quarterly event is characteristic of the trend seen since the startup of RW-2 in October 2000.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the fourth quarter 2002 event on November 11 through November 13, 2002. The wells sampled consisted of 15 upper zone wells and 16 lower zone wells. Monitoring wells LW-9S and LW-10S were dry and not sampled as part of this event. Except as shown in Table B-1, all groundwater samples were analyzed for the following quarterly constituents: semivolatile organic compounds [SVOCs; U.S. Environmental Protection Agency (EPA) Method 8270]; pentachlorophenol (PCP; EPA Method 8270 SIM); volatile organic compounds (VOCs; EPA Method 8260); six priority pollutant metals (arsenic, chromium, copper, lead, nickel, and zinc; EPA Methods 6010/7000 series); chloride (EPA Method 325.2); total dissolved solids (TDS; EPA Method 160.1); and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, groundwater from eight monitoring wells was analyzed for diesel-range total petroleum hydrocarbons (TPH; NWTPH-D). Samples from wells B-1, LW-8S, LW-11S, RW-1, and RW-2 were also analyzed for TPH in the gasoline and motor oil ranges (NWTPH-G and NWTPH-Dx). Laboratory analyses were conducted by Analytical Resources, Inc. (ARI, Seattle, Washington).

Analytical results for the fourth quarter 2002 event are provided in Tables B-3a through B-3f for the upper zone wells and Tables B-4a through B-4f for the lower zone wells. The results are discussed in the following sections. In the summary discussions below, the listed results refer to the maximum concentration for a particular constituent where field duplicate results are available or where specific constituents are analyzed using more than one analytical method for the ISCO monitoring events (e.g., PCP using EPA Method 8270 and Method 8040). Data qualifier definitions (e.g., J, M, etc.) are included in Table B-5.

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2.2.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected from the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled using disposable bailers, except for RW-2, which was sampled from the in-line sampling port on the groundwater interim action system. Wells were purged using a peristaltic pump or a centrifugal purge pump. Purging continued until at least 3 casing volumes of water had been removed and specific conductance and temperature had stabilized or until the well purged dry. Four replicate measurements of field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing of VOCs during sampling, the pumping rate was maintained below about 100 ml/min. All sampling was conducted in accordance with the Phase I/II RI/FS work plan (Landau Associates 1996) and appropriate provisions of the revised quality assurance project plan and project health and safety plan (Landau Associates 2001c). A more detailed description of groundwater sampling procedures is provided in the Phase II RI report (Landau Associates 2000c).

2.2.2 UPPER WATER-BEARING ZONE

The groundwater quality results from the upper zone indicate the following:

- PCP was detected in samples from wells LW-11S and RW-1 using EPA Method 8270 with concentrations of 2,200 µg/L and 5,400 µg/L, respectively. Using EPA Method 8270 SIM and EPA Method 8040, PCP was detected at nine wells (J1, LW-4S, LW-11S, LW-13S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 0.49 µg/L (LW-13S) to 3,700 µg/L (LW-11S).

- Naphthalene, a noncarcinogenic polycyclic aromatic hydrocarbon (PAH), was detected in samples from five wells (J1, LW-7S, LW-8S, LW-11S, RW-1) with concentrations ranging from 1 to 11 µg/L, using Method 8270. Naphthalene was detected at nine wells (B1, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 5.4 to 99 µg/L using Method 8260.

- Other semivolatile results by EPA Method 8040 were reported as nondetect with the following exceptions:
  - 2,3,4,5-tetrachlorophenol [detected at all ISCO pilot study wells with concentrations ranging from 4.2J µg/L (LW-11S) to 110 µg/L (RW-1)]
  - 2,3,5,6- and 2,3,4,6-tetrachlorophenol [detected at all ISCO pilot study wells with concentrations ranging from 70 µg/L (OX-1S) to 380 µg/L (LW-11S)]
  - 2,3,6-trichlorophenol [detected at all ISCO pilot study wells with concentrations ranging from 0.28 µg/L (OX-2S) to 1.3J µg/L (OX-3S)]

- 2,4,6-trichlorophenol [detected at all ISCO pilot study wells except OX-2S, with concentrations ranging from 1.1 µg/L (OX-1S) to 2.7J µg/L (OX-4S)]

- All other semivolatile results were reported as nondetect with the following exceptions:
  - 2-methylnaphthalene [detected at three wells (LW-8S, LW-11S, and RW-1) with concentrations ranging from 2.8 µg/L to 25 µg/L]
  - phenol (detected at well RW-1 at a concentration of 10 µg/L).

- Several volatile compounds were detected in the upper zone wells including:
  - 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene [detected at ten wells (B1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with individual concentrations ranging from 1.2 µg/L (LW-7S) to 580 µg/L (OX-4S)]
  - 2-butanone [detected at five wells (LW-7S, LW-11S, OX-1S, OX-3S, and RW-1) with concentrations ranging from 5.4 µg/L (OX-1S) to 47 µg/L (RW-1)]
  - 4-isopropyltoluene [detected at seven wells (LW-7S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 1.1 µg/L (LW-7S) to 24 µg/L (OX-4S)]
  - acetone [detected at seven wells (LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 7.2 µg/L (LW-8S) to 240 µg/L (OX-3S)]
  - benzene [detected at eight wells (B1, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 1.1 µg/L (OX-2S) to 94 µg/L (OX-3S)]
  - chloroethane [detected at one well (LW-7S) at a concentration of 1.4M µg/L]
  - carbon disulfide [detected at one well (OX-4S) at a concentration of 1.3 µg/L]
  - chloromethane [detected at three wells (LW-7S, LW-8S, and RW1) with concentrations ranging from 1.5 (LW-8S and RW1) to 2.7 µg/L (LW-8S)]
  - ethylbenzene [detected at ten wells (B1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 4.8 µg/L (LW-4S) to 330 µg/L (OX-4S)]
  - isopropylbenzene [detected at eleven wells (B1, J1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 3.5 µg/L (J1) to 180 µg/L (LW-8S)]
  - m-, p-, and o-xylene [detected at ten wells (B1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with total xylene concentrations ranging from 9.7 (LW-4S) to 1,250 µg/L (OX-4S)]
  - n-butylbenzene [detected at nine wells (B1, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 2.2 µg/L (B1) to 25M µg/L (OX-4S)].
  - n-propylbenzene [detected at eleven wells (B1, J1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 4.9 µg/L (J1) to 160 µg/L (LW-8S)]

- sec-Butylbenzene [detected at ten wells (B1, LW-4S, LW-7S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 2 (LW-4S) to 24 µg/L (LW-8S)].
- tert-Butylbenzene [detected at four wells (LW-8S, LW-11S, OX-2S, and RW-1) with concentrations ranging from 1.3M µg/L (LW-11S) to 7.6 µg/L (LW-8S)]
- toluene [detected at six wells (B1, LW-11S, OX-1S, OX-3S, OX-4S, and RW-1) with concentrations ranging from 1.3 µg/L (LW-11S) to 61 µg/L (B1)]

- Gasoline-range TPH concentrations were detected at each well where analyzed (B1, LW-8S, LW-11S, and RW-1) with concentrations ranging from 2.4 mg/L (B1) to 18 mg/L (RW-1).

- Diesel-range TPH was detected at all upper zone wells analyzed with concentrations ranging from 0.5 mg/L (LW-7S) to 13 mg/L (RW-1).

- Motor oil-range TPH was not detected in any of the four samples analyzed.

- At least one priority pollutant metal was detected in each upper zone well as follows:
  - Chromium [detected at three wells (B1, LW-4S, RW-1) with concentrations ranging from 0.013 mg/L (RW-1) to 0.07 mg/L (LW-4S)]
  - Copper [detected at four wells (B1, K, LW-4S, RW-1) with concentrations ranging from 0.006 mg/L (K) to 0.163 mg/L (LW-4S)]
  - Lead [detected at two wells (B1 and LW-4S) with concentrations of 0.03 and 0.04 mg/l, respectively)
  - Nickel [detected at five wells (B1, K , LW-4S, LW-11S, RW-1) with concentrations ranging from 0.02 mg/L (RW-1) to 0.12 mg/L (LW-11S)]
  - Zinc [detected at seven wells (B1, J1, K, LW-4S, LW-8S, LW-11S, and RW-1) with concentrations ranging from 0.006 mg/L (J1) to 0.17 mg/L (LW-4S)].

In summary, the analytical results from the upper zone wells indicate that samples from eleven wells contained detectable concentrations of PCP during the fourth quarter 2002 event. The highest concentration was observed in the samples from wells LW-11S and RW-1 (3,700 and 5,400 µg/L, respectively), which are located downgradient of the former PCP mixing area. The PCP concentration in LW-11S has decreased slightly during the last year from 4,700 µg/L in the first quarter 2002 to 3,700 µg/L this quarter. These concentrations are greater than the historic low concentration detected at this well in the fourth quarter of 2001 (560 µg/L). However, since May 2000, the PCP concentrations in this well have been considerably lower than the maximum concentration observed to date at this location (24,000 µg/L in May 1999). The detected concentration of PCP at well RW-1 during this current quarter (5,400 µg/L) is greater than last quarter (2,600 µg/L). The PCP concentrations detected at RW-1 have been increasing since November 2001, but are still less than the maximum detected at this well (11,000 µg/L) in May 2000 and February 2001. In addition, samples from the ISCO monitoring wells, OX-1S, OX-2S, OX-3S, and OX-4S, which are located downgradient of the former PCP warehouse and between

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LW-11S and RW-1, had PCP concentrations ranging from 200 to 1,200J µg/L. The PCP concentrations detected at well J1 continued to decrease from 3.1 µg/L during the third quarter 2002 to 0.57 µg/L this quarter. The PCP concentration detected in the sample collected from well LW-4S (1.5 µg/L) is less than during the two previous quarterly events (770 and 2,200 µg/L, respectively). Decreases in PCP concentrations at some shallow wells since the previous quarter may be due to the ISCO pilot study injection event in mid-September 2002; the results of this pilot study will be provided in the upcoming Field Pilot Test Report prepared by In-Situ Oxidative Technologies, Inc.

Other semivolatile compounds were detected at low concentrations, but most detections were less than 10 µg/L and none were greater than 70 µg/L (2,3,5,6- and 2,3,4,6-tetrachlorophenol at well OX-1S). The highest concentrations of volatile compounds (benzene; toluene; ethylbenzene; m-, p-, and o-xylene; and 1,2,4-trimethylbenzene) were detected in samples collected at wells B1, LW-4S, LW-8S, LW-11S, OX-1S, OX-2S, OX-3S, OX-4S, and RW-1. No TPH detection was greater than 18 mg/L (TPH-G at well RW-1). The highest concentrations of metals were detected in samples collected at wells B1 and RW-1.

2.2.3 LOWER WATER-BEARING ZONE

The groundwater quality results for samples collected from wells screened in the lower water-bearing zone indicate the following:

- Groundwater from five wells (J2, LW-1D, LW-3D, LW-9D, and LW-11D) contained only low detected concentrations of metals.
- PCP was detected only in two samples, from well RW-2 at 37 µg/L using EPA Method 8270, and from well LW-10D at 0.47 µg/L using EPA Method 8270 SIM.
- Naphthalene, a noncarcinogenic PAH, was detected in the sample collected from well RW-2 at a concentration of 4.1 µg/L using EPA Method 8270 and at 6.3 µg/L using EPA Method 8260.
- Other semivolatile sample results were reported as nondetect for lower zone wells with the following exceptions:
  - 2-methylnaphthalene (detected at well RW-2 at a concentration of 11 µg/L)
  - diethyl phthalate [detected at two wells (B2 and G1A) at concentrations of 1.4 and 5M µg/L, respectively]
  - fluorene (detected at well O at a concentration of 2.1 µg/L)
- Several volatile compounds were detected at low concentrations, including:
  - 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (detected at well RW-2 at concentrations of 9.8 and 37 µg/L, respectively)
  - 4-isopropyltoluene (detected at well RW-2 at a concentration of 1.3 µg/L)

- acetone [detected at two wells (LW-6D and LW-11D) at concentrations of 16 µg/L and 31 µg/L, respectively]
- benzene [detected at three wells (O, R, and RW-2) with concentrations ranging from 3.4 µg/L (RW-2) to 40 µg/L (O)]
- ethylbenzene (detected at well RW-2 at a concentration of 7.9 µg/L)
- isopropylbenzene [detected at six wells (G1A, LW-4D, LW-6D, O, R, and RW-2) with concentrations ranging from 3.4 µg/L (LW-6D) to 150 µg/L (G1A)]
- toluene [detected at two wells (O and R) at concentrations of 2.5 µg/L and 1.6 µg/L, respectively)
- m-, p-, and o-xylene [detected at three wells (O, R, and RW-2) with total concentrations ranging from 1.4 µg/L (R) to 17 µg/L (RW-2)]
- methyl chloride (detected at well G1A at a concentration of 1.4 µg/L)
- n-butylbenzene [detected at five wells (G1A, LW-4D, O, R, and RW-2) with concentrations ranging from 1.1M µg/L (LW-4D) to 11M µg/L (G1A)]
- n-propylbenzene [detected at five wells (G1A, LW-4D, O, R, and RW-2) with concentrations ranging from 4.2 µg/L (LW-4D) to 130 µg/L (G1A)]
- sec-butylbenzene [detected at six wells (G1A, LW-4D, LW-6D, O, R, and RW-2) with concentrations ranging from 1.3 µg/L (LW-4D) to 18 µg/L (G1A)]
- tert-butylbenzene [detected at three wells (G1A, LW-6D, and RW-2) with concentrations ranging from 1.6 µg/L (RW-2) to 3.7 µg/L (G1A)].

- Diesel-range TPH concentrations were detected at five (G1A, LW-4D, LW-6D, LW-11D, and RW-2) of the seven lower zone wells analyzed with concentrations ranging from 0.8 mg/L (LW-11D) to 4.4 mg/L (G1A).

- Gasoline-range and motor-oil range TPH analyses were conducted on the sample from well RW-2; only gasoline-range TPH was detected at a concentration of 2.4 mg/L. The motor oil-range concentration at LW-10D was nondetect.

- At least one priority pollutant metal was detected in each lower zone well as follows:
  - Chromium [detected at three wells (G1A, LW-10D and LW-11D) with concentrations ranging from 0.008 mg/L (G1A) and 0.032 mg/L (LW-11D)]
  - Copper [detected at seven lower zone wells (G1A, LW-1D, LW-3D, LW-4D, LW-10D, LW-11D, RW-2) with concentrations ranging from 0.002 mg/L (LW-3D) to 0.034 mg/L (LW-11D)]
  - Nickel [detected at three wells (G1A, LW-10D, and LW-11D) with concentrations ranging from 0.01 mg/L (G1A, LW-10D) to 0.05 mg/L (LW-11D)]
  - Zinc [detected at eight wells (G1A, J2, LW-1D, LW-4D, LW-9D, LW-10D, LW-11D, RW-2) with concentrations ranging from 0.008 mg/L (LW-9D) to 0.096 mg/L (LW-11D)].

In summary, the fourth quarter 2002 analytical results for samples from the lower zone wells indicate that PCP was detected only at wells RW-2 (37 µg/L) and LW-10D (0.47 µg/L). The detection of

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PCP at LW-10D was the first occurrence at this location and may reflect the temporary shutdown of recovery well RW-2 during September 2002 for installation of the stormwater intercept system (see Section 3.0). None of the other semivolatile organic compounds detected were at concentrations greater than 11 µg/L (2-methylnapthalene at RW-2). The highest concentrations of VOCs detected were in the samples collected from wells G1A and RW-2; however, none of the detected concentrations were greater than 150 µg/L (isopropylbenzene at G1A). None of the detected concentrations of TPH were greater than 4.4 mg/L (diesel-range TPH at G1A). The highest concentrations of metals were detected in the samples collected from wells G1A, LW-10D, and LW-11D.

2.2.4 WATER LEVEL AND CONTAMINANT TRENDS

Potential trends between water levels and the detected concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the period covered by the Phase II RI quarterly sampling events (March 1997 through the current quarterly event). Plots of PCP concentrations (maximum concentration of EPA Methods 8270 and 8040 for events prior to the second quarter 2001 event and since ISCO monitoring began in June 2002) versus time for selected upper zone wells (LW-4S, LW-11S, LW-13S, and RW-1); selected lower zone wells (LW-4D, LW-11D, and RW-2); and nested wells (LW-4S and LW-4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-4S and LW-11S versus time are shown on Figures 8 and 9. Figure 10 shows groundwater elevations and PCP concentrations at lower zone well LW-4D plotted with the Willamette River stage.

As shown on Figure 5, PCP concentrations in the selected upper zone wells show variable concentration trends over time (note the logarithmic scale). As discussed in previous quarterly reports, PCP concentrations at well RW-1 decreased between May and November 2001 from a high of 11,000 µg/L to a low of 17 µg/L, but have shown an increasing trend since then to the most recent concentration of 5,400 µg/L. The PCP concentration at LW-13S increased to about 10 µg/L between May 2000 and July 2001, was nondetect between the fourth quarter 2001 and third quarter 2002 events and increased slightly to 0.49 µg/L during this event. The PCP concentrations in LW-11S have continued to decrease during the last year. PCP concentrations in well LW-4S, located slightly south of the east-west trending storm drain, have been variable over time with spikes in the concentrations occurring in November 1998 (4,200 µg/L), August 2000 (9,400 µg/L), and June 2002 (2,200 µg/L). Initially, as reported in previous quarterly reports, these spikes in PCP concentrations appeared anomalous, but, after further review over time, they appear to be related to periodic downgradient migration of PCP from the source areas due to seasonal precipitation events (Figure 8). As a result of the ISCO pilot test injection

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events, upper zone groundwater concentrations initially decreased within the area of the PCP plume; however, the fourth quarter 2002 results indicated that concentrations had rebounded at RW-1 and OX-2S. It is anticipated that full-scale implementation of the ISCO technique will be effective in permanently reducing upper zone groundwater PCP concentrations.

As shown on Figure 6 (note the logarithmic scale), PCP concentrations in the lower zone generally decreased over time, except at RW-2 where concentrations decreased from 630 to 0.68 µg/L between September 2000 and June 2001, but increased to 76 µg/L between June 2001 and June 2002. This quarter, PCP concentrations remained relatively the same compared to the previous quarterly event (36J and 37 µg/L, respectively). The increase in PCP concentrations over time at RW-2 is likely related to operation of the well for groundwater recovery, thus inducing flow of contaminated groundwater toward this location.

As in previous quarters, PCP concentrations detected this quarter at selected lower zone well locations where PCP has historically been detected are generally lower than the concentrations in the upper zone wells at the same location or similar locations. The PCP concentration trends for nested wells LW-4S and LW-4D (Figure 7) indicate that contamination observed in the lower zone at this location does not appear to be related to the upper zone at the same location, except possibly between December 1999 to November 2001. Overall, PCP concentrations at lower zone well LW-4D have decreased over time with nondetect concentrations mainly observed since groundwater recovery began at nearby well RW-2; however, at adjacent upper zone well LW-4S, intermittent spikes in PCP concentration have been observed, as discussed earlier. In addition, the lower zone concentrations were typically greater than upper zone concentrations before May 1999, but since that time, the upper zone concentrations are higher when the concentrations at the wells are different.

Fluctuations in groundwater elevations in the upper zone reflect typical seasonal variability with seasonal lows during the fall months (October-November) and seasonal highs during the winter and early spring months (January-March) since monitoring began in March 1997. The groundwater levels during the past year are similar to those observed during 2000, except for this quarter which had the lowest upper zone groundwater elevations measured to date at the terminal. The lack of measurable product at well LW-11S during this quarter when groundwater levels are lowest varies from previous events when product was measured and may reflect successful removal of PCP from the soil resulting from the ISCO injection. Figure 8 shows that PCP concentrations in the upper zone at well LW-11S generally follow the water level trends in that zone over time. However, as shown on Figure 9, there does not appear to be a direct correlation between the water levels and PCP concentrations in the upper zone at well LW-4S. As discussed earlier, the spikes in PCP concentrations at LW-4S appear to be related to seasonal trends in PCP concentrations at locations upgradient and within the source areas, and subsequent migration

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downgradient. In the lower zone, groundwater levels show similar trends with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at LW-4D with river stage on Figure 10. However, there appears to be no correlation between PCP concentrations and groundwater/river stage elevations at LW-4D.

Contaminant and groundwater level trends will continue to be evaluated and discussed for future quarterly events.

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3.0 GROUNDWATER INTERIM ACTION

This section presents a summary of the performance and status of the groundwater interim action system at the terminal for the fourth quarter of 2002 (October 1 – December 31, 2002). System operation data for the groundwater interim action were evaluated in accordance with the startup monitoring plan (Landau Associates 2000d) to determine fourth quarter 2002 compliance with performance criteria for the upper zone and the lower zone at the terminal. Specific performance criteria include: 1) groundwater recovery from an upper zone recovery well (HRW-1) when pump is operating or when sufficient groundwater is present in the upper zone; 2) continuous pumping from a lower zone recovery well (RW-2), except for brief periods of system maintenance (or as described below); 3) groundwater flow toward HRW-1 and RW-2 from the downgradient and upgradient directions; 4) reversal of the lower zone groundwater flow direction at the leading edge of the PCP plume; 5) chemical confirmation that continued migration of PCP in groundwater downgradient of RW-2 and HRW-1 is not occurring; and 6) compliance with the requirements of the existing discharge permit. In addition to the six criteria listed above, information is also presented in this section related to the operation of a groundwater recovery system implemented in a storm drain at the site.

Specific operational information for the fourth quarter 2002 as it relates to the issues identified above is provided as follows:

1) During the fourth quarter 2002, no groundwater was extracted from HRW-1. As stated in the previous quarterly report, the pump in HRW-1 was pulled on August 2, 2002 and observations indicated that there was likely biofouling on the pump and in the well. It appears that the well was "plugged" and not allowing water in the upper zone to enter the horizontal well at a rate sufficient to maintain pumping. Currently, we are continuing to assess the value of controlling the biological growth in HRW-1 in comparison with the potential full-scale implementation of the ISCO treatment program. A summary of historical groundwater recovery for HRW-1 is included in Appendix C, Table C-1.

2) As discussed in section 2.1, groundwater elevation data was collected from the upper zone monitoring wells on November 13, 2002. The groundwater elevation data are summarized in Table B-2 and presented on Figure 3. Because the pump was pulled from HRW-1 in early August, an assessment of the impact of upper zone water elevations from pumping of HRW-1 was not possible during this quarterly monitoring event.

3) With the exception of periodic shutdowns for system maintenance and for installation of the stormwater intercept system (see No. 6 below), groundwater was extracted continuously from the lower zone during the period from October 10 to December 31, 2002 by operating the groundwater recovery pump in RW-2. A total of 871,416 gallons of groundwater were recovered from RW-2 during the fourth quarter of 2002 at an estimated rate of 7.3 gpm. The recovery pump in RW-2 operated for approximately 1,983 hours and discharged water to Tank 16804 for temporary storage until treated by the terminal's wastewater treatment system. A summary of the groundwater recovery for RW-2 is included in Appendix C, Table C-1.

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4) As discussed in Section 2.1, groundwater elevation data was collected from the lower zone on November 13, 2002. The groundwater elevation data are summarized in Table B-2 and presented on Figure 4. Based on the groundwater elevation data collected, the groundwater flow direction has been reversed locally downgradient of the leading edge of the PCP plume in the lower zone near RW-2.

5) As previously discussed in Section 2.2, groundwater samples were collected at the site on November 11 through November 13, 2002. Historically, the extent of groundwater impact has been estimated based on the extent of dissolved-phase PCP. The extent of PCP in the upper and lower zones is depicted on Figures 11 and 12, respectively, based on data collected during the November 2002 groundwater sampling event. The extent of PCP in the upper zone is consistent with previous quarterly events. The lower zone analytical data indicate that monitoring wells downgradient of RW-2 do not exhibit detectable concentrations of PCP, confirming the hydraulic capture of lower zone groundwater in that direction, with one exception. A low level PCP concentration was detected at LW-10D, located at the southern property boundary of the terminal. Because of the shutdown of RW-2 for 15 days in September-October 2002, it is possible that low levels of PCP could have migrated downgradient beyond the RW-2 capture zone; however, PCP groundwater results at this well for the first quarter 2003 were nondetect.

6) Due to the disruption in the operation of HRW-1 and the potential for upper zone groundwater to infiltrate into an east-west trending stormwater drain line located approximately 15 to 20 ft south (downgradient) of HRW-1, a pump was placed in the stormwater manhole (SDM-1) located closest to the point of discharge to the Willamette River. Initially, the pump was installed in SDM-1 on September 16, 2002, after the discharge piping from SDM-1 to the river was temporarily plugged and all of the water (stormwater and groundwater) that entered SDM-1 from the inlet pipe was discharged to Tank 16804 for processing in the onsite wastewater treatment system and discharged to the sanitary sewer. On October 8, 2002, the groundwater intercept system installation in the stormwater drain line was completed. The system consists of an 8-inch diameter polyethylene pipe routed through the stormwater drain line from stormwater manhole SDM-1A through SDM-1 to route "clean" stormwater to the river (Figure 2). Potentially impacted groundwater entering the storm drain pipe between SDM-1A and SDM-1 is collected in SDM-1 and the water is pumped from the manhole to Tank 16804 for processing by the onsite wastewater treatment plant. The details of the groundwater intercept system installed in the stormwater drain line were provided in as-built drawings submitted by Landau Associates to DEQ in a correspondence dated January 13, 2003. Between November 1 and December 31, 2002, approximately 125,000 gallons of groundwater was recorded to be pumped from SDM-1 to Tank 16804 for treatment with an average flowrate of approximately 1.4 gpm.

7) The industrial wastewater discharge permit (City of Portland Permit No. 400.121) for discharge of the extracted groundwater following treatment at the terminal's wastewater treatment plant includes the following discharge limitations:

Parameter	Permitted Limit
PCP	40 micrograms/liter (µg/L)
Benzene	50 µg/L
BETX (benzene, ethylbenzene, toluene, and xylenes)	750 µg/L
pH	5 to 11.5

Samples of the treated groundwater discharged were collected on October 3, 2002 for laboratory analyses of the listed parameters. None of the permitted limits were exceeded. The analytical results for PCP are provided in Appendix C, Table C-1.

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4.0 FUTURE GROUNDWATER TASKS

The first quarter 2003 groundwater sampling event was conducted February 10 through February 14, 2003. The groundwater monitoring and analytical program for the first quarter 2003 event included the following: 1) monitoring at routine quarterly well locations; 2) sampling of annual monitoring well locations including wells H, LW-5S, L and east property wells LW-101S, LW-102S, LW-103S, LW-104S; 3) monitoring of wells LW-13S, LW-14D, LW-17D, W-18D, and RW-2 for evaluation of the groundwater interim action within the lower zone; and 4) sampling of monitoring wells OX-1S, OX-2S, OX-3S, and OX-4S as part of the ongoing ISCO pilot study. The results for the first quarter 2003 groundwater monitoring event and the first quarter groundwater interim action status will be provided in the *First Quarter 2003 Groundwater Monitoring and Groundwater Interim Action Status Report.*

5.0 USE OF THIS REPORT

This quarterly groundwater report has been prepared by Landau Associates for the exclusive use of Time Oil Co. for specific application to the Northwest Terminal. Services for this project were conducted in accordance with the Environmental Services Contract between Time Oil Co. and Landau Associates, Inc. Landau Associates has performed our services in accordance with generally accepted engineering and consulting standards for environmental work in effect at the time and locality services were performed. The reuse of information, conclusions, and recommendations provided herein by Time Oil Co. or others in connection with any site other than the Northwest Terminal without Landau Associates written permission shall be at the sole risk of Time Oil Co. and without liability to Landau Associates.

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APPENDIX A

Summary of Modifications to Quarterly Groundwater Analysis Program

APPENDIX A

SUMMARY OF MODIFICATIONS TO QUARTERLY GROUNDWATER ANALYSIS PROGRAM

A summary of modifications to the quarterly groundwater monitoring program for the Time Oil Northwest Terminal in Portland, Oregon is presented below by the date of first implementation. A reference list for the modifications is attached.

- ***Second Quarter 1998*** (Landau Associates 1998a; DEQ 1998):
  - annual sampling of east property wells LW-101S, LW-102S, LW-103S, and LW-104S
  - elimination of 2-chloroethylvinylether from the volatile analyte list
  - reduction of the suite of metals analyses to include only arsenic, chromium, copper, lead, nickel, and zinc
  - quarterly analysis of only metals in well K and only chlorinated phenols and metals in well H
  - elimination of PCB analysis
  - annual analysis for major ions; quarterly analysis for chloride and dissolved oxygen.
- ***First Quarter 1999*** [Landau Associates 1999a; (verbal approval DEQ 1999)]:
  - analysis of polynuclear aromatic hydrocarbons (PAHs) using analytical techniques that provide lower detection limits at upper zone wells LW-2S, LW-7S and LW-101S and at lower zone wells G1A, O, and LW-4D for the first quarter 1999 event only
  - elimination of sampling at well J3
- ***Second Quarter 2000*** (Landau Associates 2000a; DEQ 2000a):
  - elimination of dioxin/furan analyses
- ***Third Quarter 2000*** (Landau Associates 2000b; Tom Roick, DEQ 2000b):
  - reduction of sampling frequency of wells H, L, and LW-5S from quarterly to annually
- ***Second Quarter 2001*** (Landau Associates 2001a; DEQ 2001b):
  - reduction of the list of chlorinated phenols being analyzed by EPA Method 8040 to pentachlorophenol (PCP) only using EPA Method 8270 SIM
- ***Second Quarter 2001*** (Landau Associates 2001b; Tom Roick, DEQ 2001b):
  - reduction of the frequency of total petroleum hydrocarbon (TPH) analysis from quarterly to annually at upper zone wells J1 and LW-1S; lower zone wells B2, J2, LW-1D; and deep sand unit well LW-12D2. In addition, TPH analysis was eliminated for the following wells: upper zone wells D, L, LW-5S, LW-101S through -104S, and lower zone well LW-3D.

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APPENDIX B

Groundwater Level Measurements And Quality Data

TABLE B-1
GROUNDWATER MONITORING LOCATIONS AND ANALYTICAL METHODS
FOURTH QUARTER EVENT, NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Total Depth	SVOC (8270)	VOC (8260)	PCP (8270 SIM)	PCP (8040) (a)	TPH-D	TPH-DX	TPH-G	PP Metals (6010/7000) (b)	TDS (160.1)	Chloride (325.2)
B1	22.3	X	X	X			X	X	X	X	X
B2	40	X	X	X					X	X	X
D	20	X	X	X					X	X	X
G1A	40	X	X	X		X			X	X	X
J1	20	X	X	X					X	X	X
J2	40	X	X	X					X	X	X
K	20								X		
O	40	X	X								
R	40	X	X								
LW1S	20	X	X	X					X	X	X
LW1D	42.5	X	X	X					X	X	X
LW3D	45	X	X	X					X	X	X
LW4S	20	X	X	X		X			X	X	X
LW4D	41	X	X	X		X			X	X	X
LW6D	37.5	X	X	X		X			X	X	X
LW7S	21	X	X	X		X			X	X	X
LW8S	19	X	X	X			X	X	X	X	X
LW9S (c)	21										
LW9D	40	X	X	X		X			X	X	X
LW10S (c)	20										
LW10D	39.5	X	X	X		X			X	X	X
LW11S	21	X	X	X	X		X	X	X	X	X
LW11D	41	X	X	X		X			X	X	X
LW13S	20.5			X							
LW14D	41.5			X							
LW17D	40			X							
LW18D	40			X							
OX1S	21		X		X						
OX2S	18.5		X		X						
OX3S	18		X		X						
OX4S	20.5		X		X						
RW1	21.5	X	X	X	X		X	X	X	X	X
RW2	44.5	X	X	X			X	X	X	X	X

(a) PCP by EPA Method 8040 was analyzed only for wells sampled on October 29, 2002 for the ISCO pilot study.

(b) Metals analyzed include: arsenic, chromium, copper, lead, nickel, and zinc.

(c) Well dry and not sampled.

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
Shallow Wells:							
B *	03/25/97	----	29.04	NM	----	NM	Couldn't remove cap
B *	03/31/97	----	29.04	NM	----	NM	Couldn't remove cap
B *	07/16/97	08:30	29.04	11.02	18.02	----	
B *	10/21/97	16:35	29.04	13.39	15.65	----	
B *	01/27/98	12:15	29.04	11.53	17.51	----	
B *	05/18/98	17:56	29.04	12.51	16.53	----	
B *	08/17/98	11:02	29.04	14.40	14.64	----	
B *	11/13/98	10:24	29.04	14.38	14.66	----	
B *	02/16/99	13:36	29.04	9.69	19.35	----	
B *	05/18/99	15:52	29.04	11.72	17.32	----	
B *	09/21/99	12:21	29.04	15.18	13.86	----	
B *	12/06/99	14:37	29.04	13.00	16.04	----	
B *	02/16/00	10:57	29.04	11.84	17.20	----	
B *	05/23/00	17:31	29.04	13.22	15.82	----	
B *	08/29/00	14:23	29.04	15.32	13.72	----	
B *	11/09/00	13:31	29.04	15.29	13.75	----	
B *	02/12/01	15:25	29.04	13.68	15.36	----	
B *	06/04/01	12:49	29.04	14.18	14.86	----	
B *	08/16/01	11:54	29.04	15.80	13.24	----	
B *	11/28/01	12:44	29.04	13.80	15.24	----	
B *	02/27/02	14:33	29.04	12.27	16.77	----	
B *	06/27/02	15:05	29.04	13.38	15.66	----	
B *	08/26/02	16:59	29.04	14.02	15.02	----	
B *	11/13/02	09:01	29.04	13.90	15.14	----	
B1	03/25/97	10:48	29.74	----	----	----	Couldn't remove cap
B1	03/31/97	----	29.74	----	----	----	Couldn't remove cap
B1	07/16/97	07:49	29.74	11.01	18.73	----	
B1	10/21/97	16:33	29.74	13.56	16.18	----	
B1	01/27/98	12:10	29.74	11.68	18.06	----	
B1	05/18/98	17:55	29.74	12.76	16.98	----	
B1	08/17/98	11:04	29.74	14.15	15.59	----	
B1	11/13/98	10:21	29.74	15.05	14.69	----	
B1	02/16/99	13:33	29.74	9.59	20.15	----	
B1	05/18/99	15:51	29.74	11.79	17.95	----	
B1	09/21/99	12:19	29.74	14.63	15.11	----	
B1	12/06/99	14:38	29.74	14.25	15.49	----	
B1	02/16/00	10:55	29.74	12.20	17.54	----	
B1	05/23/00	17:32	29.74	13.25	16.49	----	
B1	08/29/00	14:22	29.74	14.93	14.81	----	
B1	11/09/00	13:30	29.74	15.56	14.18	----	
B1	02/12/01	15:26	29.74	15.19	14.55	----	
B1	06/04/01	12:50	29.74	15.06	14.68	----	
B1	08/16/01	11:55	29.74	15.72	14.02	----	
B1	11/28/01	12:45	29.74	15.47	14.27	----	
B1	02/27/02	14:34	29.74	12.15	17.59	----	
B1	03/05/02	11:06	29.74	12.28	17.46	----	
B1	04/05/02	08:42	29.74	12.40	17.34	----	
B1	05/29/02	00:00	29.74	13.20	16.54	----	
B1	06/27/02	15:06	29.74	13.77	15.97	----	
B1	08/26/02	17:00	29.74	14.79	14.95	----	
B1	11/13/02	09:02	29.74	16.00	13.74	----	
C *	03/25/97	12:32	28.89	5.56	23.33	----	
C *	03/31/97	11:38	28.89	6.16	22.73	----	
C *	07/16/97	08:47	28.89	8.28	20.61	----	
C *	10/21/97	15:15	28.89	10.00	18.89	----	
C *	01/27/98	13:41	28.89	7.98	20.91	----	
C *	05/18/98	18:08	28.89	9.54	19.35	----	
C *	08/17/98	11:11	28.89	dry	----	----	
C *	11/13/98	10:36	28.89	10.36	18.53	----	
C *	02/16/99	13:58	28.89	5.91	22.98	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
C *	05/18/99	16:04	28.89	7.90	20.99	----	
C *	09/21/99	12:44	28.89	dry	----	----	
C *	12/06/99	14:50	28.89	9.82	----	----	Water in endcap
C *	02/16/00	09:51	28.89	8.78	20.11	----	
C *	05/23/00	17:55	28.89	dry	----	----	
C *	08/29/00	14:33	28.89	dry	----	----	
C *	11/09/00	13:47	28.89	9.94	18.95	----	Dry?
C *	02/12/01	15:08	28.89	dry	----	----	
C *	06/04/01	13:25	28.89	dry	----	----	
C *	08/16/01	12:11	28.89	dry	----	----	
C *	11/28/01	13:03	28.89	dry	----	----	
C *	02/27/02	14:44	28.89	8.94	19.95	----	
C *	06/27/02	15:36	28.89	dry	----	----	
C *	08/26/02	17:31	28.89	dry	----	----	
C *	11/13/02	09:25	28.89	dry	----	----	
D	03/25/97	12:25	30.04	8.32	21.72	----	
D	03/31/97	11:31	30.04	8.66	21.38	----	
D	07/16/97	08:35	30.04	10.45	19.59	----	
D	10/21/97	17:10	30.04	13.27	16.77	----	
D	01/27/98	13:31	30.04	10.72	19.32	----	
D	05/18/98	17:36	30.04	12.23	17.81	----	
D	08/17/98	10:57	30.04	13.83	16.21	----	
D	11/13/98	09:05	30.04	15.01	15.03	----	
D	02/16/99	13:45	30.04	8.50	21.54	----	
D	05/18/99	15:59	30.04	11.00	19.04	----	
D	09/21/99	12:37	30.04	14.41	15.63	----	
D	12/06/99	14:46	30.04	14.04	16.00	----	
D	02/16/00	09:55	30.04	11.50	18.54	----	
D	05/23/00	12:56	30.04	12.74	17.30	----	
D	08/29/00	14:35	30.04	14.70	15.34	----	
D	11/09/00	13:43	30.04	15.49	14.55	----	
D	02/12/01	15:12	30.04	14.99	15.05	----	
D	06/04/01	12:35	30.04	14.95	15.09	----	
D	08/16/01	11:46	30.04	15.64	14.40	----	
D	11/28/01	12:43	30.04	15.45	14.59	----	
D	02/27/02	14:21	30.04	11.37	18.67	----	
D	03/05/02	11:00	30.04	11.51	18.53	----	
D	04/05/02	08:45	30.04	11.65	18.39	----	
D	05/29/02	00:00	30.04	12.73	17.31	----	
D	06/27/02	15:00	30.04	13.43	16.61	----	
D	08/26/02	17:04	30.04	14.68	15.36	----	
D	11/13/02	09:19	30.04	15.96	14.08	----	
F*	08/18/98	08:10	NA	14.77	NA		
F *							Abandoned August 7-8, 2003
G *	03/25/97	11:57	30.24	14.49	15.75	----	
G *	03/31/97	09:13	30.24	14.01	16.23	----	
G *	07/16/97	07:37	30.24	14.30	15.94	----	
G *	10/21/97	16:20	30.24	dry	----	----	
G *	01/27/98	11:49	30.24	dry	----	----	
G *	05/18/98	17:30	30.24	dry	----	----	
G *	08/17/98	11:06	30.24	dry	----	----	
G *	11/13/98	09:53	30.24	dry	----	----	
G *	02/16/99	13:14	30.24	dry	----	----	
G *	05/18/99	14:50	30.24	dry	----	----	
G *	09/21/99	11:30	30.24	dry	----	----	
G *	12/06/99	14:07	30.24	dry	----	----	
G *	02/16/00	10:19	30.24	dry	----	----	
G *	05/23/00	16:33	30.24	dry	----	----	
G *	08/29/00	13:18	30.24	dry	----	----	
G *	11/09/00	12:30	30.24	dry	----	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
G *	02/12/01	16:02	30.24	dry	----	----	
G *	06/04/01	11:41	30.24	dry	----	----	
G *	08/16/01	10:50	30.24	dry	----	----	
G *	11/28/01	11:33	30.24	dry	----	----	
G *	02/27/02	13:38	30.24	dry	----	----	
G *	06/27/02	14:13	30.24	dry	----	----	
G *	08/26/02	16:05	30.24	dry	----	----	
G *	11/13/02	07:37	30.24	dry	----	----	
H	03/31/97	11:51	27.08	5.42	21.66	----	
H	07/16/97	08:44	27.08	7.29	19.79	----	
H	10/21/97	17:45	27.08	10.08	17.00	----	
H	01/27/98	13:45	27.08	7.56	19.52	----	
H	05/18/98	17:50	27.08	9.06	18.02	----	
H	08/17/98	09:15	27.08	10.68	16.40	----	
H	11/13/98	10:54	27.08	11.84	15.24	----	
H	02/16/99	13:50	27.08	5.35	21.73	----	
H	05/18/99	15:41	27.08	7.78	19.30	----	
H	09/21/99	12:15	27.08	11.23	15.85	----	
H	12/06/99	15:13	27.08	10.91	16.17	----	
H	02/16/00	10:52	27.08	8.28	18.80	----	
H	05/23/00	17:20	27.08	9.48	17.60	----	
H	08/29/00	14:06	27.08	11.55	15.53	----	
H	11/09/00	13:23	27.08	12.34	14.74	----	
H	02/12/01	15:36	27.08	11.88	15.20	----	
H	06/04/01	12:27	27.08	11.81	15.27	----	
H	08/16/01	11:41	27.08	12.57	14.51	----	
H	11/28/01	12:34	27.08	12.39	14.69	----	
H	02/27/02	14:18	27.08	8.14	18.94	----	
H	03/05/02	10:58	27.08	8.28	18.80	----	
H	04/05/02	09:10	27.08	8.45	18.63	----	
H	05/29/02	00:00	27.08	9.38	17.70	----	
H	06/27/02	14:51	27.08	10.25	16.83	----	
H	08/26/02	17:00	27.08	11.54	15.54	----	
H	11/13/02	09:12	27.08	12.83	14.25	----	
J1	03/25/97	12:15	29.70	8.78	20.92	----	Orange/brown algae
J1	03/31/97	11:19	29.70	9.02	20.68	----	
J1	07/16/97	08:22	29.70	10.49	19.21	----	
J1	10/21/97	16:58	29.70	13.10	16.60	----	
J1	01/27/98	13:15	29.70	11.03	18.67	----	
J1	05/18/98	18:01	29.70	12.27	17.43	----	
J1	08/17/98	11:00	29.70	13.78	15.92	----	
J1	11/13/98	10:30	29.70	14.77	14.93	----	
J1	02/16/99	13:37	29.70	8.91	20.79	----	
J1	05/18/99	15:46	29.70	11.19	18.51	----	
J1	09/21/99	12:28	29.70	14.36	15.34	----	
J1	12/06/99	15:07	29.70	13.95	15.75	----	
J1	02/16/00	11:05	29.70	11.67	18.03	----	
J1	05/23/00	17:27	29.70	12.78	16.92	----	
J1	08/29/00	14:14	29.70	14.58	15.12	----	
J1	11/09/00	13:25	29.70	15.30	14.40	----	
J1	02/12/01	15:22	29.70	14.87	14.83	----	
J1	06/04/01	12:39	29.70	14.83	14.87	----	
J1	08/16/01	11:52	29.70	15.48	14.22	----	
J1	11/28/01	12:35	29.70	15.23	14.47	----	
J1	02/27/02	14:30	29.70	11.62	18.08	----	
J1	03/05/02	11:04	29.70	11.76	17.94	----	
J1	04/05/02	08:40	29.70	11.87	17.83	----	
J1	05/29/02	00:00	29.70	12.77	16.93	----	
J1	06/27/02	15:02	29.70	13.40	16.30	----	
J1	08/26/02	16:54	29.70	14.51	15.19	----	
J1	11/13/02	09:00	29.70	15.71	13.99	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
K	03/25/97	12:08	29.42	8.20	21.22	----	
K	03/31/97	09:32	29.42	8.46	20.96	----	
K	07/16/97	08:00	29.42	10.03	19.39	----	
K	10/21/97	16:45	29.42	12.71	16.71	----	
K	01/27/98	12:37	29.42	10.46	18.96	----	
K	05/18/98	17:52	29.42	11.77	17.65	----	
K	08/17/98	10:50	29.42	13.34	16.08	----	
K	11/13/98	10:14	29.42	14.30	15.12	----	
K	02/16/99	13:55	29.42	8.41	21.01	----	
K	05/18/99	15:30	29.42	10.68	18.74	----	
K	09/21/99	12:08	29.42	13.91	15.51	----	
K	12/06/99	14:32	29.42	13.44	15.98	----	
K	02/16/00	10:48	29.42	11.15	18.27	----	
K	05/23/00	17:12	29.42	12.25	17.17	----	
K	08/29/00	13:56	29.42	14.16	15.26	----	
K	11/09/00	13:16	29.42	14.84	14.58	----	
K	02/12/01	15:41	29.42	14.35	15.07	----	
K	06/04/01	12:20	29.42	14.22	15.20	----	
K	08/16/01	11:35	29.42	15.12	14.30	----	
K	11/28/01	12:26	29.42	14.68	14.74	----	
K	02/27/02	14:17	29.42	11.05	18.37	----	
K	03/05/02	10:55	29.42	11.25	18.17	----	
K	04/05/02	08:55	29.42	11.30	18.12	----	
K	05/29/02	00:00	29.42	12.22	17.20	----	
K	06/27/02	14:47	29.42	12.92	16.50	----	
K	08/26/02	17:17	29.42	14.12	15.30	----	
K	11/13/02	09:11	29.42	15.18	14.24	----	
L	03/25/97	12:35	28.10	4.98	23.12	----	
L	03/31/97	11:40	28.10	5.24	22.86	----	
L	07/16/97	08:49	28.10	7.50	20.60	----	
L	10/21/97	15:18	28.10	9.55	18.55	----	
L	01/27/98	13:39	28.10	6.45	21.65	----	
L	05/18/98	18:07	28.10	9.21	18.89	----	
L	08/17/98	11:10	28.10	11.59	16.51	----	
L	11/13/98	10:35	28.10	13.02	15.08	----	
L	02/16/99	13:57	28.10	4.78	23.32	----	
L	05/18/99	16:03	28.10	7.62	20.48	----	
L	09/21/99	12:43	28.10	12.30	15.80	----	
L	12/06/99	14:49	28.10	9.51	18.59	----	
L	02/16/00	09:49	28.10	7.13	20.97	----	
L	05/23/00	17:54	28.10	9.11	18.99	----	
L	08/29/00	14:32	28.10	12.66	15.44	----	
L	11/09/00	13:46	28.10	13.56	14.54	----	
L	02/12/01	15:07	28.10	13.04	15.06	----	
L	06/04/01	13:24	28.10	12.78	15.32	----	
L	08/16/01	12:10	28.10	13.66	14.44	----	
L	11/28/01	13:02	28.10	12.34	15.76	----	
L	02/27/02	14:42	28.10	7.16	20.94	----	
L	03/05/02	11:12	28.10	7.39	20.71	----	
L	04/05/02	08:39	28.10	7.63	20.47	----	
L	05/29/02	00:00	28.10	9.09	19.01	----	
L	06/27/02	10:38	28.10	10.11	17.99	----	
L	08/26/02	17:30	28.10	12.56	15.54	----	
L	11/13/02	09:26	28.10	14.00	14.10	----	
N	03/25/97	11:48	31.40	14.05	17.35	----	
N	03/31/97	08:59	31.40	14.26	17.14	----	Hydrocarbon odor, product
N	07/16/97	07:20	31.40	16.03	16.33	1.20	Light brown color; thick coating on probe
N	10/21/97	16:09	31.40	16.46	14.94	----	No product - strong petroleum odor
N	10/23/97	17:20	31.40	16.48	14.92	----	No product - strong petroleum odor
N	01/27/98	11:13	31.40	15.01	16.41	0.02	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
N	05/18/98	17:20	31.40	16.39	15.06	0.06	
N	08/17/98	10:40	31.40	17.16	14.26	0.02	Thin coat of thick product
N	11/13/98	09:48	31.40	17.83	13.58	0.01	
N	02/16/99	12:55	31.40	14.09	17.53	0.27	Strong petroleum odor
N	05/18/99	14:47	31.40	15.79	15.64	0.04	
N	09/21/99	11:23	31.40	17.39	14.02	0.01	
N	12/06/99	14:00	31.40	16.57	14.83	----	
N	02/16/00	10:10	31.40	15.69	15.71	----	
N	05/23/00	16:24	31.40	16.42	14.98	----	Strong petroleum odor, no product
N	08/29/00	13:07	31.40	17.61	13.79	----	
N	11/09/00	12:26	31.40	18.23	13.19	0.03	
N	02/12/01	15:49	31.40	17.64	13.76	----	
N	06/04/01	11:31	31.40	17.58	13.82	----	
N	08/16/01	10:29	31.40	18.08	13.32	----	Trace product
N	11/28/01	11:27	31.40	18.06	13.34	----	Trace product
N	02/27/02	13:25	31.40	15.76	15.64	----	
N	04/05/02	08:09	31.40	15.88	15.52	----	
N	05/29/02	00:00	31.40	16.42	14.98	----	
N	06/27/02	14:12	31.40	16.80	14.60	----	
N	08/26/02	15:56	31.40	17.51	13.89	----	No product
N	11/13/02	07:27	31.40	18.44	12.98	0.03	Product present
P	03/25/97	11:45	29.96	12.88	17.08	----	
P	03/31/97	08:55	29.96	12.94	17.02	----	Hydrocarbon odor, product
P	07/16/97	07:15	29.96	14.02	16.08	0.17	Light coating on probe; light brown color
P	10/21/97	16:05	29.96	15.23	14.73	----	No product - strong petroleum odor
P	10/23/97	17:25	29.96	15.21	14.75	----	No product - strong petroleum odor
P	01/27/98	11:09	29.96	13.87	16.09	----	
P	05/18/98	17:18	29.96	13.08	16.88	----	Trace of product on probe
P	08/17/98	10:37	29.96	15.82	14.15	0.01	Sheen on probe, strong petroleum odor
P	11/13/98	09:46	29.96	16.63	13.37	0.05	Strong gasoline odor
P	02/16/99	12:52	29.96	12.91	17.10	0.06	Strong petroleum odor
P	05/18/99	14:43	29.96	14.68	15.38	0.13	
P	09/21/99	11:20	29.96	16.08	13.89	0.01	
P	12/06/99	13:55	29.96	15.41	14.55	----	
P	02/16/00	10:08	29.96	14.51	15.45	----	
P	05/23/00	16:21	29.96	15.15	14.81	----	Trace of product on surface
P	08/29/00	13:04	29.96	16.26	13.71	0.01	
P	11/09/00	12:24	29.96	16.98	13.00	0.03	
P	02/12/01	15:46	29.96	16.31	13.65	----	
P	06/04/01	11:27	29.96	16.26	13.70	----	Trace product
P	08/16/01	10:28	29.96	16.75	13.21	----	
P	11/28/01	11:24	29.96	17.01	12.95	----	
P	02/27/02	13:22	29.96	14.60	15.44	0.10	Strong ethanol-like odor
P	04/05/02	08:07	29.96	14.70	15.34	0.10	
P	05/29/02	00:00	29.96	15.00	14.96	----	Trace product
P	06/27/02	14:11	29.96	15.49	14.47	----	
P	08/26/02	15:54	29.96	16.15	13.81	----	No product
P	11/13/02	07:25	29.96	16.99	13.00	0.04	Product present
Q	03/25/97	11:42	30.36	13.55	16.81	----	
Q	03/31/97	08:52	30.36	13.54	16.82	----	Hydrocarbon odor
Q	07/16/97	07:10	30.36	14.55	15.83	0.02	Light coating on probe; light brown color
Q	10/21/97	16:04	30.36	15.70	14.66	----	No product - strong petroleum odor
Q	10/23/97	17:29	30.36	15.69	14.67	----	No product - strong petroleum odor
Q	01/27/98	11:05	30.36	14.48	15.88	----	
Q	05/18/98	17:16	30.36	15.58	14.78	----	
Q	08/17/98	10:35	30.36	16.27	14.09	----	Slight sheen on probe; no product, strong petroleum odor
Q	11/13/98	09:44	30.36	17.01	13.36	0.01	Strong gasoline odor
Q	02/16/99	12:49	30.36	13.61	16.76	0.01	Strong petroleum odor
Q	05/18/99	14:40	30.36	15.13	15.23	----	Strong odor when cap removed
Q	09/21/99	11:17	30.36	16.51	13.85	----	
Q	12/06/99	13:53	30.36	15.88	14.48	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
Q	02/16/00	10:06	30.36	15.02	15.34	----	Film of product
Q	05/23/00	16:19	30.36	15.64	14.72	----	Strong petroleum odor, no product
Q	08/29/00	13:01	30.36	16.69	13.67	----	
Q	11/09/00	12:23	30.36	17.50	12.86	----	Trace of product
Q	02/12/01	15:45	30.36	16.71	13.65	----	
Q	06/04/01	11:25	30.36	16.66	13.70	----	
Q	08/16/01	10:26	30.36	17.15	13.21	----	Trace product
Q	11/28/01	11:21	30.36	17.76	12.94	0.42	
Q	02/27/02	13:20	30.36	15.07	15.29	----	Strong petroleum odor, no product
Q	04/05/02	08:05	30.36	15.23	15.13	----	Trace product
Q	05/29/02	00:00	30.36	15.53	14.83	----	Trace product
Q	06/27/02	14:10	30.36	15.95	14.41	----	Trace product
Q	08/26/02	15:52	30.36	16.60	13.76	----	No product
Q	11/13/02	07:30	30.36	17.50	12.87	0.01	Product present
LW001S	03/31/97	11:12	27.96	6.65	21.31		
LW001S	07/16/97	08:15	27.96	8.34	19.62	----	
LW001S	10/21/97	16:53	27.96	11.02	16.94	----	
LW001S	01/27/98	13:00	27.96	8.75	19.21	----	
LW001S	05/18/98	17:40	27.96	9.15	18.81	----	
LW001S	08/17/98	10:54	27.96	11.67	16.29	----	
LW001S	11/13/98	10:02	27.96	12.76	15.20	----	
LW001S	02/16/99	13:24	27.96	6.60	21.36	----	
LW001S	05/18/99	15:38	27.96	8.92	19.04	----	
LW001S	09/21/99	12:10	27.96	12.20	15.76	----	
LW001S	12/06/99	14:33	27.96	11.86	16.10	----	
LW001S	02/16/00	10:50	27.96	9.42	18.54	----	
LW001S	05/23/00	17:18	27.96	10.52	17.44	----	
LW001S	08/29/00	13:58	27.96	12.51	15.45	----	
LW001S	11/09/00	13:17	27.96	13.26	14.70	----	
LW001S	02/12/01	15:33	27.96	12.82	15.14	----	
LW001S	06/04/01	12:24	27.96	12.77	15.19	----	
LW001S	08/16/01	11:37	27.96	13.45	14.51	----	
LW001S	11/28/01	12:28	27.96	13.25	14.71	----	
LW001S	02/27/02	14:19	27.96	9.31	18.65	----	
LW001S	03/05/02	10:56	27.96	9.45	18.51	----	
LW001S	04/05/02	09:08	27.96	9.60	18.36	----	
LW001S	05/29/02	00:00	27.96	10.49	17.47	----	
LW001S	06/27/02	14:50	27.96	11.26	16.70	----	
LW001S	08/26/02	17:11	27.96	12.47	15.49	----	
LW001S	11/13/02	09:07	27.96	13.72	14.24	----	
LW002S	03/25/97	12:22	29.56	8.06	21.50	----	
LW002S	03/31/97	11:27	29.56	8.34	21.22	----	
LW002S	07/16/97	08:33	29.56	10.05	19.51	----	
LW002S	10/21/97	17:04	29.56	12.77	16.79	----	
LW002S	01/27/98	13:25	29.56	10.39	19.17	----	
LW002S	05/18/98	18:02	29.56	11.78	17.78	----	
LW002S	08/17/98	10:56	29.56	13.38	16.18	----	
LW002S	11/13/98	10:32	29.56	14.47	15.09	----	
LW002S	02/16/99	13:42	29.56	8.27	21.29	----	
LW002S	05/18/99	15:45	29.56	10.63	18.93	----	
LW002S	09/21/99	12:34	29.56	13.95	15.61	----	
LW002S	12/06/99	15:11	29.56	13.54	16.02	----	
LW002S	02/16/00	10:38	29.56	11.08	18.48	----	
LW002S	05/23/00	17:24	29.56	12.29	17.27	----	
LW002S	08/29/00	14:12	29.56	14.23	15.33	----	
LW002S	11/09/00	13:04	29.56	15.00	14.56	----	
LW002S	02/12/01	15:30	29.56	14.52	15.04	----	
LW002S	06/04/01	12:34	29.56	14.46	15.10	----	
LW002S	08/16/01	11:45	29.56	15.16	14.40	----	
LW002S	11/28/01	12:41	29.56	14.90	14.66	----	
LW002S	02/27/02	14:19	29.56	11.02	18.54	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW002S	03/05/02	10:59	29.56	11.17	18.39	----	
LW002S	04/05/02	08:47	29.56	11.33	18.23	----	
LW002S	05/29/02	00:00	29.56	12.22	17.34	----	
LW002S	06/27/02	14:56	29.56	13.00	16.56	----	
LW002S							Abandoned August 7-8, 2002
LW004S	03/31/97	09:20	30.26	12.77	17.49	----	
LW004S	07/16/97	07:40	30.26	14.66	15.60	----	
LW004S	10/21/97	16:25	30.26	16.88	13.38	----	
LW004S	01/27/98	12:00	30.26	15.13	15.13	----	
LW004S	05/18/98	17:32	30.26	16.08	14.18	----	
LW004S	08/17/98	11:07	30.26	17.30	12.96	----	
LW004S	11/13/98	09:56	30.26	17.96	12.30	----	
LW004S	02/16/99	13:16	30.26	13.10	17.16	----	
LW004S	05/18/99	15:03	30.26	15.43	14.83	----	
LW004S	09/21/99	11:44	30.26	17.61	12.65	----	
LW004S	12/06/99	14:19	30.26	17.08	13.18	----	
LW004S	02/16/00	10:31	30.26	15.84	14.42	----	
LW004S	05/23/00	16:55	30.26	16.71	13.55	----	
LW004S	08/29/00	13:39	30.26	17.78	12.48	----	
LW004S	11/09/00	12:53	30.26	18.17	12.09	----	
LW004S	02/12/01	16:38	30.26	17.08	13.18	----	
LW004S	06/04/01	12:08	30.26	17.81	12.45	----	
LW004S	08/16/01	11:14	30.26	18.39	11.87	----	
LW004S	11/28/01	12:05	30.26	17.84	12.42	----	
LW004S	02/27/02	14:01	30.26	15.82	14.44	----	
LW004S	03/05/02	11:35	30.26	15.95	14.31	----	
LW004S	04/05/02	08:20	30.26	16.02	14.24	----	
LW004S	05/29/02	00:00	30.26	16.74	13.52	----	
LW004S	06/27/02	14:39	30.26	16.89	13.37	----	
LW004S	08/26/02	16:31	30.26	17.68	12.58	----	
LW004S	11/13/02	08:22	30.26	19.04	11.22	----	
LW005S	03/25/97	12:29	30.79	10.57	20.22	----	
LW005S	03/31/97	11:35	30.79	10.84	19.95	----	
LW005S	07/16/97	08:53	30.79	12.29	18.50	----	
LW005S	10/21/97	15:16	30.79	15.00	15.79	----	
LW005S	01/27/98	13:36	30.79	12.90	17.89	----	
LW005S	05/18/98	18:05	30.79	14.19	16.60	----	
LW005S	08/17/98	11:09	30.79	15.54	15.25	----	
LW005S	11/13/98	10:38	30.79	16.55	14.24	----	
LW005S	02/16/99	13:16	30.79	10.59	20.20	----	
LW005S	05/18/99	16:01	30.79	13.12	17.67	----	
LW005S	09/21/99	12:40	30.79	16.00	14.79	----	
LW005S	12/06/99	14:47	30.79	15.64	15.15	----	
LW005S	02/16/00	09:56	30.79	13.54	17.25	----	
LW005S	05/23/00	17:51	30.79	14.80	15.99	----	
LW005S	08/29/00	14:37	30.79	16.35	14.44	----	
LW005S	11/09/00	13:45	30.79	16.98	13.81	----	
LW005S	02/12/01	15:13	30.79	16.51	14.28	----	
LW005S	06/04/01	13:23	30.79	16.43	14.36	----	
LW005S	08/16/01	12:07	30.79	17.03	13.76	----	
LW005S	11/28/01	13:01	30.79	16.94	13.85	----	
LW005S	02/27/02	14:39	30.79	13.48	17.31	----	
LW005S	03/05/02	11:13	30.79	13.62	17.17	----	
LW005S	04/05/02	08:38	30.79	13.60	17.19	----	
LW005S	05/29/02	00:00	30.79	14.81	15.98	----	
LW005S	06/27/02	10:43	30.79	15.15	15.64	----	
LW005S	08/26/02	17:08	30.79	16.12	14.67	----	
LW005S	11/13/02	09:22	30.79	17.39	13.40	----	
LW007S	03/31/97	11:05	28.10	6.75	21.35	----	
LW007S	07/16/97	08:05	28.10	8.62	19.48	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW007S	10/21/97	16:45	28.10	11.26	16.84	----	
LW007S	01/27/98	12:47	28.10	8.85	19.25	----	
LW007S	05/18/98	17:48	28.10	10.34	17.76	----	
LW007S	08/17/98	10:48	28.10	11.85	16.25	----	
LW007S	11/13/98	10:12	28.10	12.90	15.20	----	Strong gasoline odor
LW007S	02/16/99	13:53	28.10	6.81	21.29	----	
LW007S	05/18/99	15:23	28.10	9.14	18.96	----	
LW007S	09/21/99	12:03	28.10	12.37	15.73	----	
LW007S	12/06/99	14:27	28.10	12.00	16.10	----	
LW007S	02/16/00	10:46	28.10	9.60	18.50	----	
LW007S	05/23/00	17:09	28.10	10.70	17.40	----	
LW007S	08/29/00	13:53	28.10	12.64	15.46	----	
LW007S	11/09/00	13:14	28.10	13.36	14.74	----	
LW007S	02/12/01	15:39	28.10	12.94	15.16	----	
LW007S	06/04/01	12:17	28.10	12.87	15.23	----	
LW007S	08/16/01	11:33	28.10	13.58	14.52	----	
LW007S	11/28/01	12:22	28.10	13.34	14.76	----	
LW007S	02/27/02	14:15	28.10	9.47	18.63	----	
LW007S	03/05/02	10:52	28.10	9.62	18.48	----	
LW007S	04/05/02	08:57	28.10	9.73	18.37	----	
LW007S	05/29/02	00:00	28.10	10.63	17.47	----	
LW007S	06/27/02	14:45	28.10	11.36	16.74	----	
LW007S	08/26/02	17:18	28.10	12.69	15.41	----	
LW007S	11/13/02	09:16	28.10	13.82	14.28	----	
LW008S	05/18/99	14:55	31.28	14.84	16.44	----	
LW008S	09/21/99	12:24	31.28	16.94	14.34	----	
LW008S	12/06/99	14:40	31.28	16.63	14.65	----	
LW008S	02/16/00	10:16	31.28	15.18	16.10	----	
LW008S	05/23/00	17:42	31.28	15.88	15.40	----	
LW008S	08/29/00	14:26	31.28	17.06	14.22	----	
LW008S	11/09/00	13:32	31.28	17.55	13.73	----	
LW008S	02/12/01	15:58	31.28	17.24	14.04	----	
LW008S	06/04/01	13:05	31.28	17.14	14.14	----	
LW008S	08/16/01	12:00	31.28	17.70	13.58	----	
LW008S	11/28/01	12:57	31.28	17.63	13.65	0.04	
LW008S	02/27/02	14:37	31.28	15.12	16.16	----	
LW008S	03/05/02	11:09	31.28	15.26	16.02	----	
LW008S	04/05/02	08:17	31.28	15.34	15.94	----	
LW008S	05/29/02	00:00	31.28	15.91	15.37	----	No Product
LW008S	06/27/02	15:21	31.28	16.21	15.07	----	
LW008S	08/26/02	16:38	31.28	16.95	14.33	----	
LW008S	11/13/02	08:50	31.28	17.88	13.40	----	
LW009S	05/18/99	14:57	31.04	19.58	11.46	----	Water level appears to be more representative of lower zc
LW009S	09/21/99	11:36	31.04	dry	----	----	
LW009S	12/06/99	14:13	31.04	19.64	----	----	Water in endcap
LW009S	02/16/00	10:24	31.04	19.59	----	----	Water in endcap
LW009S	05/23/00	16:39	31.04	dry	----	----	
LW009S	08/29/00	13:28	31.04	dry	----	----	
LW009S	11/09/00	12:42	31.04	dry	----	----	
LW009S	02/12/01	16:12	31.04	dry	----	----	
LW009S	06/04/01	11:50	31.04	dry	----	----	
LW009S	08/16/01	11:01	31.04	dry	----	----	
LW009S	11/28/01	11:52	31.04	dry	----	----	
LW009S	02/27/02	13:48	31.04	dry	----	----	
LW009S	03/05/02	11:15	31.04	dry	----	----	
LW009S	04/05/02	08:26	31.04	dry	----	----	
LW009S	05/29/02	00:00	31.04	dry	----	----	
LW009S	06/27/02	14:24	31.04	dry	----	----	
LW009S	08/26/02	16:09	31.04	dry	----	----	
LW009S	11/13/02	07:49	31.04	dry	----	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW010S	05/18/99	14:59	30.75	17.24	13.51	----	
LW010S	09/21/99	11:38	30.75	19.13	11.62	----	
LW010S	12/06/99	14:14	30.75	18.54	12.21	----	
LW010S	02/16/00	10:26	30.75	17.62	13.13	----	
LW010S	05/23/00	16:41	30.75	18.25	12.50	----	
LW010S	08/29/00	13:30	30.75	dry	----	----	
LW010S	11/09/00	12:45	30.75	dry	----	----	
LW010S	02/12/01	16:14	30.75	dry	----	----	
LW010S	06/04/01	11:53	30.75	dry	----	----	
LW010S	08/16/01	11:03	30.75	dry	----	----	
LW010S	11/28/01	11:54	30.75	dry	----	----	
LW010S	02/27/02	13:50	30.75	17.77	12.98	----	
LW010S	03/05/02	11:32	30.75	17.84	12.91	----	
LW010S	04/05/02	08:24	30.75	17.82	12.93	----	
LW010S	05/29/02	00:00	30.75	18.22	12.53	----	
LW010S	06/27/02	14:28	30.75	18.27	12.48	----	
LW010S	08/26/02	16:15	30.75	dry	----	----	
LW010S	11/13/02	08:00	30.75	dry	----	----	
LW011S	05/18/99	15:10	29.10	11.47	17.63	----	
LW011S	09/21/99	11:51	29.10	14.23	14.87	----	
LW011S	12/06/99	15:05	29.10	14.00	15.10	----	
LW011S	02/16/00	11:01	29.10	11.94	17.16	----	
LW011S	05/23/00	11:01	29.10	13.01	16.09	----	
LW011S	08/29/00	14:55	29.10	14.51	14.59	----	
LW011S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well.
LW011S	02/12/01	15:18	29.10	14.62	14.48	----	
LW011S	06/04/01	13:12	29.10	14.65	14.45	----	
LW011S	08/16/01	11:24	29.10	15.46	13.86	0.28	
LW011S	11/28/01	12:51	29.10	15.10	14.00	----	Trace product
LW011S	02/27/02	14:59	29.10	11.86	17.24	----	
LW011S	03/05/02	11:40	29.10	11.96	17.14	----	
LW011S	04/05/02	08:34	29.10	12.07	17.03	----	
LW011S	05/29/02	00:00	29.10	13.00	16.10	----	No Product
LW011S	06/27/02	15:09	29.10	13.40	15.70	----	
LW011S	08/26/02	16:48	29.10	14.37	14.73	----	
LW011S	11/13/02	08:54	29.10	15.53	13.57	----	
LW013S	05/23/00	16:51	30.17	17.23	12.94	----	
LW013S	08/29/00	13:37	30.17	18.27	11.90	----	
LW013S	11/09/00	12:51	30.17	18.75	11.42	----	
LW013S	02/12/01	16:30	30.17	18.26	11.91	----	
LW013S	06/04/01	12:06	30.17	18.30	11.87	----	
LW013S	08/16/01	11:13	30.17	18.81	11.36	----	
LW013S	11/28/01	12:03	30.17	18.37	11.80	----	
LW013S	02/27/02	13:58	30.17	16.60	13.57	----	
LW013S	03/05/02	11:33	30.17	16.68	13.49	----	
LW013S	04/05/02	08:22	30.17	16.73	13.44	----	
LW013S	05/29/02	00:00	30.17	17.30	12.87	----	
LW013S	06/27/02	14:37	30.17	17.38	12.79	----	
LW013S	08/26/02	16:30	30.17	18.11	12.06	----	
LW013S	11/13/02	08:14	30.17	19.04	11.13	----	
LW101S	03/31/97	09:54	29.41	4.51	24.90	----	
LW101S	07/16/97	09:01	29.41	6.81	22.60	----	
LW101S	10/21/97	18:01	29.41	7.28	22.13	----	
LW101S	01/27/98	14:15	29.41	4.10	25.31	----	
LW101S	05/18/98	18:18	29.41	6.68	22.73	----	
LW101S	08/17/98	11:21	29.41	8.14	21.27	----	
LW101S	11/13/98	10:48	29.41	8.61	20.80	----	
LW101S	02/16/99	14:11	29.41	3.21	26.20	----	
LW101S	05/18/99	16:17	29.41	6.00	23.41	----	
LW101S	09/21/99	12:54	29.41	8.60	20.81	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW101S	12/06/99	14:58	29.41	6.98	22.43	----	
LW101S	02/16/00	09:44	29.41	4.96	24.45	----	
LW101S	05/23/00	18:06	29.41	6.83	22.58	----	
LW101S	08/29/00	14:47	29.41	8.67	20.74	----	
LW101S	11/09/00	13:56	29.41	9.39	20.02	----	
LW101S	02/12/01	15:02	29.41	8.02	21.39	----	
LW101S	06/04/01	13:35	29.41	8.40	21.01	----	
LW101S	08/16/01	12:20	29.41	9.44	19.97	----	
LW101S	11/28/01	13:12	29.41	8.58	20.83	----	
LW101S	02/27/02	14:52	29.41	5.70	23.71	----	
LW101S	06/27/02	15:32	29.41	7.80	21.61	----	
LW101S	08/26/02	17:34	29.41	8.85	20.56	----	
LW101S	11/13/02	09:35	29.41	9.92	19.49	----	
LW102S	03/31/97	10:01	25.77	1.86	23.91	----	
LW102S	07/16/97	09:09	25.77	3.91	21.86	----	
LW102S	10/21/97	17:59	25.77	4.03	21.74	----	
LW102S	01/27/98	14:07	25.77	1.26	24.51	----	
LW102S	05/18/98	18:15	25.77	3.57	22.20	----	
LW102S	08/17/98	11:18	25.77	4.88	20.89	----	
LW102S	11/13/98	10:45	25.77	5.14	20.63	----	
LW102S	02/16/99	14:08	25.77	0.45	25.32	----	
LW102S	05/18/99	16:12	25.77	3.24	22.53	----	
LW102S	09/21/99	12:52	25.77	5.33	20.44	----	
LW102S	12/06/99	14:56	25.77	3.67	22.10	----	
LW102S	02/16/00	09:41	25.77	1.91	23.86	----	
LW102S	05/23/00	18:03	25.77	3.72	22.05	----	
LW102S	08/29/00	14:45	25.77	5.40	20.37	----	
LW102S	11/09/00	13:53	25.77	5.94	19.83	----	
LW102S	02/12/01	15:00	25.77	4.52	21.25	----	
LW102S	06/04/01	13:32	25.77	4.93	20.84	----	
LW102S	08/16/01	12:17	25.77	5.96	19.81	----	
LW102S	11/28/01	13:10	25.77	5.15	20.62	----	
LW102S	02/27/02	14:48	25.77	2.14	23.63	----	
LW102S	06/27/02	15:30	25.77	4.50	21.27	----	
LW102S	08/26/02	17:39	25.77	5.48	20.29	----	
LW102S	11/13/02	09:32	25.77	6.50	19.27	----	
LW103S	03/31/97	09:50	29.07	5.50	23.57	----	
LW103S	07/16/97	08:59	29.07	6.93	22.14	----	
LW103S	10/21/97	18:03	29.07	7.08	21.99	----	
LW103S	01/27/98	14:20	29.07	5.11	23.96	----	
LW103S	05/18/98	18:21	29.07	6.57	22.50	----	
LW103S	08/17/98	11:24	29.07	7.80	21.27	----	
LW103S	11/13/98	10:51	29.07	7.91	21.16	----	
LW103S	02/16/99	14:14	29.07	4.54	24.53	----	
LW103S	05/18/99	16:20	29.07	6.20	22.87	----	
LW103S	09/21/99	12:57	29.07	8.30	20.77	----	
LW103S	12/06/99	15:00	29.07	6.60	22.47	----	
LW103S	02/16/00	09:46	29.07	5.50	23.57	----	
LW103S	05/23/00	18:10	29.07	6.64	22.43	----	
LW103S	08/29/00	14:50	29.07	8.41	20.66	----	
LW103S	11/09/00	13:58	29.07	8.78	20.29	----	
LW103S	02/12/01	15:04	29.07	7.39	21.68	----	
LW103S	06/04/01	13:37	29.07	7.83	21.24	----	
LW103S	08/16/01	12:23	29.07	9.07	20.00	----	
LW103S	11/28/01	13:16	29.07	8.02	21.05	----	
LW103S	02/27/02	14:50	29.07	5.26	23.81	----	
LW103S	06/27/02	15:34	29.07	7.42	21.65	----	
LW103S	08/26/02	17:36	29.07	8.57	20.50	----	
LW103S	11/13/02	09:37	29.07	9.48	19.59	----	
LW104S	03/31/97	10:06	26.57	3.55	23.02	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW104S	07/16/97	08:54	26.57	5.71	20.86	----	
LW104S	10/21/97	16:22	26.57	5.71	20.86	----	
LW104S	01/27/98	14:00	26.57	2.84	23.73	----	
LW104S	05/18/98	18:11	26.57	5.17	21.40	----	
LW104S	08/17/98	11:15	26.57	6.64	19.93	----	
LW104S	11/13/98	10:41	26.57	6.72	19.85	----	
LW104S	02/16/99	14:03	26.57	2.11	24.46	----	
LW104S	05/18/99	16:08	26.57	4.97	21.60	----	
LW104S	09/21/99	12:48	26.57	7.18	19.39	----	
LW104S	12/06/99	14:54	26.57	5.00	21.57	----	
LW104S	02/16/00	09:39	26.57	3.61	22.96	----	
LW104S	05/23/00	17:59	26.57	5.61	20.96	----	
LW104S	08/29/00	14:43	26.57	7.08	19.49	----	
LW104S	11/09/00	13:51	26.57	7.49	19.08	----	
LW104S	02/12/01	14:57	26.57	6.28	20.29	----	
LW104S	06/04/01	13:30	26.57	6.64	19.93	----	
LW104S	08/16/01	12:15	26.57	7.56	19.01	----	
LW104S	11/28/01	13:06	26.57	6.30	20.27	----	
LW104S	02/27/02	14:46	26.57	4.07	22.50	----	
LW104S	06/27/02	15:27	26.57	6.28	20.29	----	
LW104S	08/26/02	17:41	26.57	7.13	19.44	----	
LW104S	11/13/02	09:30	26.57	7.85	18.72	----	
RW1	05/18/99	15:06	31.46	15.70	15.76	----	
RW1	09/21/99	11:46	31.46	18.02	13.44	----	
RW1	12/06/99	14:43	31.46	17.73	13.73	----	
RW1	02/16/00	10:33	31.46	16.14	15.32	----	
RW1	05/23/00	17:46	31.46	17.09	14.37	----	
RW1	08/29/00	14:28	31.46	18.29	13.17	----	
RW1	11/09/00	12:57	31.46	18.67	12.79	----	
RW1	02/12/01	16:44	31.46	18.30	13.16	----	
RW1	06/04/01	13:17	31.46	18.22	13.24	----	
RW1	08/16/01	10:55	31.46		----	----	Vapor/water recovery system test running - not measured
RW1	11/28/01	12:02	31.46	18.55	12.91	----	
RW1	02/27/02	14:03	31.46	16.12	15.34	----	
RW1	03/05/02	11:38	31.46	16.33	15.13	----	
RW1	04/05/02	08:27	31.46	16.28	15.18	----	
RW1	05/29/02	00:00	31.46	17.00	14.46	----	
RW1	06/27/02	15:16	31.46	17.33	14.13	----	
RW1	08/26/02	16:40	31.46	18.00	13.46	----	
RW1	11/13/02	08:26	31.46	18.85	12.61	----	
RW3	12/06/99	15:24	29.96	14.20	15.76	----	
RW3	02/16/00	10:37	29.96	11.88	18.08	----	
RW3	05/23/00	17:26	29.96	13.02	16.94	----	
RW3	08/29/00	13:42	29.96	14.88	15.08	----	
RW3	11/09/00	13:03	29.96	15.58	14.38	----	
RW3	02/12/01	15:28	29.96	15.13	14.83	----	
RW3	06/04/01	12:30	29.96	15.09	14.87	----	
RW3	08/16/01	11:44	29.96	15.74	14.22	----	
RW3	11/28/01	12:40	29.96	15.52	14.44	----	
RW3	02/27/02	14:26	29.96	11.80	18.16	----	
RW3	03/05/02	11:02	29.96	11.94	18.02	----	
RW3	04/05/02	08:44	29.96	12.06	17.90	----	
RW3	05/29/02	00:00	29.96	13.00	16.96	----	
RW3	06/27/02	14:59	29.96	13.64	16.32	----	
RW3							Abandoned August 7-8, 2003
PZ1	05/23/00	17:47	28.04	14.21	13.83	----	
PZ1	08/29/00	14:30	28.04	15.33	12.71	----	
PZ1	11/09/00	12:55	28.04	15.68	12.36	----	
PZ1	02/12/01	16:42	28.04	15.30	12.74	----	
PZ1	06/04/01	13:20	28.04	15.29	12.75	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
PZ1	08/16/01	11:17	28.04	15.94	12.10	----	
PZ1	11/28/01	12:09	28.04	15.48	12.56	----	
PZ1	02/27/02	14:02	28.04	13.28	14.76	----	
PZ1	03/05/02	11:34	28.04	13.40	14.64	----	
PZ1	04/05/02	08:32	28.04	13.44	14.60	----	
PZ1	05/29/02	00:00	28.04	14.16	13.88	----	
PZ1	06/27/02	15:17	28.04	14.50	13.54	----	
PZ1	08/26/02	16:33	28.04	15.17	12.87	----	
PZ1	11/13/02	08:42	28.04	15.83	12.21	----	
PZ2	06/27/02	15:18	31.97	18.31	13.66	----	Developed 6/26/02
PZ2	08/26/02	16:34	31.97	18.88	13.09	----	
PZ2	11/13/02	08:25	31.97	19.40	12.57	----	
PZ3	06/27/02	15:19	31.12	19.35	11.77	----	Developed 6/26/02
PZ3	08/26/02	16:35	31.12	19.74	11.38	----	
PZ3	11/13/02	08:45	31.12	16.87	----	----	
PZ4	06/27/02	15:20	28.47	dry	----	----	
PZ4	08/26/02	16:36	28.47	dry	----	----	
PZ4	11/13/02	08:48	28.47	16.87	11.60	----	
OX001S	06/27/02	15:13	33.38	17.85	15.53	----	
OX001S	08/26/02	16:45	33.38	18.75	14.63	----	
OX001S	11/13/02	08:30	33.38	19.92	13.46	----	
OX002S	06/27/02	15:12	28.69	13.22	15.47	----	
OX002S	08/26/02	16:44	28.69	14.26	14.43	----	
OX002S	11/13/02	08:33	28.69	15.39	13.30	----	
OX003S	06/27/02	15:14	30.01	14.65	15.36	----	
OX003S	08/26/02	16:42	30.01	15.50	14.51	----	
OX003S	11/13/02	08:31	30.01	16.65	13.36	----	
OX004S	06/27/02	15:15	33.42	19.07	14.35	----	
OX004S	08/26/02	16:39	33.42	19.74	13.68	----	
OX004S	11/13/02	08:24	33.42	20.73	12.69	----	
Deep Wells:							
B2	08/11/93	10:02	30.31	25.44	4.87	----	Slight sheen, slight to mod solvent-like odor
B2	10/26/93	13:32	30.31	25.25	5.06	----	
B2	11/17/93	13:32	30.31	25.23	5.08	----	
B2	12/17/93	12:59	30.31	23.88	6.43	----	
B2	01/17/94	13:12	30.31	23.99	6.32	----	
B2	02/18/94	14:20	30.31	23.73	6.58	----	
B2	03/18/94	12:59	30.31	23.15	7.16	----	
B2	04/18/94	14:42	30.31	24.35	5.96	----	
B2	05/18/94	15:22	30.31	23.12	7.19	----	
B2	06/17/94	14:54	30.31	22.90	7.41	----	
B2	07/19/94	09:20	30.31	24.38	5.93	----	
B2	08/17/94	07:35	30.31	25.22	5.09	----	
B2	09/16/94	07:27	30.31	25.89	4.42	----	
B2	10/17/94	09:03	30.31	25.43	4.88	----	
B2	11/21/94	11:51	30.31	24.56	5.75	----	
B2	12/19/94	11:10	30.31	21.82	8.49	----	
B2	01/18/95	11:18	30.31	18.93	11.38	----	
B2	02/21/95	13:23	30.31	17.12	13.19	----	
B2	03/21/95	13:05	30.31	20.37	9.94	----	
B2	04/19/95	12:48	30.31	21.21	9.10	----	
B2	05/19/95	13:38	30.31	19.30	11.01	----	
B2	07/17/95	13:55	30.31	22.72	7.59	----	
B2	08/22/95	07:53	30.31	24.42	5.89	----	
B2	09/22/95	08:28	30.31	25.28	5.03	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
B2	11/20/95	07:57	30.31	22.02	8.29	----	
B2	12/01/95	08:29	30.31	13.63	16.68	----	
B2	12/19/95	07:26	30.31	15.57	14.74	----	
B2	01/19/96	08:38	30.31	16.48	13.83	----	
B2	02/20/96	10:42	30.31	10.63	19.68	----	
B2	03/19/96	09:23	30.31	16.61	13.70	----	
B2	04/19/96	11:53	30.31	16.20	14.11	----	
B2	07/22/96	14:24	30.31	22.29	8.02	----	
B2	08/20/96	14:20	30.31	23.43	6.88	----	
B2	09/24/96	08:11	30.31	24.30	6.01	----	
B2	10/28/96	11:09	30.31	23.76	6.55	----	
B2	12/13/96	10:47	30.31	16.70	13.61	----	
B2	03/25/97	12:02	30.31	15.85	14.46	----	
B2	03/31/97	09:27	30.31	14.91	15.40	----	
B2	07/16/97	07:45	30.31	19.91	10.40	----	
B2	10/21/97	16:30	30.31	23.56	6.75	----	
B2	01/27/98	12:06	30.31	19.32	10.99	----	
B2	05/18/98	17:54	30.31	18.80	11.51	----	
B2	08/17/98	10:23	30.31	24.38	5.93	----	
B2	11/13/98	10:17	30.31	25.33	4.98	----	
B2	02/16/99	13:34	30.31	19.64	10.67	----	
B2	05/18/99	15:50	30.31	19.04	11.27	----	
B2	09/21/99	12:18	30.31	25.34	4.97	----	
B2	12/06/99	14:39	30.31	20.25	10.06	----	
B2	02/16/00	10:56	30.31	20.57	9.74	----	
B2	05/23/00	17:33	30.31	20.99	9.32	----	
B2	08/29/00	14:20	30.31	25.38	4.93	----	
B2	11/09/00	13:29	30.31	25.31	5.00	----	
B2	02/12/01	15:27	30.31	24.62	5.69	----	
B2	06/04/01	13:04	30.31	24.84	5.47	----	
B2	08/16/01	11:58	30.31	26.75	3.56	----	
B2	11/28/01	12:46	30.31	24.14	6.17	----	
B2	02/27/02	14:35	30.31	22.90	7.41	----	
B2	06/27/02	15:07	30.31	20.16	10.15	----	
B2	08/26/02	17:01	30.31	25.32	4.99	----	
B2	11/13/02	09:03	30.31	25.28	5.03	----	
G1A	03/25/97	11:55	29.72	14.84	14.88	----	
G1A	03/31/97	09:11	29.72	14.28	15.44	----	
G1A	07/16/97	07:33	29.72	18.94	10.78	----	
G1A	10/21/97	16:18	29.72	22.44	7.28	----	
G1A	01/27/98	11:46	29.72	18.42	11.30	----	
G1A	05/18/98	17:31	29.72	18.05	11.67	----	
G1A	08/17/98	10:07	29.72	23.35	6.37	----	
G1A	11/13/98	09:54	29.72	24.59	5.13	----	
G1A	02/16/99	13:14	29.72	18.28	11.44	----	
G1A	05/18/99	14:51	29.72	18.42	11.30	----	
G1A	09/21/99	11:29	29.72	24.32	5.40	----	
G1A	12/06/99	14:05	29.72	19.82	9.90	----	
G1A	02/16/00	10:18	29.72	19.81	9.91	----	
G1A	05/23/00	16:31	29.72	20.08	9.64	----	Replaced lock and tubing
G1A	08/29/00	13:13	29.72	24.36	5.36	----	
G1A	11/09/00	12:32	29.72	24.85	4.87	----	
G1A	02/12/01	16:01	29.72	24.08	5.64	----	
G1A	06/04/01	11:40	29.72	24.10	5.62	----	
G1A	08/16/01	10:52	29.72	25.51	4.21	----	
G1A	11/28/01	11:32	29.72	23.84	5.88	----	
G1A	02/27/02	13:39	29.72	21.96	7.76	----	
G1A	06/27/02	14:17	29.72	19.48	10.24	----	
G1A	08/26/02	16:06	29.72	24.36	5.36	----	
G1A	11/13/02	07:35	29.72	24.60	5.12	----	
J2	03/25/97	12:18	29.65	15.22	14.43	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
J2	03/31/97	11:21	29.65	14.38	15.27	----	
J2	07/16/97	08:24	29.65	19.28	10.37	----	
J2	10/21/97	17:00	29.65	23.02	6.63	----	
J2	01/27/98	13:19	29.65	18.69	10.96	----	
J2	05/18/98	18:00	29.65	18.14	11.51	----	
J2	08/17/98	10:21	29.65	23.70	5.95	----	
J2	11/13/98	10:28	29.65	24.64	5.01	----	
J2	02/16/99	13:40	29.65	19.00	10.65	----	
J2	05/18/99	15:46	29.65	18.40	11.25	----	
J2	09/21/99	12:30	29.65	24.73	4.92	----	
J2	12/06/99	15:08	29.65	19.53	10.12	----	
J2	02/16/00	11:07	29.65	19.89	9.76	----	
J2	05/23/00	17:28	29.65	20.33	9.32	----	
J2	08/29/00	14:15	29.65	24.67	4.98	----	
J2	11/09/00	13:26	29.65	24.66	4.99	----	
J2	02/12/01	15:23	29.65	23.92	5.73	----	
J2	06/04/01	13:02	29.65	24.17	5.48	----	
J2	08/16/01	11:51	29.65	25.57	4.08	----	
J2	11/28/01	12:36	29.65	23.45	6.20	----	
J2	02/27/02	14:31	29.65	22.21	7.44	----	
J2	06/27/02	15:03	29.65	19.48	10.17	----	
J2	08/26/02	16:56	29.65	24.67	4.98	----	
J2	11/13/02	08:59	29.65	24.60	5.05	----	
J3	03/25/97	12:20	29.58	14.70	14.88	----	
J3	03/31/97	11:25	29.58	14.03	15.55	----	
J3	07/16/97	08:25	29.58	18.91	10.67	----	
J3	10/21/97	17:02	29.58	22.37	7.21	----	
J3	01/27/98	13:21	29.58	18.28	11.30	----	
J3	05/18/98	17:58	29.58	17.84	11.74	----	
J3	08/17/98	10:22	29.58	23.12	6.46	----	
J3	11/13/98	10:26	29.58	24.14	5.44	----	
J3	02/16/99	13:41	29.58	18.32	11.26	----	
J3	05/18/99	15:48	29.58	18.01	11.57	----	
J3	09/21/99	12:31	29.58	24.12	5.46	----	
J3	12/06/99	15:09	29.58	19.31	10.27	----	
J3	02/16/00	10:07	29.58	19.50	10.08	----	
J3	05/23/00	17:29	29.58	19.86	9.72	----	
J3	08/29/00	14:17	29.58	24.05	5.53	----	
J3	11/09/00	13:27	29.58	24.24	5.34	----	
J3	02/12/01	15:24	29.58	23.45	6.13	----	
J3	06/04/01	12:44	29.58	23.62	5.96	----	
J3	08/16/01	11:50	29.58	24.98	4.60	----	
J3	11/28/01	12:37	29.58	22.98	6.60	----	
J3	02/27/02	14:32	29.58	21.52	8.06	----	
J3	06/27/02	15:04	29.58	19.14	10.44	----	
J3	08/26/02	16:57	29.58	23.99	5.59	----	
J3	11/13/02	08:58	29.58	24.10	5.48	----	
O	03/25/97	11:40	32.03	17.01	15.02	----	
O	03/31/97	08:48	32.03	16.39	15.64	----	
O	07/16/97	07:05	32.03	21.93	10.10	----	
O	10/21/97	16:01	32.03	22.23	9.80	----	
O	01/27/98	11:03	32.03	20.51	11.52	----	
O	05/18/98	17:14	32.03	20.25	11.78	----	
O	08/17/98	10:13	32.03	25.42	6.61	----	
O	11/13/98	09:31	32.03	26.49	5.54	----	
O	02/16/99	12:45	32.03	20.25	11.78	----	
O	05/18/99	14:36	32.03	21.23	10.80	----	
O	09/21/99	11:09	32.03	26.22	5.81	----	
O	12/06/99	13:48	32.03	21.90	10.13	----	
O	02/16/00	10:04	32.03	22.21	9.82	----	
O	05/23/00	16:15	32.03	22.18	9.85	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
O	08/29/00	12:56	32.03	26.49	5.54	----	
O	11/09/00	12:18	32.03	27.01	5.02	----	
O	02/12/01	15:52	32.03	26.12	5.91	----	
O	06/04/01	11:22	32.03	26.08	5.95	----	
O	08/16/01	10:22	32.03	27.58	4.45	----	
O	11/28/01	11:18	32.03	26.15	5.88	----	
O	02/27/02	13:15	32.03	24.08	7.95	----	
O	06/27/02	14:09	32.03	21.29	10.74	----	
O	08/26/02	15:47	32.03	25.91	6.12	----	No product
O	11/13/02	07:21	32.03	26.56	5.47	----	
R	03/25/97	11:36	30.47	15.56	14.91	----	
R	03/31/97	08:43	30.47	14.85	15.62	----	
R	07/16/97	07:00	30.47	20.37	10.10	----	
R	10/21/97	15:56	30.47	22.54	7.93	----	
R	01/27/98	10:57	30.47	18.98	11.49	----	
R	05/18/98	17:15	30.47	18.73	11.74	----	
R	08/17/98	10:12	30.47	23.93	6.54	----	
R	11/13/98	09:35	30.47	25.17	5.30	----	
R	02/16/99	13:05	30.47	18.79	11.68	----	
R	05/18/99	14:37	30.47	19.64	10.83	----	
R	09/21/99	11:15	30.47	24.53	5.94	----	
R	12/06/99	13:46	30.47	20.33	10.14	----	
R	02/16/00	10:12	30.47	20.65	9.82	----	
R	05/23/00	16:17	30.47	20.64	9.83	----	
R	08/29/00	12:58	30.47	24.97	5.50	----	
R	11/09/00	12:20	30.47	25.47	5.00	----	
R	02/12/01	15:54	30.47	24.46	6.01	----	
R	06/04/01	11:36	30.47	24.53	5.94	----	
R	08/16/01	10:35	30.47	26.02	4.45	----	
R	11/28/01	11:19	30.47	24.57	5.90	----	
R	02/27/02	13:17	30.47	22.50	7.97	----	
R	06/27/02	14:08	30.47	19.75	10.72	----	
R	08/26/02	15:58	30.47	24.38	6.09	----	No product
R	11/13/02	07:22	30.47	25.04	5.43	----	
LW001D	03/31/97	11:11	28.31	12.71	15.60	----	
LW001D	07/16/97	08:12	28.31	17.65	10.66	----	
LW001D	10/21/97	16:55	28.31	21.29	7.02	----	
LW001D	01/27/98	13:07	28.31	17.06	11.25	----	
LW001D	05/18/98	17:39	28.31	16.53	11.78	----	
LW001D	08/17/98	10:30	28.31	21.82	6.49	----	
LW001D	11/13/98	10:01	28.31	22.77	5.54	----	
LW001D	02/16/99	13:21	28.31	17.30	11.01	----	
LW001D	05/18/99	15:36	28.31	16.76	11.55	----	
LW001D	09/21/99	12:12	28.31	22.91	5.40	----	
LW001D	12/06/99	14:34	28.31	18.00	10.31	----	
LW001D	02/16/00	10:49	28.31	18.16	10.15	----	
LW001D	05/23/00	17:19	28.31	18.62	9.69	----	
LW001D	08/29/00	13:59	28.31	22.81	5.50	----	
LW001D	11/09/00	13:20	28.31	22.98	5.33	----	
LW001D	02/12/01	15:35	28.31	22.23	6.08	----	
LW001D	06/04/01	12:23	28.31	22.36	5.95	----	
LW001D	08/16/01	11:38	28.31	23.73	4.58	----	
LW001D	11/28/01	12:29	28.31	21.73	6.58	----	
LW001D	02/27/02	14:17	28.31	20.31	8.00	----	
LW001D	06/27/02	14:49	28.31	17.81	10.50	----	
LW001D	08/26/02	17:12	28.31	22.85	5.46	----	
LW001D	11/13/02	09:08	28.31	22.91	5.40	----	
LW003D	03/31/97	11:45	30.80	19.38	11.42	----	Time estimated
LW003D	07/16/97	08:38	30.80	28.09	2.71	----	
LW003D	10/21/97	17:07	30.80	23.36	7.44	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW003D	01/27/98	13:30	30.80	21.66	9.14	----	
LW003D	05/18/98	17:35	30.80	19.21	11.59	----	
LW003D	08/17/98	10:24	30.80	24.62	6.18	----	
LW003D	11/13/98	09:03	30.80	25.56	5.24	----	
LW003D	02/16/99	13:44	30.80	20.00	10.80	----	
LW003D	05/18/99	15:58	30.80	19.42	11.38	----	Purged dry at 11:00
LW003D	09/21/99	10:40	30.80	25.76	5.04	----	
LW003D	12/06/99	14:45	30.80	20.69	10.11	----	
LW003D	02/16/00	09:54	30.80	20.98	9.82	----	
LW003D	05/23/00	14:40	30.80	21.16	9.64	----	Purged dry at 13:10
LW003D	08/29/00	14:36	30.80	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW003D	11/09/00		30.80	----	----	----	Well sampled 11/8/00 - water level not representative
LW003D	02/12/01	15:11	30.80	24.85	5.95	----	
LW003D	06/04/01	12:35	30.80	25.09	5.71	----	
LW003D	08/16/01	11:47	30.80	26.43	4.37	----	
LW003D	11/28/01	12:42	30.80	24.48	6.32	----	
LW003D	02/27/02	14:20	30.80	23.13	7.67	----	
LW003D	06/27/02	14:59	30.80	20.55	10.25	----	
LW003D	08/26/02	17:03	30.80	25.63	5.17	----	
LW003D	11/13/02	09:20	30.80	25.57	5.23	----	
LW004D	03/31/97	09:18	30.17	14.73	15.44	----	
LW004D	07/16/97	07:42	30.17	19.43	10.74	----	
LW004D	10/21/97	16:27	30.17	23.02	7.15	----	
LW004D	01/27/98	11:56	30.17	18.84	11.33	----	
LW004D	05/18/98	17:33	30.17	18.54	11.63	----	
LW004D	08/17/98	10:18	30.17	23.81	6.36	----	
LW004D	11/13/98	09:57	30.17	24.99	5.18	----	
LW004D	02/16/99	13:17	30.17	18.79	11.38	----	
LW004D	05/18/99	15:04	30.17	18.77	11.40	----	Completed sampling at 13:40
LW004D	09/21/99	11:41	30.17	24.78	5.39	----	
LW004D	12/06/99	14:18	30.17	20.21	9.96	----	
LW004D	02/16/00	10:30	30.17	20.23	9.94	----	
LW004D	05/23/00	16:54	30.17	20.55	9.62	----	
LW004D	08/29/00	13:38	30.17	24.78	5.39	----	
LW004D	11/09/00	12:52	30.17	25.19	4.98	----	
LW004D	02/12/01	16:39	30.17	24.71	5.46	----	
LW004D	06/04/01	12:07	30.17	24.66	5.51	----	
LW004D	08/16/01	11:15	30.17	26.27	3.90	----	
LW004D	11/28/01	12:04	30.17	24.41	5.76	----	
LW004D	02/27/02	14:00	30.17	22.65	7.52	----	
LW004D	03/05/02	11:36	30.17	22.94	7.23	----	
LW004D	04/05/02	08:19	30.17	23.75	6.42	----	
LW004D	05/29/02	00:00	30.17	20.48	9.69	----	
LW004D	06/27/02	14:41	30.17	20.15	10.02	----	
LW004D	08/26/02	16:32	30.17	25.02	5.15	----	
LW004D	11/13/02	08:23	30.17	25.26	4.91	----	
LW006D	03/25/97	11:52	30.84	16.51	14.33	----	
LW006D	03/31/97	09:05	30.84	15.53	15.31	----	Faint odor
LW006D	07/16/97	07:30	30.84	20.74	10.10	----	
LW006D	10/21/97	16:16	30.84	24.05	6.79	----	
LW006D	01/27/98	11:38	30.84	19.94	10.90	----	
LW006D	05/18/98	17:28	30.84	19.36	11.48	----	
LW006D	08/17/98	10:05	30.84	24.92	5.92	----	
LW006D	11/13/98	09:50	30.84	25.94	4.90	----	
LW006D	02/16/99	13:11	30.84	20.40	10.44	----	
LW006D	05/18/99	14:53	30.84	19.81	11.03	----	
LW006D	09/21/99	11:32	30.84	25.92	4.92	----	
LW006D	12/06/99	14:09	30.84	20.86	9.98	----	
LW006D	02/16/00	10:20	30.84	21.27	9.57	----	
LW006D	05/23/00	16:35	30.84	21.64	9.20	----	
LW006D	08/29/00	13:20	30.84	25.93	4.91	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW006D	11/09/00	12:35	30.84	26.21	4.63	----	
LW006D	02/12/01	16:03	30.84	25.37	5.47	----	
LW006D	06/04/01	11:42	30.84	25.30	5.54	----	
LW006D	08/16/01	10:54	30.84	26.72	4.12	----	
LW006D	11/28/01	11:46	30.84	24.92	5.92	----	
LW006D	02/27/02	13:35	30.84	23.62	7.22	----	
LW006D	06/27/02	14:19	30.84	20.68	10.16	----	
LW006D	08/26/02	16:04	30.84	25.79	5.05	----	
LW006D	11/13/02	07:42	30.84	25.82	5.02	----	
LW009D	05/18/99	14:56	30.98	20.02	10.96	----	
LW009D	09/21/99	11:34	30.98	25.23	5.75	----	
LW009D	12/06/99	14:11	30.98	21.04	9.94	----	
LW009D	02/16/00	10:23	30.98	21.17	9.81	----	
LW009D	05/23/00	16:39	30.98	21.15	9.83	----	
LW009D	08/29/00	13:27	30.98	25.36	5.62	----	
LW009D	11/09/00	12:43	30.98	25.96	5.02	----	
LW009D	02/12/01	16:11	30.98	25.13	5.85	----	
LW009D	06/04/01	11:49	30.98	25.15	5.83	----	
LW009D	08/16/01	11:02	30.98	26.57	4.41	----	
LW009D	11/28/01	11:53	30.98	25.40	5.58	----	
LW009D	02/27/02	13:47	30.98	22.97	8.01	----	
LW009D	06/27/02	14:25	30.98	20.38	10.60	----	
LW009D	08/26/02	16:11	30.98	24.90	6.08	----	
LW009D	11/13/02	07:48	30.98	25.73	5.25	----	
LW010D	05/18/99	15:00	31.12	19.82	11.30	----	
LW010D	09/21/99	11:37	31.12	25.81	5.31	----	
LW010D	12/06/99	14:15	31.12	21.18	9.94	----	
LW010D	02/16/00	10:27	31.12	21.20	9.92	----	
LW010D	05/23/00	16:42	31.12	21.51	9.61	----	
LW010D	08/29/00	13:29	31.12	25.86	5.26	----	
LW010D	11/09/00	12:46	31.12	26.26	4.86	----	
LW010D	02/12/01	16:15	31.12	25.63	5.49	----	
LW010D	06/04/01	11:52	31.12	25.62	5.50	----	
LW010D	08/16/01	11:04	31.12	27.16	3.96	----	
LW010D	11/28/01	11:55	31.12	25.46	5.66	----	
LW010D	02/27/02	13:49	31.12	23.58	7.54	----	
LW010D	06/27/02	14:29	31.12	21.03	10.09	----	
LW010D	08/26/02	16:17	31.12	25.91	5.21	----	
LW010D	11/13/02	08:01	31.12	26.17	4.95	----	
LW011D	05/18/99	15:09	29.04	18.59	10.45	----	
LW011D	09/21/99	11:50	29.04	20.76	8.28	----	
LW011D	12/06/99	15:06	29.04	21.81	7.23	----	
LW011D	02/16/00	11:02	29.04	20.35	8.69	----	
LW011D	05/23/00	17:37	29.04	19.50	9.54	----	
LW011D	08/29/00	14:54	29.04	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW011D	11/09/00		29.04	----	----	----	Well sampled 11/8/00 - water level not representative
LW011D	02/12/01	15:16	29.04	23.14	5.90	----	
LW011D	06/04/01	13:11	29.04	23.35	5.69	----	
LW011D	08/16/01	11:25	29.04	26.94	2.10	----	
LW011D	11/28/01	12:53	29.04	24.54	4.50	----	
LW011D	02/27/02	14:57	29.04	21.80	7.24	----	
LW011D	06/27/02	15:11	29.04	18.84	10.20	----	
LW011D	08/26/02	16:47	29.04	22.71	6.33	----	
LW011D	11/13/02	08:55	29.04	23.87	5.17	----	
LW012D1	05/18/99	15:13	30.02	18.45	11.57	----	
LW012D1	09/21/99	11:54	30.02	24.44	5.58	----	
LW012D1	12/06/99	14:21	30.02	19.72	10.30	----	
LW012D1	02/16/00	10:35	30.02	19.89	10.13	----	
LW012D1	05/23/00	17:00	30.02	20.23	9.79	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW012D1	08/29/00	13:45	30.02	24.38	5.64	----	
LW012D1	11/09/00	13:00	30.02	24.66	5.36	----	
LW012D1	02/12/01	15:57	30.02	23.92	6.10	----	
LW012D1	06/04/01	12:32	30.02	23.99	6.03	----	
LW012D1	08/16/01	11:42	30.02	25.39	4.63	----	
LW012D1	11/28/01	12:38	30.02	23.33	6.69	----	
LW012D1	02/27/02	14:28	30.02	21.88	8.14	----	
LW012D1	06/27/02	14:57	30.02	19.58	10.44	----	
LW012D1							Abandoned August 7-8, 2003
LW012D2	05/18/99	15:14	29.24	18.23	11.01	----	
LW012D2	09/21/99	11:53	29.24	24.69	4.55	----	
LW012D2	12/06/99	14:22	29.24	19.40	9.84	----	
LW012D2	02/16/00	10:36	29.24	19.90	9.34	----	
LW012D2	05/23/00	16:59	29.24	20.38	8.86	----	
LW012D2	08/29/00	13:44	29.24	24.68	4.56	----	
LW012D2	11/09/00	13:01	29.24	24.56	4.68	----	
LW012D2	02/12/01	15:56	29.24	23.88	5.36	----	
LW012D2	06/04/01	12:31	29.24	24.10	5.14	----	
LW012D2	08/16/01	11:43	29.24	25.43	3.81	----	
LW012D2	11/28/01	12:39	29.24	23.17	6.07	----	
LW012D2	02/27/02	14:29	29.24	22.38	6.86	----	
LW012D2	06/27/02	14:58	29.24	19.44	9.80	----	
LW012D2							Abandoned August 7-8, 2003
LW014D	05/23/00	16:50	30.54	21.26	9.28	----	
LW014D	08/29/00	13:35	30.54	25.68	4.86	----	
LW014D	11/09/00	12:49	30.54	25.90	4.64	----	
LW014D	02/12/01	16:20	30.54	25.33	5.21	----	
LW014D	06/04/01	12:00	30.54	25.37	5.17	----	
LW014D	08/16/01	11:08	30.54	27.00	3.54	----	
LW014D	11/28/01	11:56	30.54	25.03	5.51	----	
LW014D	02/27/02	13:55	30.54	23.57	6.97	----	
LW014D	06/27/02	14:33	30.54	20.70	9.84	----	
LW014D	08/26/02	16:26	30.54	25.90	4.64	----	
LW014D	11/13/02	08:07	30.54	25.76	4.78	----	
LW015D	05/23/00	16:49	30.85	21.26	9.59	----	
LW015D	08/29/00	13:34	30.85	25.54	5.31	----	
LW015D	11/09/00	12:48	30.85	25.98	4.87	----	
LW015D	02/12/01	16:18	30.85	25.43	5.42	----	
LW015D	06/04/01	11:59	30.85	25.41	5.44	----	
LW015D	08/16/01	11:07	30.85	27.05	3.80	----	
LW015D	11/28/01	11:55	30.85	25.29	5.56	----	
LW015D	02/27/02	13:52	30.85	23.42	7.43	----	
LW015D	06/27/02	14:32	30.85	20.91	9.94	----	
LW015D	08/26/02	16:25	30.85	25.77	5.08	----	
LW015D	11/13/02	08:05	30.85	26.04	4.81	----	
LW016D	05/23/00	16:48	28.4	18.79	9.61	----	
LW016D	08/29/00	13:32	28.4	23.07	5.33	----	
LW016D	11/09/00	12:47	28.4	23.59	4.81	----	
LW016D	02/12/01	16:17	28.4	22.94	5.46	----	
LW016D	06/04/01	11:57	28.4	23.00	5.40	----	
LW016D	08/16/01	11:05	28.4	24.43	3.97	----	
LW016D	11/28/01	11:57	28.4	22.87	5.53	----	
LW016D	02/27/02	13:54	28.4	20.94	7.46	----	
LW016D	06/27/02	14:31	28.4	18.46	9.94	----	
LW016D	08/26/02	16:23	28.4	23.24	5.16	----	
LW016D	11/13/02	08:08	28.4	23.45	4.95	----	
LW017D	08/29/00	13:21	27.82	22.96	4.86	----	
LW017D	11/09/00	12:36	27.82	23.17	4.65	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW017D	02/12/01	16:04	27.82	22.44	5.38	----	
LW017D	06/04/01	11:44	27.82	22.42	5.40	----	
LW017D	08/16/01	10:55	27.82	23.80	4.02	----	
LW017D	11/28/01	11:50	27.82	22.00	5.82	----	
LW017D	02/27/02	13:37	27.82	19.82	8.00	----	
LW017D	03/05/02	11:30	27.82	20.46	7.36	----	
LW017D	04/05/02	08:15	27.82	21.34	6.48	----	
LW017D	05/29/02	00:00	27.82	17.90	9.92	----	
LW017D	06/27/02	14:20	27.82	17.64	10.18	----	
LW017D	08/26/02	16:07	27.82	22.67	5.15	----	
LW017D	11/13/02	07:45	27.82	22.80	5.02	----	
LW018D	08/29/00	13:25	27.82	22.79	5.03	----	
LW018D	11/09/00	12:40	27.82	22.91	4.91	----	
LW018D	02/12/01	16:10	27.82	22.56	5.26	----	
LW018D	06/04/01	11:47	27.82	22.28	5.54	----	
LW018D	08/16/01	11:00	27.82	23.81	4.01	----	
LW018D	11/28/01	11:51	27.82	22.00	5.82	----	
LW018D	02/27/02	13:43	27.82	20.44	7.38	----	
LW018D	06/27/02	14:23	27.82	17.72	10.10	----	
LW018D	08/26/02	16:13	27.82	21.90	5.92	----	
LW018D	11/13/02	07:51	27.82	22.71	5.11	----	
RW2	05/18/99	15:02	30.68	19.50	11.18	----	
RW2	09/21/99	11:40	30.68	25.75	4.93	----	
RW2	12/06/99	14:17	30.68	20.77	9.91	----	
RW2	02/16/00	10:29	30.68	20.99	9.69	----	
RW2	05/23/00	16:52	30.68	21.37	9.31	----	
RW2	08/29/00	13:36	30.68	25.36	5.32	----	
RW2	11/09/00	12:50	30.68	25.83	4.85	----	Groundwater interim action pumping began 10/5/00 in the lower zone at this well. Pump not running at time of measurement.
RW2	02/12/01	16:37	30.68	26.40	4.28	----	
RW2	06/04/01	12:05	30.68	26.26	4.42	----	
RW2	08/16/01	11:11	30.68	28.98	1.70	----	
RW2	11/28/01	12:02	30.68	26.86	3.82	----	
RW2	02/27/02	13:57	30.68	26.02	4.66	----	
RW2	06/27/02	14:35	30.68	23.68	7.00	----	
RW2	08/26/02	16:29	30.68	28.26	2.42	----	
RW2	11/13/02	08:20	30.68	28.50	2.18	----	
RIVER_GAUGE	08/11/93	12:57	28.13	24.90	3.23	----	
RIVER_GAUGE	10/26/93	13:17	28.13	25.27	2.86	----	
RIVER_GAUGE	11/17/93	13:21	28.13	24.18	3.95	----	
RIVER_GAUGE	12/17/93	12:46	28.13	22.48	5.65	----	
RIVER_GAUGE	01/17/94	12:58	28.13	22.90	5.23	----	
RIVER_GAUGE	02/18/94	14:10	28.13	22.30	5.83	----	
RIVER_GAUGE	03/18/94	12:48	28.13	21.70	6.43	----	
RIVER_GAUGE	04/18/94	14:34	28.13	23.50	4.63	----	
RIVER_GAUGE	05/18/94	15:14	28.13	21.80	6.33	----	
RIVER_GAUGE	06/17/94	14:45	28.13	21.32	6.81	----	
RIVER_GAUGE	07/19/94	09:10	28.13	23.25	4.88	----	
RIVER_GAUGE	08/17/94	07:26	28.13	24.00	4.13	----	
RIVER_GAUGE	09/16/94	07:30	28.13	24.66	3.47	----	
RIVER_GAUGE	10/17/94	08:58	28.13	24.10	4.03	----	
RIVER_GAUGE	11/21/94	11:43	28.13	23.20	4.93	----	
RIVER_GAUGE	12/19/94	10:58	28.13	19.95	8.18	----	
RIVER_GAUGE	01/18/95	11:04	28.13	16.70	11.43	----	
RIVER_GAUGE	02/21/95	13:14	28.13	14.65	13.48	----	
RIVER_GAUGE	03/21/95	12:58	28.13	18.90	9.23	----	
RIVER_GAUGE	04/19/95	12:37	28.13	19.80	8.33	----	
RIVER_GAUGE	05/19/95	13:22	28.13	17.40	10.73	----	
RIVER_GAUGE	07/17/95	13:48	28.13	22.00	6.13	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
RIVER_GAUGE	08/22/95	07:45	28.13	23.24	4.89	----	
RIVER_GAUGE	09/22/95	08:19	28.13	24.26	3.87	----	
RIVER_GAUGE	11/20/95	07:50	28.13	20.20	7.93	----	
RIVER_GAUGE	12/01/95	08:23	28.13	8.45	19.68	----	
RIVER_GAUGE	12/19/95	07:11	28.13	14.10	14.03	----	
RIVER_GAUGE	01/19/96	08:29	28.13	14.06	14.07	----	
RIVER_GAUGE	02/20/96	10:36	28.13	8.00	20.13	----	
RIVER_GAUGE	03/19/96	09:15	28.13	15.95	12.18	----	
RIVER_GAUGE	04/19/96	11:45	28.13	13.95	14.18	----	
RIVER_GAUGE	07/22/96	14:18	28.13	22.00	6.13	----	
RIVER_GAUGE	07/22/96	15:05	28.13	22.20	5.93	----	
RIVER_GAUGE	08/20/96	14:09	28.13	22.80	5.33	----	
RIVER_GAUGE	08/20/96	15:10	28.13	23.00	5.13	----	
RIVER_GAUGE	09/24/96	07:55	28.13	23.41	4.72	----	
RIVER_GAUGE	09/24/96	10:15	28.13	24.25	3.88	----	
RIVER_GAUGE	10/28/96	10:53	28.13	22.95	5.18	----	
RIVER_GAUGE	10/28/96	12:12	28.13	23.21	4.92	----	
RIVER_GAUGE	12/13/96	12:09	28.13	14.50	13.63	----	
RIVER_GAUGE	03/25/97	11:33	28.13	14.60	13.53	----	
RIVER_GAUGE	03/31/97		28.13	----	----	----	Locked
RIVER_GAUGE	07/16/97	06:55	28.13	18.73	9.40	----	
RIVER_GAUGE	07/16/97	07:55	28.13	18.84	9.29	----	
RIVER_GAUGE	07/16/97	09:14	28.13	18.92	9.21	----	
RIVER_GAUGE	10/21/97	15:52	28.13	23.38	4.75	----	
RIVER_GAUGE	10/21/97	16:11	28.13	23.44	4.69	----	
RIVER_GAUGE	10/21/97	17:55	28.13	23.59	4.54	----	
RIVER_GAUGE	01/27/98	10:46	28.13	18.20	9.93	----	
RIVER_GAUGE	01/27/98	12:25	28.13	18.31	9.82	----	
RIVER_GAUGE	01/27/98	13:56	28.13	17.89	10.24	----	
RIVER_GAUGE	05/18/98	17:12	28.13	16.97	11.16	----	
RIVER_GAUGE	05/18/98	17:45	28.13	17.15	10.98	----	
RIVER_GAUGE	08/17/98	09:58	28.13	23.98	4.15	----	
RIVER_GAUGE	08/17/98	10:34	28.13	24.15	3.98	----	
RIVER_GAUGE	11/13/98	09:30	28.13	24.64	3.49	----	
RIVER_GAUGE	11/13/98	10:05	28.13	24.45	3.68	----	
RIVER_GAUGE	02/16/99	12:40	28.13	19.36	8.77	----	
RIVER_GAUGE	02/16/99	13:27	28.13	19.43	8.70	----	
RIVER_GAUGE	05/18/99	14:33	28.13	17.24	10.89	----	
RIVER_GAUGE	05/18/99	15:19	28.13	17.30	10.83	----	
RIVER_GAUGE	09/21/99	11:10	28.13	24.94	3.19	----	
RIVER_GAUGE	09/21/99	11:59	28.13	25.03	3.10	----	
RIVER_GAUGE	12/06/99	13:43	28.13	18.24	9.89	----	
RIVER_GAUGE	12/06/99	14:25	28.13	18.06	10.07	----	
RIVER_GAUGE	02/16/00	10:03	28.13	19.18	8.95	----	
RIVER_GAUGE	02/16/00	10:41	28.13	19.07	9.06	----	
RIVER_GAUGE	05/23/00	16:12	28.13	19.80	8.33	----	
RIVER_GAUGE	05/23/00	17:04	28.13	19.94	8.19	----	
RIVER_GAUGE	08/29/00	12:54	28.13	24.63	3.50	----	
RIVER_GAUGE	08/29/00	13:49	28.13	24.91	3.22	----	
RIVER_GAUGE	11/09/00	12:19	28.13	24.26	3.87	----	
RIVER_GAUGE	11/09/00	13:10	28.13	23.67	4.46	----	
RIVER_GAUGE	02/12/01	15:45	28.13	23.75	4.38	----	
RIVER_GAUGE	02/12/01	16:43	28.13	24.00	4.13	----	
RIVER_GAUGE	06/04/01	11:20	28.13	23.62	4.51	----	
RIVER_GAUGE	06/04/01	12:15	28.13	23.79	4.34	----	
RIVER_GAUGE	08/16/01	10:20	28.13	24.83	3.30	----	
RIVER_GAUGE	08/16/01	11:29	28.13	25.23	2.90	----	
RIVER_GAUGE	11/28/01	11:16	28.13	22.50	5.63	----	
RIVER_GAUGE	11/28/01	12:18	28.13	23.13	5.00	----	
RIVER_GAUGE	02/27/02	13:11	28.13	22.24	5.89	----	
RIVER_GAUGE	02/27/02	14:12	28.13	22.27	5.86	----	
RIVER_GAUGE	03/05/02	11:25	28.13	21.42	6.71	----	
RIVER_GAUGE	04/05/02	08:00	28.13	23.10	5.03	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
RIVER_GAUGE	05/29/02	14:07	28.13	17.31	10.82	----	
RIVER_GAUGE	06/27/02	14:07	28.13	18.31	9.82	----	
RIVER_GAUGE	06/27/02	14:43	28.13	18.36	9.77	----	
RIVER_GAUGE	08/26/02	15:45	28.13	24.83	3.30	----	
RIVER_GAUGE	08/26/02	16:13	28.13	24.85	3.28	----	
RIVER_GAUGE	11/13/02	07:19	28.13	24.10	4.03	----	
RIVER_GAUGE	11/13/02	07:54	28.13	24.21	3.92	----	

Notes:
NM Not measured.
NA Not available.
-- No measurable product or odor observed.
* Well Point
(a) Reference Elevation (Ref. Elev) is the north side of the top of the 1.25-, 2- or 4-inch well casing, reference elevation surveys were conducted by Zarosinski-Tatone Engineers, Inc., Portland, Oregon. For the river gauge, the reference elevation was measured at a marked location on the south side of the dock on the Willamette River.
(b) Depth to water (DTW) measured from surveyed reference elevation [see note (1)].
(c) Where LNAPL thickness measured, groundwater elevation adjusted to account for the presence of LNAPL in the well using the method in "*Estimation of Free Hydrocarbon Volume from Fluid Levels in Monitoring Wells*" [Lenhard and Parker 1990; Groundwater 28(1):57-67].

APPENDIX C

Groundwater Interim Action Recovery Summary

TABLE C-1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
UPPER AND LOWER WATER-BEARING ZONES
TIME OIL NORTHWEST TERMINAL

	RW-2 Discharge				HRW-1 Discharge				SDM-1 Discharge				Treatment System Discharge			
Monitoring Period	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (µg/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (µg/L)	Comments
Fourth Quarter 2000																
October 2000	439,003			0.35									0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/9/2000	95	0.24									467,478	11/7/2000	ND (a)	
December 2000	348,720	12/20/2000	39	0.11									497,656	12/6/2000 12/20/2000	5.89 9.73	
Quarterly Totals	*1,093,324*			*0.70*									*965,134*			
First Quarter 2001																
January 2001	416,140	1/18/2001	38.8	0.13									239,207	1/18/2001	14.3	
February 2001	335,008	2/13/2001	30	0.08									184,192			
March 2001	332,963	3/7/2001	ND (b)	0.03									517,332	3/7/2001	ND (b)	
Quarterly Totals	*1,084,111*			*0.25*									*940,731*			
Second Quarter 2001																
April 2001	377,931			0.04									275,519			
May 2001	344,252	5/22/2001	12.3	0.04									195,522	5/22/2001	5.29	
June 2001	361,846	6/4/2001	0.68	0.04									563,853			
Quarterly Totals	*1,084,029*			*0.11*									*1,034,894*			
Third Quarter 2001																
July 2001	351,509			0.01									559,015			
August 2001	486,123	8/13/2001	5	0.02									66,876			
Quarterly Totals	*837,632*			*0.03*									*625,891*			
Fourth Quarter 2001																
October 2001	393,168	10/11/2001	ND (a)	0.01									484,158	10/11/2001	ND (a)	
November 2001	319,798			0.01									118,786	11/1 & 11/15/01	ND (a)	
December 2001	361,058	12/6/2001	ND (c)	0.01									717,769	12/6/2001	ND (c)	
Quarterly Totals	*680,856*			*0.02*									*836,555*			
First Quarter 2002																
January 2002	331,224			0.02	1,812			0.01					340,688			Recovered groundwater from HRW-1 from January 22-29. Re-initiated groundwater recovery from HRW-1 on February 28.
February 2002	282,480	2/27/2002	8.6	0.02	58			0.00					437,943			HRW-1 mass removal estimates for January and February are based on the March 12 sample event.
March 2002	280,814			0.02	40,294	3/12/2002	786	0.26					234,816			RW-2 mass removal estimates for January and March are based on February 27 sample event.
Quarterly Totals	*894,518*			*0.06*	*42,164*			*0.28*					*1,013,447*			
Second Quarter 2002																
April 2002	292,099			0.19	74,996	4/5/2002	94	0.06					391,263	4/5/02 4/22/02	34.4 9.33	RW-2 mass removal estimates for April and May are based on June 27 sample event.
May 2002	310,584			0.20	23,427	5/29/2002	452	0.09					247,440			
June 2002	272,393	6/27/2002	76	0.17	25,484	6/25/2002	410	0.09					307,810			
Quarterly Totals	*875,076*			*0.56*	*123,907*			*0.23*					*946,513*			
Third Quarter 2002																
July 2002	272,771			0.08	51,111			0.18					188,300	7/24/2002	2.09	
August 2002	270,746	8/27/2002	36	0.08	7								301,613	8/20/2002	9.15	HRW-1 shut down on July 24 due to dry pumping conditions and potential biofouling of the well. HRW-1 mass removal rate estimate based on June 2002 data.
September 2002	143,662			0.04	0				Not metered	9/23/2002	47.0		369,469	9/23/2002	11.8	RW-2 temporarily shut down on September 25.
Quarterly Totals	*687,179*				*51,118*								*859,382*			Water being intercepted from SDM-1 and pumped to treatment system beginning on September 16. RW-2 mass removal rates based on August 27 sampling event.
Fourth Quarter 2002																
October 2002	177,937			0.05	0				Not metered				112,129	10/3/2002	8.84	Pumping resumed at RW-2 on October 10.
November 2002	275,033	11/13/2002	37	0.09	0				95,157							The storage tank flowmeter was moved to the groundwater sump SDM-1 on November 1.
December 2002	418,446			0.13	0				124,894							
Quarterly Totals	*871,416*				*0*											RW-2 mass removal rates based on November 13 sampling event.

(a) PCP not detected above the detection limit of 5 µg/L; concentration-dependent calculations based on half the detection limit.
(b) PCP not detected above the detection limit of 25 µg/L; concentration-dependent calculations based on half the detection limit.
(c) PCP not detected above the detection limit of 5.25 µg/L; concentration-dependent calculations based on half the detection limit.

BZTO104(e)017601

APPENDIX D

Data Validation Report

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL · GEOTECHNICAL · NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager

cc: Tom Roick, Oregon Department of Environmental Quality (DEQ)
Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

FROM: Stacy Pischer, QA Manager

DATE: January 31, 2003

RE: FOURTH QUARTER 2002 GROUNDWATER MONITORING LABORATORY DATA QUALITY EVALUATION TIME OIL NORTHWEST TERMINAL

This technical memorandum provides the results of a data quality evaluation for 29 groundwater samples and 3 trip blanks collected at the Time Oil Northwest Terminal on November 11 through 13, 2002 for the Phase II remedial investigation (RI) fourth quarter 2002 groundwater monitoring event. A data quality evaluation was performed for analyses of total petroleum hydrocarbons [TPH; Oregon Department of Environmental Quality (DEQ) TPH-D, TPH-D extended, and TPH-G]; volatile organic compounds [VOCs; U.S. Environmental Protection Agency (EPA) Method 8260B]; pentachlorophenol [PCP; EPA Method 8270 with selected ion monitoring (SIM)]; semivolatile organic compounds (SVOCs; EPA Method 8270C); selected priority pollutant metals (EPA Method 6010/7000 series); chloride (EPA Method 325.2), and total dissolved solids (TDS; EPA Method 160.1). All of the analyses were performed by Analytical Resources, Inc. (ARI), located in Seattle, Washington. This data quality evaluation covers ARI data packages EX87, EY88, EZ03, and EZ17. The data quality evaluation was performed in accordance with the revised quality assurance project plan (QAPP) contained in Appendix C of the *Phase III Remedial Investigation* work plan (Landau Associates 2001), and with applicable portions of the EPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* and *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994a,b).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Surrogate spike recoveries
- Matrix spike and matrix spike duplicate (MS/MSD) results
- Laboratory control sample (LCS) results
- Blank (method and field) results

- Duplicate (laboratory and field) results
- Reporting limits
- Overall data quality and completeness.

Data validation qualifiers are added to sample results based on the evaluation of data quality. The absence of a data qualifier indicates that the datum is acceptable without qualification. Applicable data validation qualifiers are summarized in Table 1. The data quality evaluation is summarized below.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package. The laboratory received all samples in good condition and all analyses requested were performed.

HOLDING TIMES

For all analyses and all samples, the time between sample collection, extraction, and analysis was determined to be within EPA and project-specified holding times, with the following exception: the diluted VOC analysis of sample RW-1 was performed 1 day past the method recommended holding time of 14 days. Because only the 1,2,4-trimethylbenzene result was affected by this analysis, only this result was qualified as an estimated (J).

SURROGATE SPIKE RECOVERIES

All of the surrogate spike recoveries were within the laboratory control limits except as discussed below:

- **Data Package EX87 - VOC analysis**. Recovery of surrogate d4-1,2-dichlorobenzene slightly exceeded the laboratory control limits. The laboratory re-analyzed the sample and all surrogate recoveries were within control limits. Results from the analyses will be reported; therefore, no qualification of the data is necessary.

- **Data Package EZ03 – SVOC analyses.** During the initial analysis of sample LW011S, recovery of one surrogate from each fraction (acid and base/neutral) exceeded the laboratory upper control limit. During the analysis of samples J1 and J2, recovery values for one surrogate were outside the laboratory control limit. No qualifiers were assigned because, in accordance with the EPA functional guidelines, two or more SVOC surrogates within the same fraction must be outside the control limits to require qualification of the data.

- **Data Package EZ17 – SVOCs analyses.** All surrogates were diluted out during the SVOC dilution analysis of sample RW1. Because surrogate recoveries during the initial (nondiluted) analysis of this sample were within the laboratory and/or project-specified control limits, no qualifiers were assigned.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) RESULTS

A minimum of one MS/MSD pair per 20 samples (or per laboratory batch if fewer than 20 samples were obtained) was performed for each organic analysis and a minimum of one MS per 20 samples (or per laboratory batch if fewer than 20 samples were obtained) was performed for total metals and conventional analyses. For all analyses, each MS/MSD was performed using a project sample. Recoveries and relative percent differences (RPDs) for the MS/MSDs were within the laboratory control limits with the following exceptions:

- **Data Package EZ03 – VOC analyses.** The recovery value for vinyl chloride in the MS exceeded the upper laboratory control limit. However, because the recovery values for vinyl chloride in the associated MSD and laboratory control samples were within the laboratory control limits, no qualifiers were added to the data.

- **Data Package EZ03 – TPH-D analyses.** The recovery value for diesel-range petroleum hydrocarbons in the MSD was slightly below the lower laboratory control limit. Also the RPD between the MS results and the MSD results exceeded the laboratory control limit. However, because the recovery values for diesel-range petroleum hydrocarbons in the associated MS and laboratory control samples were within control limits, no qualifiers were added to the data.

LABORATORY CONTROL SAMPLE (LCS) RESULTS

Except for the analysis of TDS, at least one LCS/blank spike was analyzed with each batch of samples. LCS duplicates were also performed with some of the analyses. Recoveries and RPDs for the LCSs and associated duplicates were within laboratory control limits. No qualification of the data was necessary.

METHOD BLANK RESULTS

Method blanks were analyzed with each batch of samples for each analysis. No contamination was detected in the method blanks. No qualification of the data was necessary.

FIELD BLANK RESULTS

In accordance with the QAPP, field equipment rinsate blanks were not collected (all sampling equipment was dedicated and/or disposable, which eliminated the potential for cross contamination). Trip blanks were submitted for analysis of VOCs. No VOCs were detected in the trip blanks.

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LABORATORY DUPLICATE RESULTS

At least one laboratory duplicate sample was analyzed for TDS and chloride. All RPDs were within the laboratory control limits. No qualification of the data was necessary.

FIELD DUPLICATE RESULTS

Three blind field duplicate pairs (RW2/W, X/LW008S, and OX005S/LW011S) were collected during this sampling event. The project-specified criterion of at least one blind field duplicate sample per 20 samples was met. A project-specified control limit of 20 percent was used to evaluate the RPDs between the duplicate samples except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for both duplicate sample pairs submitted for analysis were within the project-specified control limits, except as indicated in Table 1, and as discussed below:

- Copper was detected in sample RW-2 and not detected in the associated duplicate sample, W. An RPD was calculated using the maximum possible concentration for sample W (i.e., the reporting limit) and the detected concentration for RW-2. The calculated RPD exceeded the control limit. Also, both values were within 5 times the reporting limit; therefore, the values were evaluated using plus or minus the reporting limit as the control limit. This control limit was also exceeded; therefore the detected concentration for copper in sample RW-2 was qualified as an estimate (J) and the nondetected concentration for copper in Sample W was qualifed as an estimated (UJ).

- The RPD between 2,3,4,5-tetrachlorophenol and 1,3,5-trimethylbenzene results for blind field duplicate samples OX005S and LW0011S slightly exceeded the control limit of 20 percent. These results were qualified as estimates (J).

OTHER

Other factors that required qualification of the data include the following:

- During extraction of samples OX003S and OX004S for chlorophenol analysis, the laboratory noted that there were two extracts labeled identically by the laboratory. The laboratory was able to re-extract sample OX003S, but due to insufficient volume, was unable to re-extract sample OX004S. Based on the result of all three extracts, the laboratory determined which results represented samples OX003S and OX004S using the initial extracts. The laboratory did not report the results for the second extract for sample OX003S. However, based on this data evaluation, the results were not definitive, and all chlorophenol results for samples OX003S and OX004S were qualified as estimates (J detects, UJ nondetects).

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples.

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OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory duplicates, field duplicates, matrix spike duplicates, and laboratory control samples duplicates. Data accuracy was evaluated through surrogate spikes, matrix spikes, and laboratory control samples. Based on this data quality evaluation, all of the data were determined to be acceptable and no data were rejected.

The completeness for this set of data is 100 percent, which exceeds the project-specified goal of 90 percent.

REFERENCES

EPA. 1994a. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency.

EPA. 1994b. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. U.S. Environmental Protection Agency.

Landau Associates. 2001. *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon*. June 18.

TABLE 1
SUMMARY OF DATA QUALIFIERS
FOURTH QUARTER 2002 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES EX87, EY88, EZ03, AND EZ17

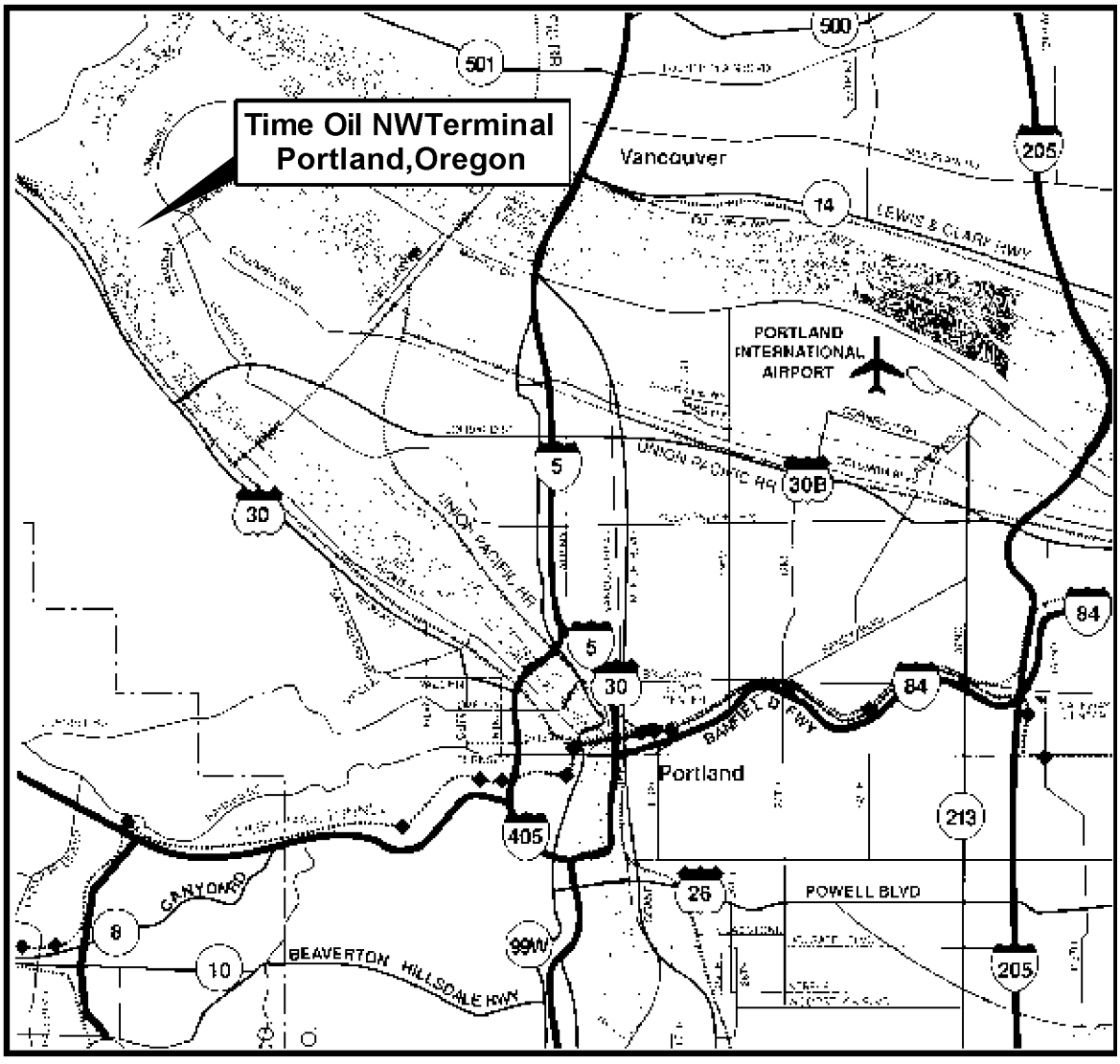
Data Package No.	Analyte	Qualifier	Sample Number	Reason
EZ17	Copper	J, UJ	RW-2 W	Low precision between field duplicate results
EX87	2,3,4,5-Tetrachlorophenol	J	OX005S LW0011S	Low precision between field duplicate results
	1,3,5-Trimethylbenzene	J	OX005S LW0011S	Low precision between field duplicate results
	1,2,4-Trimethylbenzene (diluted analysis)	J	RW-1	Holding time exceeded by 1 day
	All Chlorophenols	J, UJ	OX003S OX004S	Uncertainty if correct extract was used

J = Indicates the analyte was positively identified; the associated numerical is the approximate concentration of the analyte in the sample.
U = Indicates compound was analyzed for, but was not detected at the given detection limit.

APPENDIX E

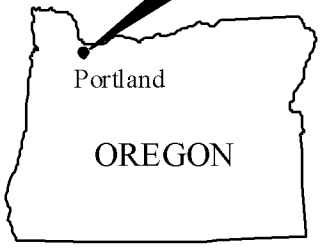
Laboratory Data

N



MapfromMetroAmerica1995

SITE LOCATION
(see enlarged map area above)



0 2 4
ApproximateScaleinMiles

Time Oil | T:\231\001\Site Map.cdr (C) 05/10/2002

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TimeOilNWTerminal Portland,Oregon	Vicinity Map	Figure 1

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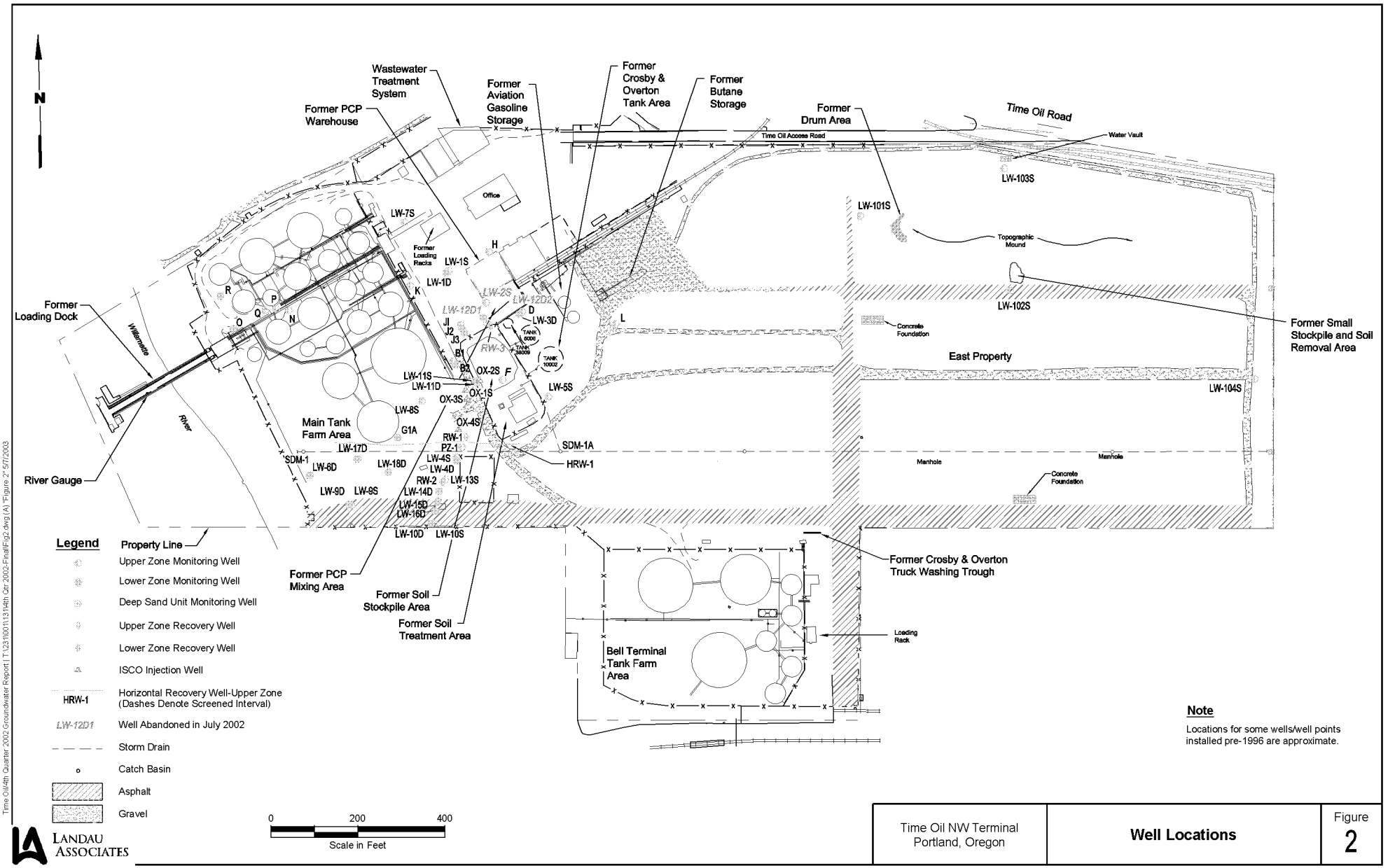

Time Oil 4th Quarter 2002 Groundwater Report | T:\231\001\13\14th Qtr 2002-Final\Fig2.dwg (A) "Figure 2" 5/7/2003

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Time Oil NW Terminal Portland, Oregon	**Well Locations**	Figure 2

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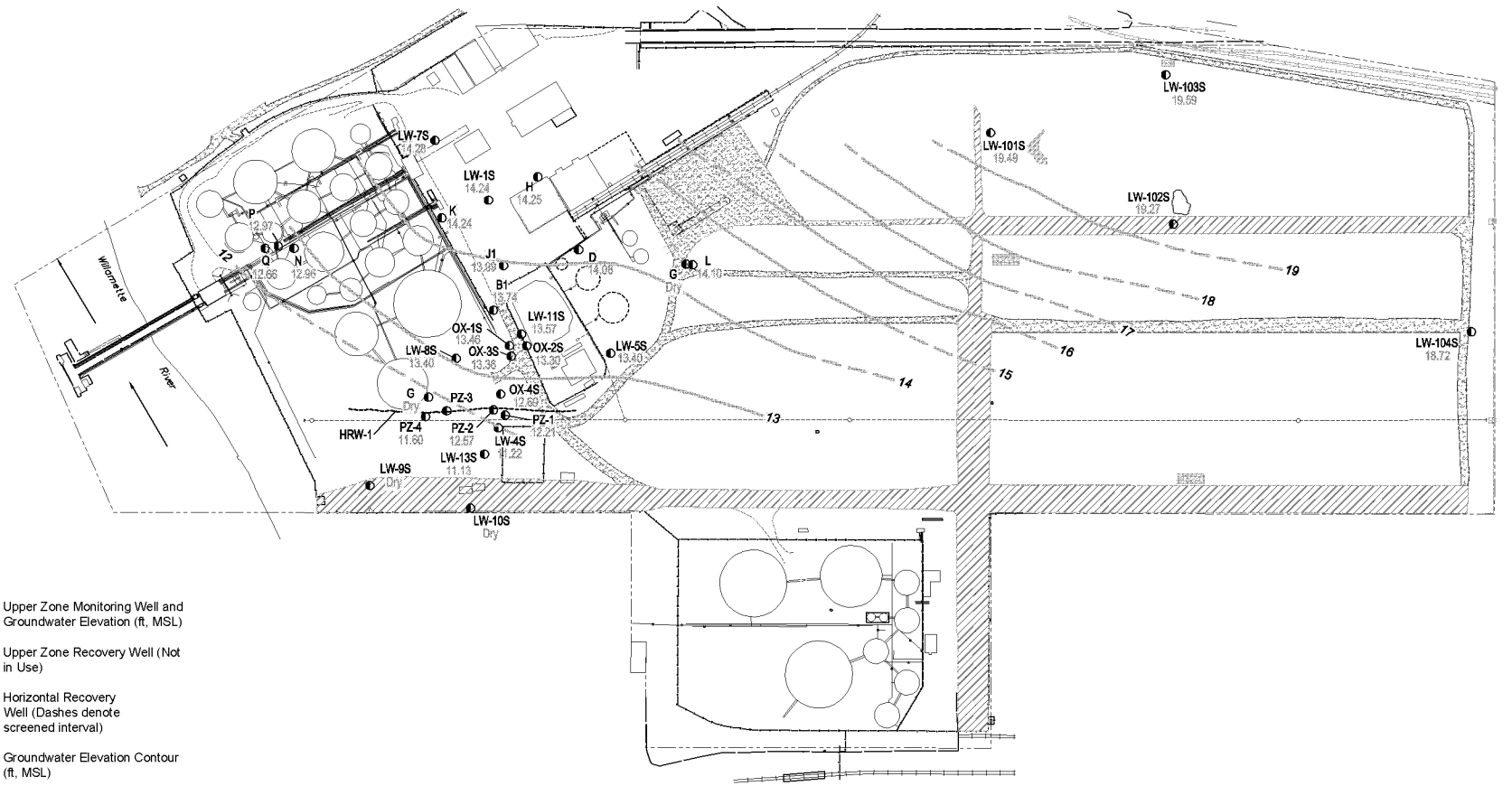

Legend

- LW-8S 16.56 — Upper Zone Monitoring Well and Groundwater Elevation (ft, MSL)
- Upper Zone Recovery Well (Not in Use)
- HRW-1 — Horizontal Recovery Well (Dashes denote screened interval)
- 18 — Groundwater Elevation Contour (ft, MSL)

0 200 400
Scale in Feet

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Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Upper Zone, November 13, 2002**	Figure 3

Time Oil\4th Quarter 2002 Groundwater Report | T:\231\001\13\14th Qtr 2002-Final\Fig3.dwg (A) "Figure 3" 5/7/2003

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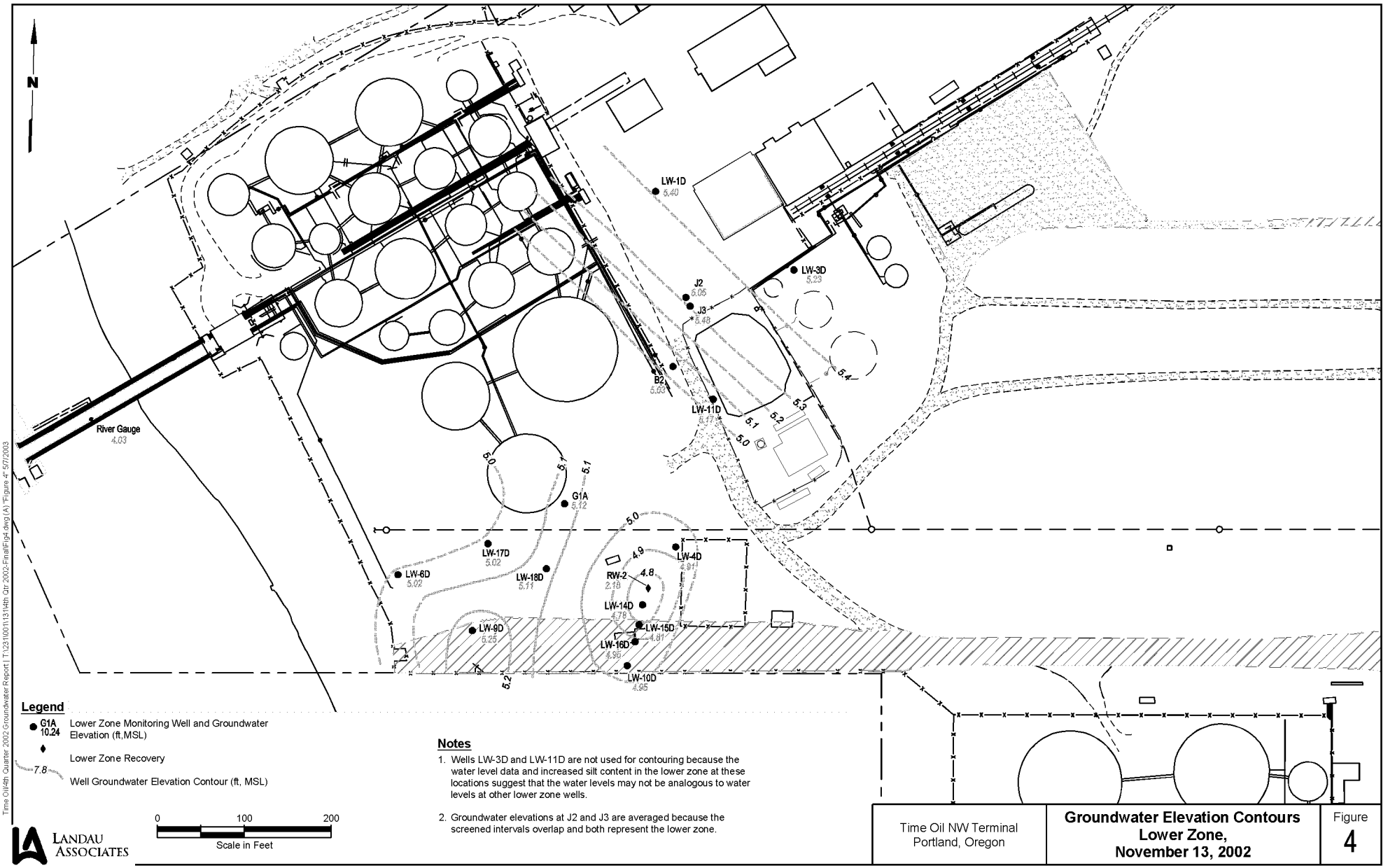

Legend

- G1A 10.24 — Lower Zone Monitoring Well and Groundwater Elevation (ft,MSL)
- Lower Zone Recovery
- 7.8 — Well Groundwater Elevation Contour (ft, MSL)

Notes

1. Wells LW-3D and LW-11D are not used for contouring because the water level data and increased silt content in the lower zone at these locations suggest that the water levels may not be analogous to water levels at other lower zone wells.
2. Groundwater elevations at J2 and J3 are averaged because the screened intervals overlap and both represent the lower zone.

0 100 200
Scale in Feet

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Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Lower Zone, November 13, 2002**	Figure 4

Time Oil 4th Quarter 2002 Groundwater Report | T:\231\001\1\31\4th Qtr 2002-Final\Fig4.dwg (A) "Figure 4" 5/7/2003

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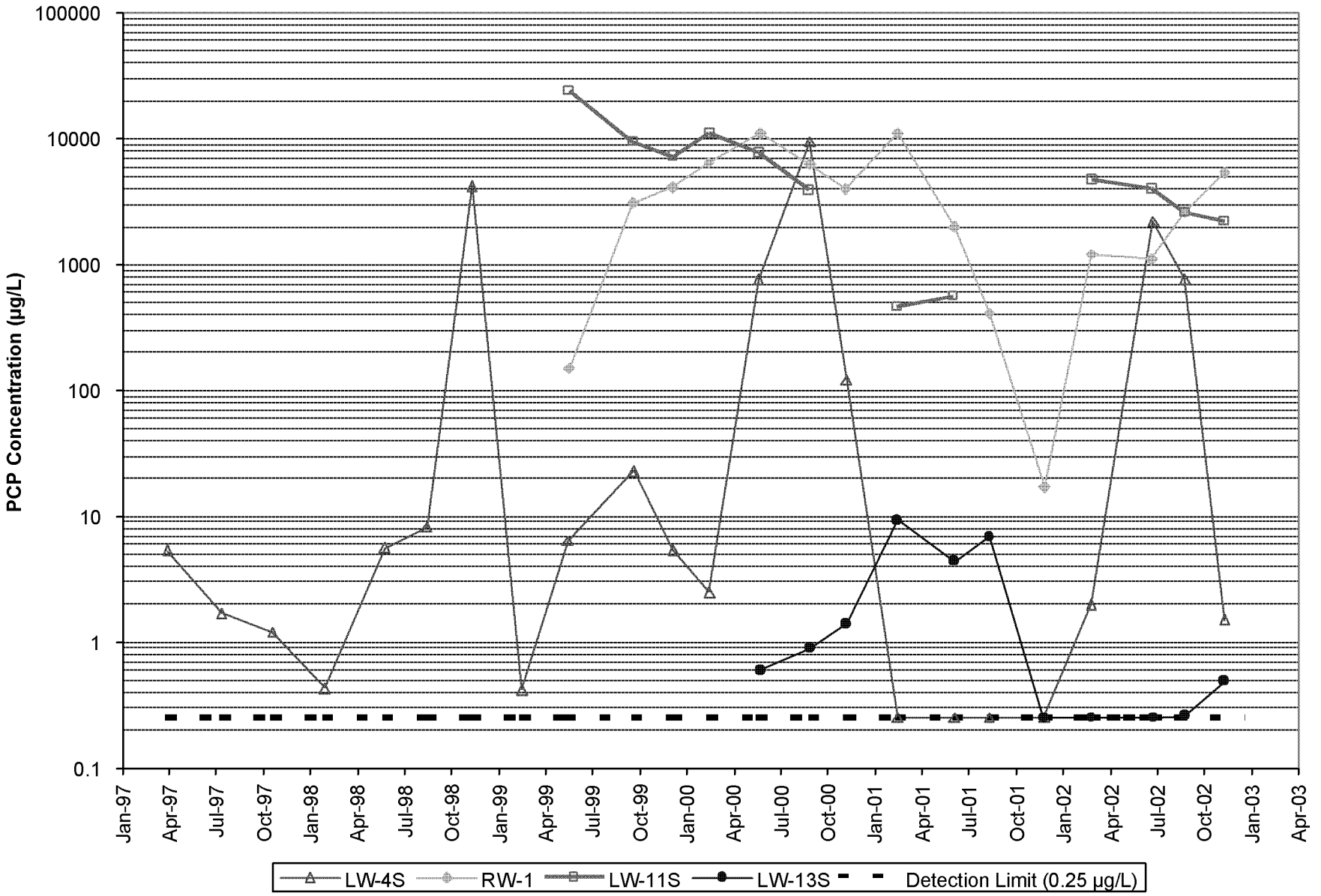
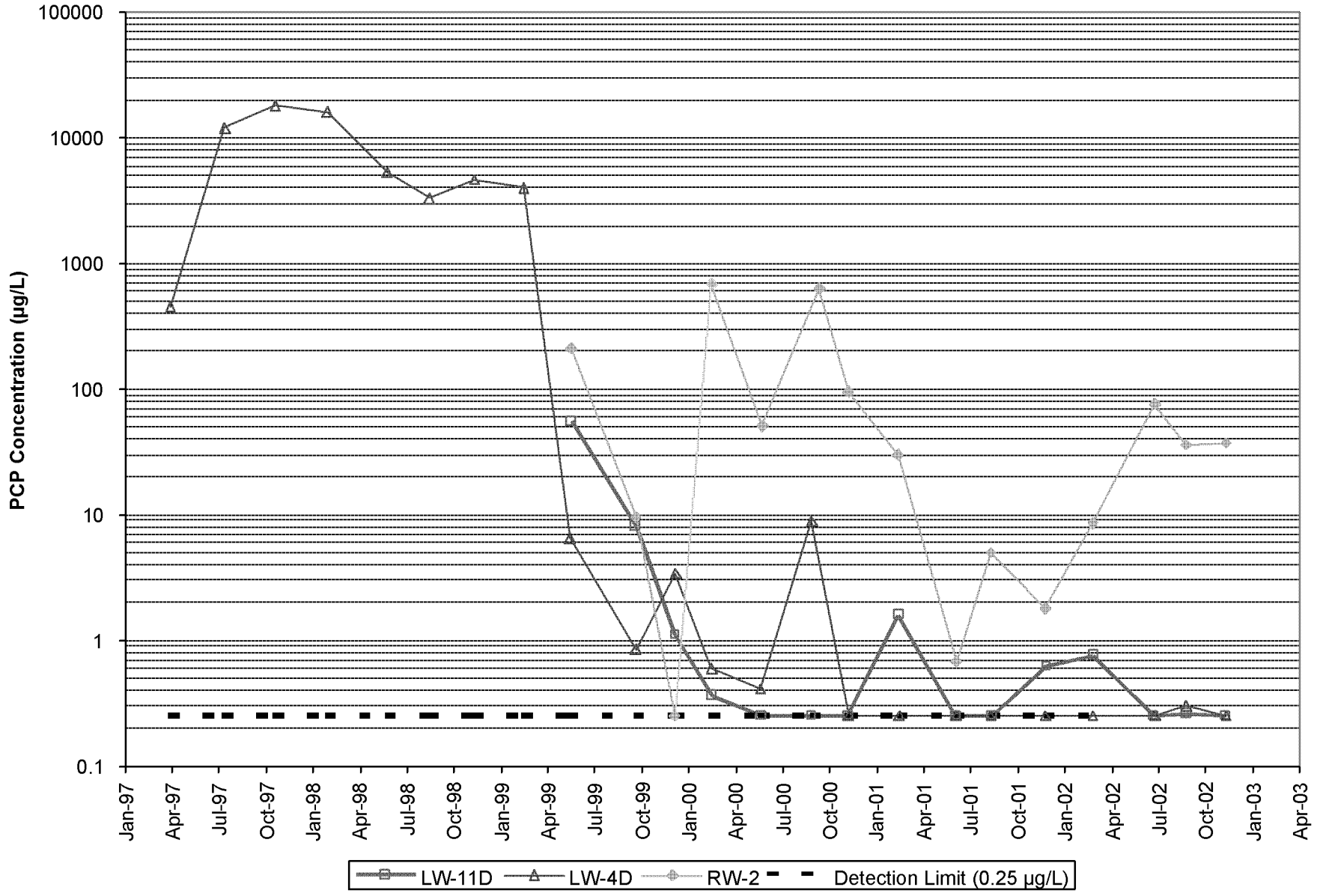


Time Oil Phase II RI
Portland, Oregon

PCP Concentrations
Selected Upper Zone Wells
April 1997 – November 2002

Figure
5



Time Oil Phase II RI
Portland, Oregon

PCP Concentrations
Selected Lower Zone Wells
April 1997 – November 2002

Figure
6

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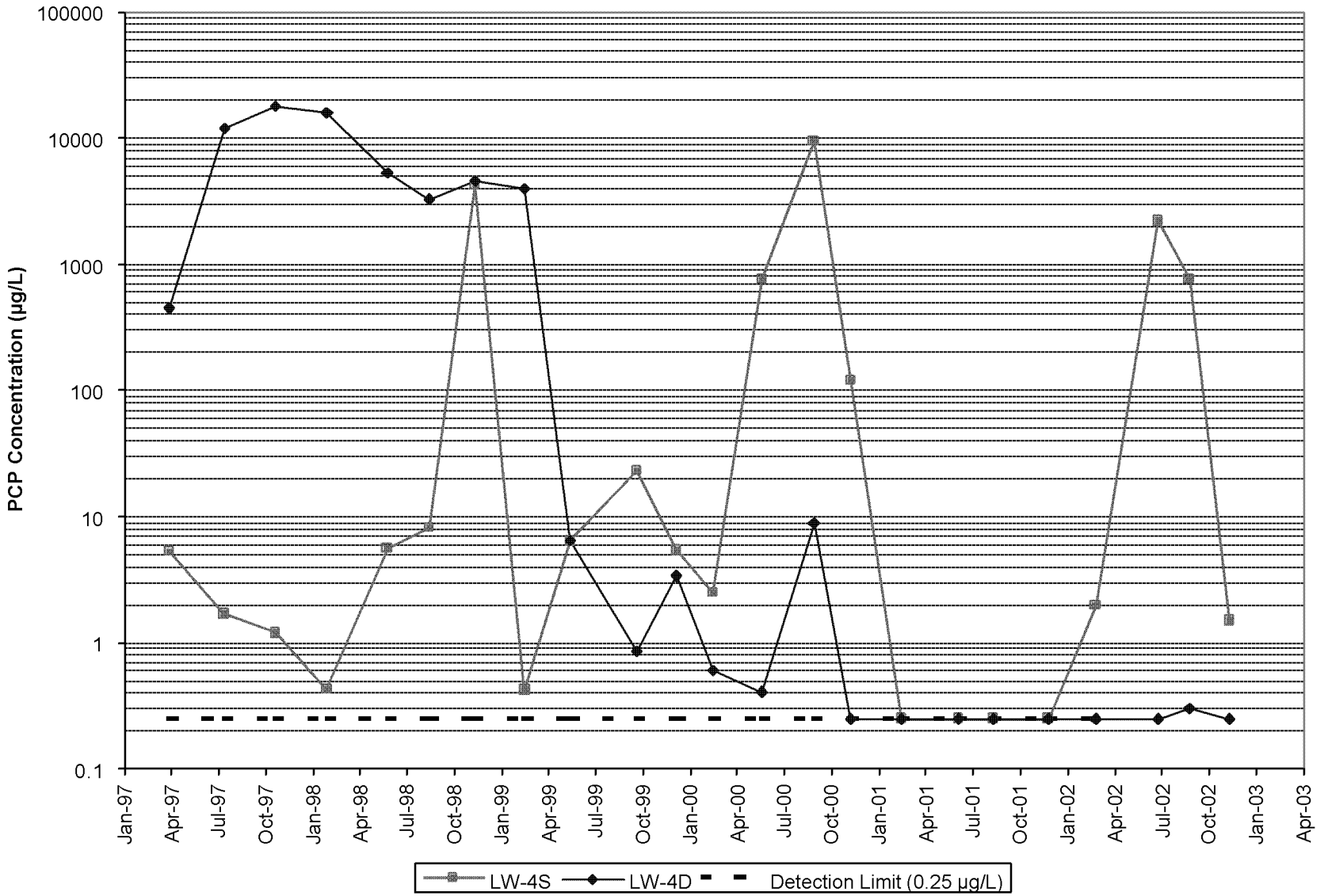

Time Oil Phase II RI Portland, Oregon	**PCP Concentrations, Wells LW-4S and LW-4D, April1997 – November 2002**	Figure 7

BZTO104(e)017616

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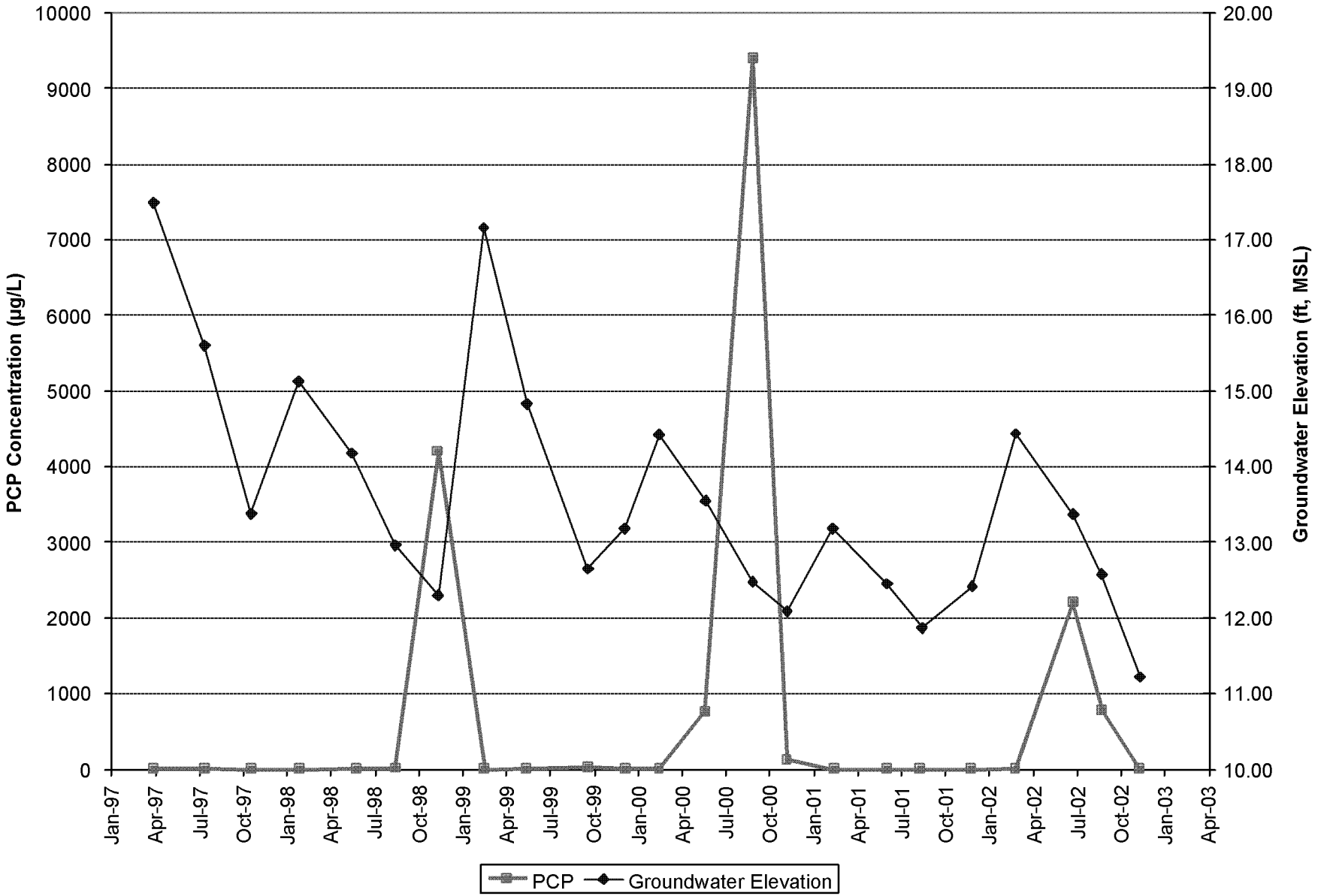

Time Oil Phase II RI
Portland, Oregon

PCP Concentrations and Groundwater Elevations, LW-4S, April 1997 – November 2002

Figure
8

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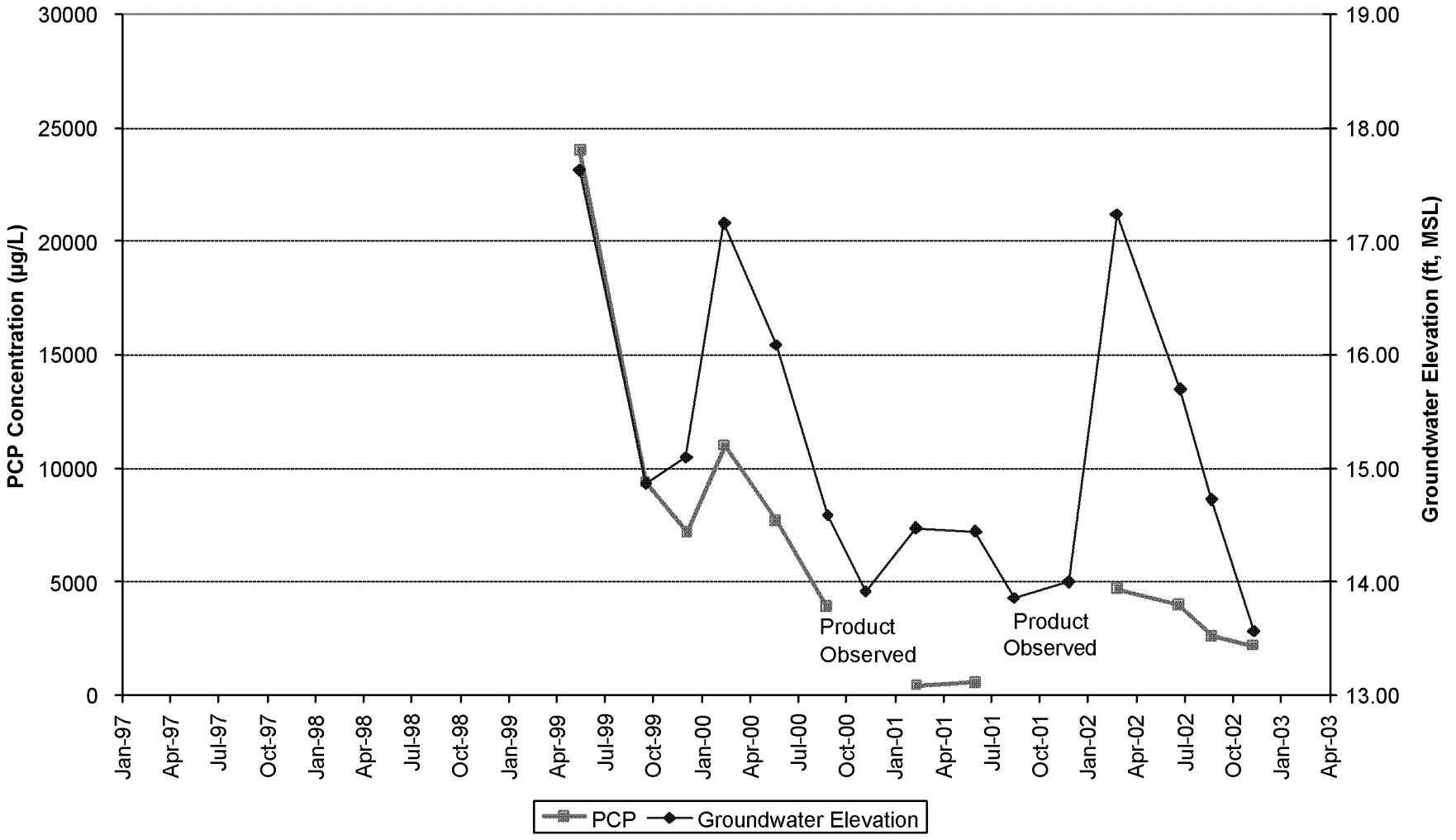

Time Oil Phase II RI Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-11S, April 1997 – November 2002**	Figure 9

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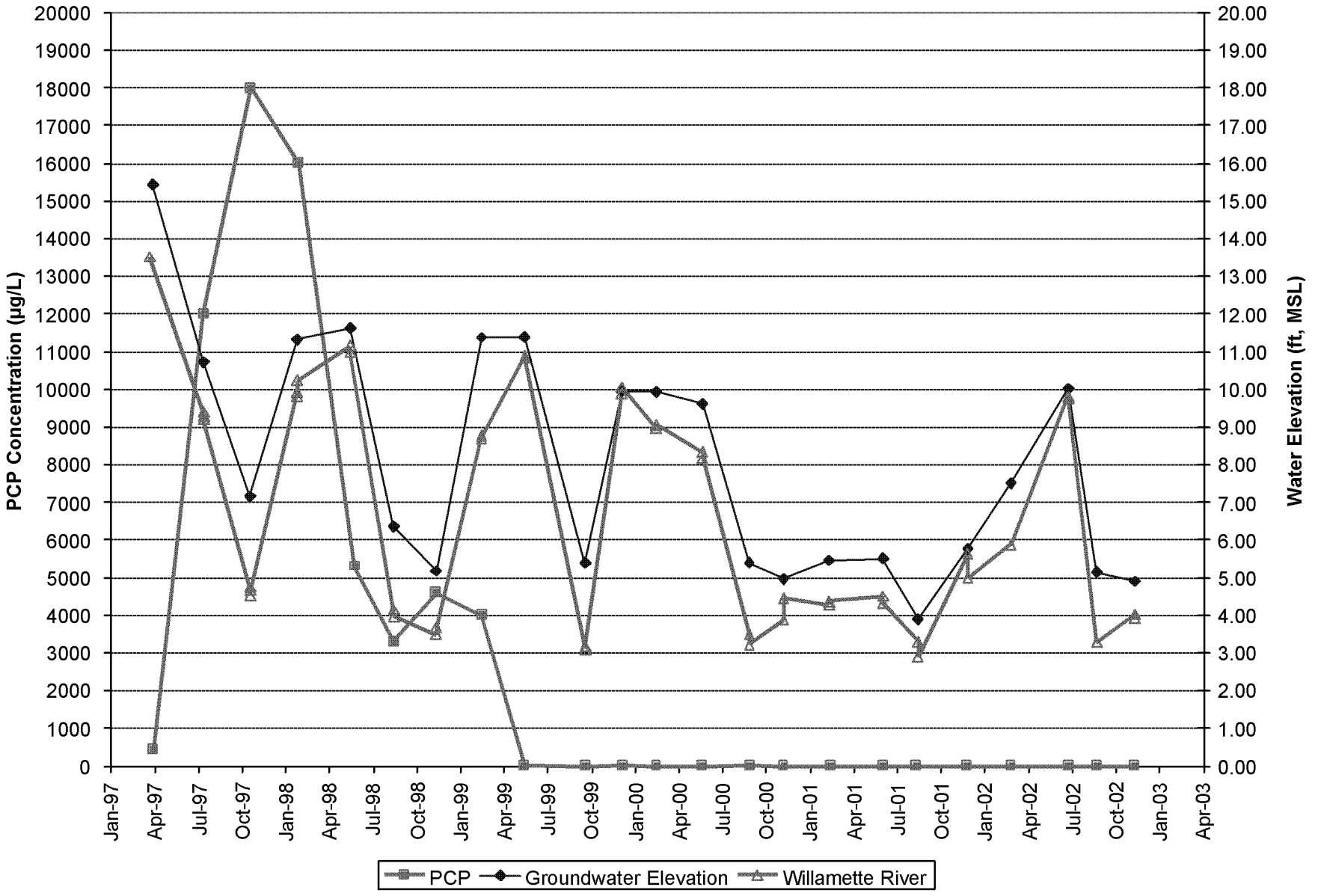

Time Oil Phase II RI Portland, Oregon	**PCP Concentrations, Groundwater Elevations, and River Stage, LW-4D, April 1997 – November 2002**	Figure 10

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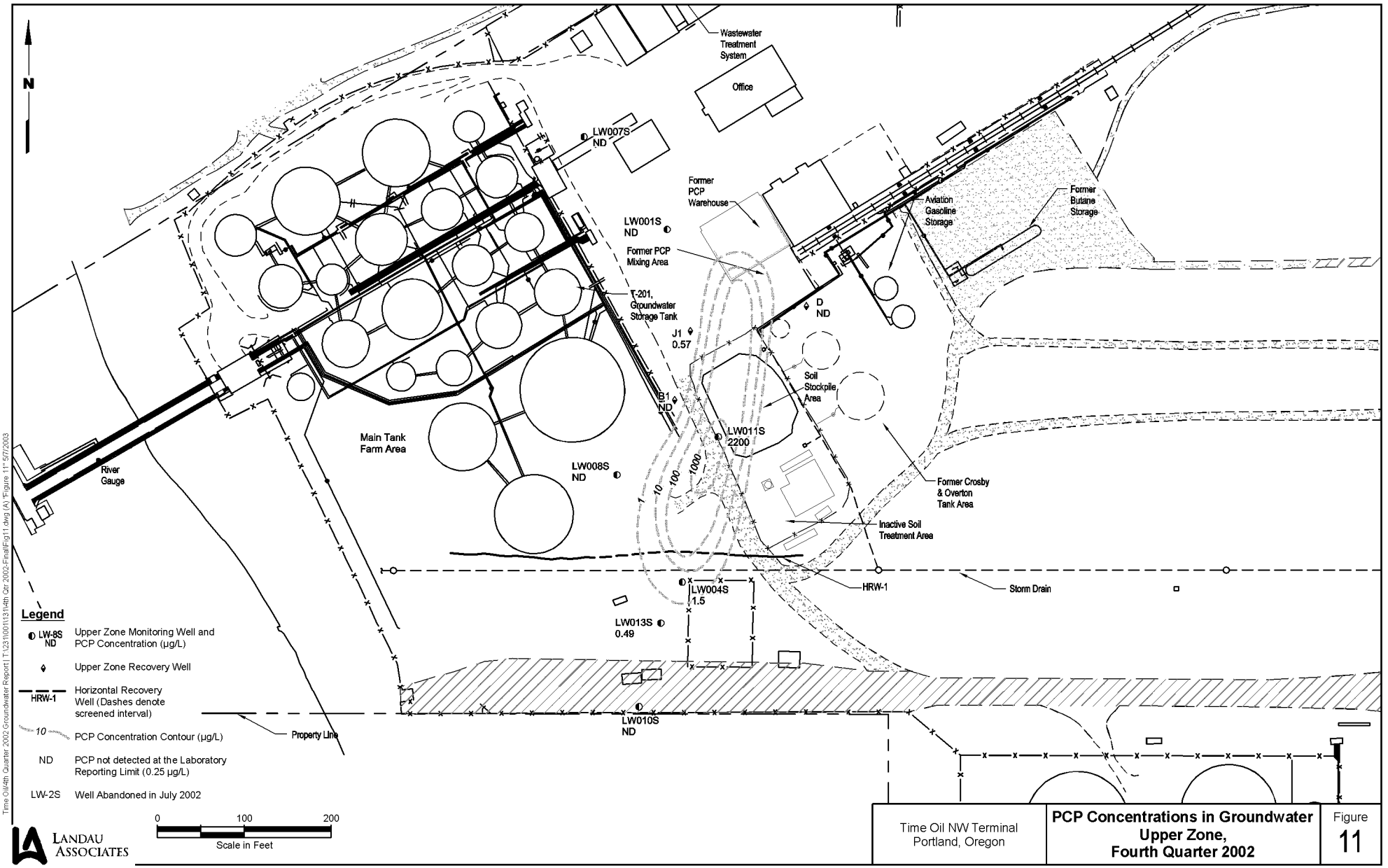

Time Oil(4th Quarter 2002 Groundwater Report) T:\231\001\13\14th Qtr 2002-Final\Fig11.dwg (A) "Figure 11" 5/7/2003

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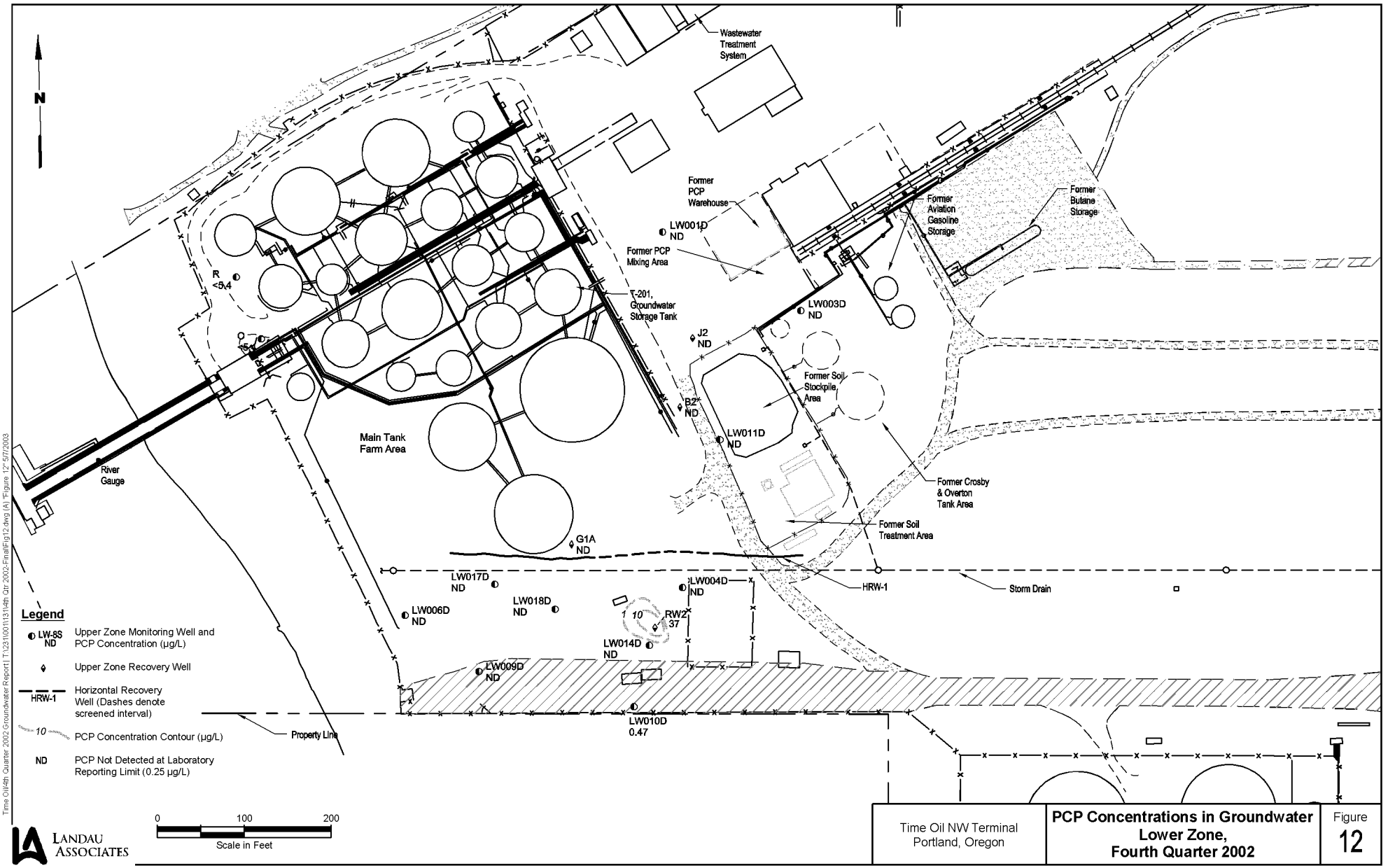


Time Oil(4th Quarter 2002 Groundwater Report) T:\231\001\113\14th Qtr 2002-Final\Fig12.dwg (A) "Figure 12" 5/7/2003

BZTO104(e)017621

Mike Tischuk

JUN 23 2003

LANDAU ASSOCIATES

June 18, 2003

Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Attn: Tom Roick

RE: SUBMISSION OF *IN SITU* CHEMICAL OXIDATION FIELD PILOT TEST REPORT
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil Co. (Time Oil), Landau Associates is submitting two copies of the *Field Pilot Test Report,* prepared by In-Situ Oxidative Technologies, Inc. (ISOTEC), for the pilot test completed at the above-referenced Time Oil facility. A site map indicating the locations of the pilot test injection points and monitoring wells is provided on Figure 1. As documented in the ISOTEC report, it appears that *in situ* chemical oxidation (ISCO) injection application is a valid remedial approach to reduce the concentration of pentachlorophenol (PCP) present in the groundwater at the site.

Additional groundwater data have been collected since the enclosed report was prepared; therefore, we are attaching Table 1 with updated analytical results and groundwater elevation information, and Figures 2 through 8 indicating the groundwater elevation and PCP concentration trends observed in specific monitoring wells utilized for the pilot study. The updated information indicates considerable reductions in PCP concentration in five of the seven monitoring wells (PZ-1, LW-11S, OX-1S, OX-3S, and OX-4S). The data also indicate that the PCP concentration increases observed in monitoring well OX-2S may be directly related to fluctuations in the water table elevation observed since the pilot test injection event or to mobilization of residual PCP in the capillary fringe soil near OX-2S as a result of the injection event. This may have caused groundwater to come into contact with residual PCP in the capillary fringe soil. Increased PCP concentrations have also been observed in monitoring well RW-1; however, the concentrations observed are within the range recorded from historical sampling events.

At this time, we would like to recommend that an interim remedial action application of ISCO technology be developed for the site. Upon your approval of our recommendation, Landau Associates will prepare a work plan for the interim action application of ISCO. If you should have any questions regarding the information provided herein, please contact Rebekah Brooks or Martin Powers of Landau Associates.

LANDAU ASSOCIATES, INC.

Martin Powers

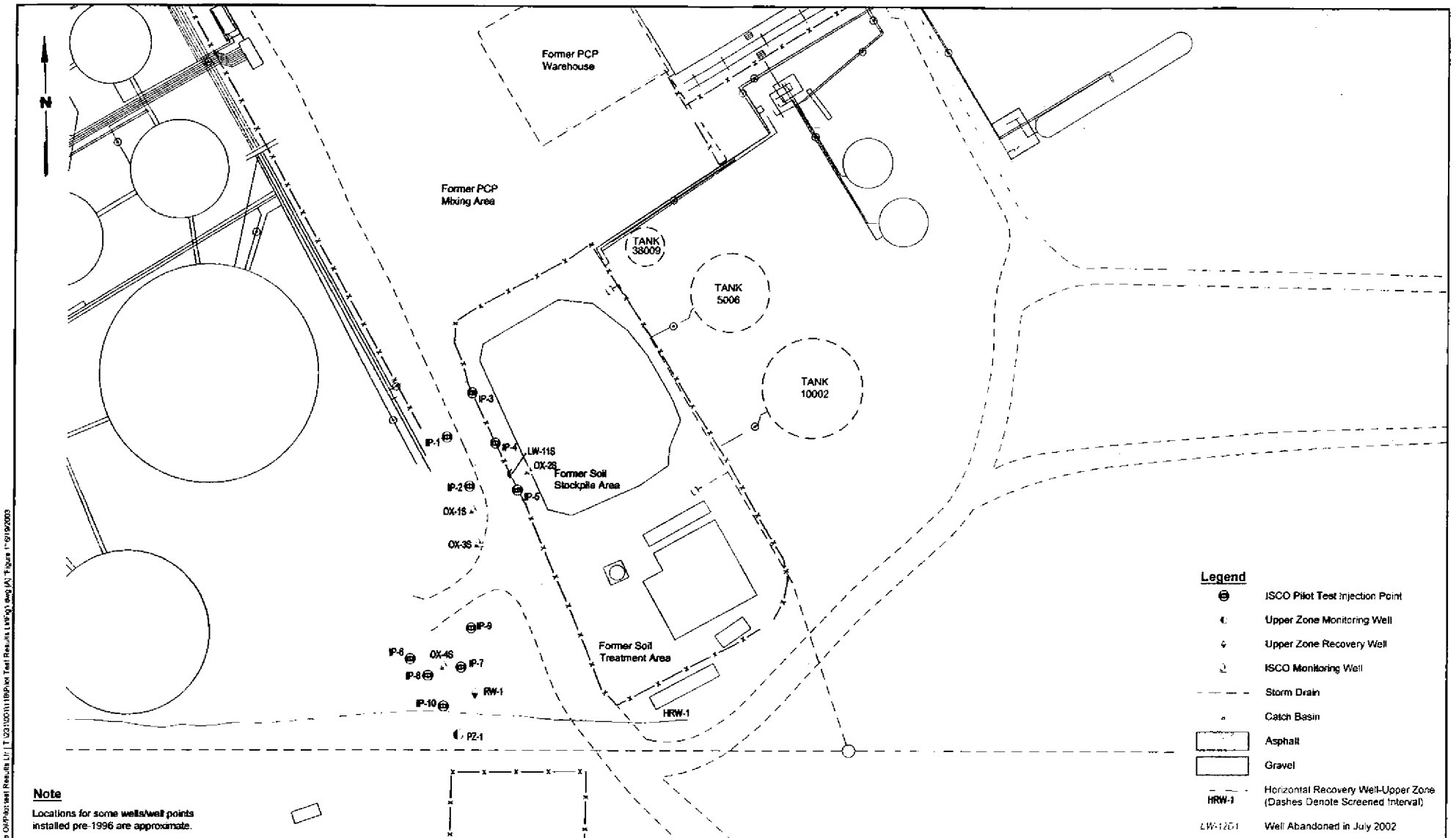
Martin Powers, P.E.
Project Engineer

Terry McCarty

Rebekah Brooks
Project Manager

MTP/RB/tam
6/19/03 \\Edmnas\wproc\231\001\118\Pilot Test Cvr Ltr.doc
Enclosures

cc: Kevin Murphy, Time Oil Co.
Patti Dost, Martin, Schwabe, Willianson & Wyatt, P.C.
Mike Tischuk, Beazer East, Inc.



Note

Locations for some wells/well points installed pre-1996 are approximate.

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Time Oil NW Terminal Portland, Oregon	ISCO Pilot Study Injection Points and Wells	Figure 1

Time Oil Pilot test Results Lin T:\231\001\1\Pilot Test Results LWFig1.dwg [A] Figure 1 6/19/2003

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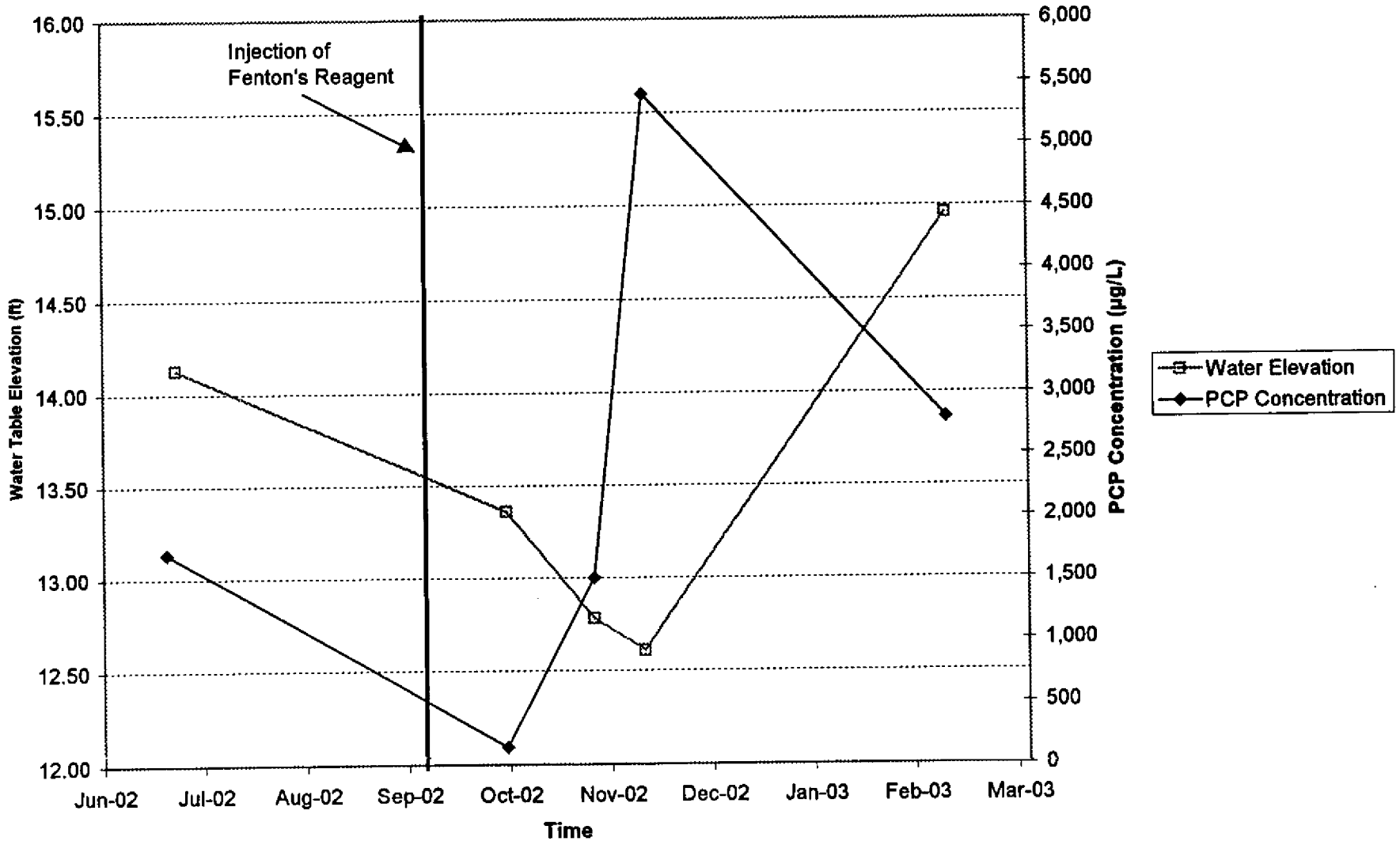

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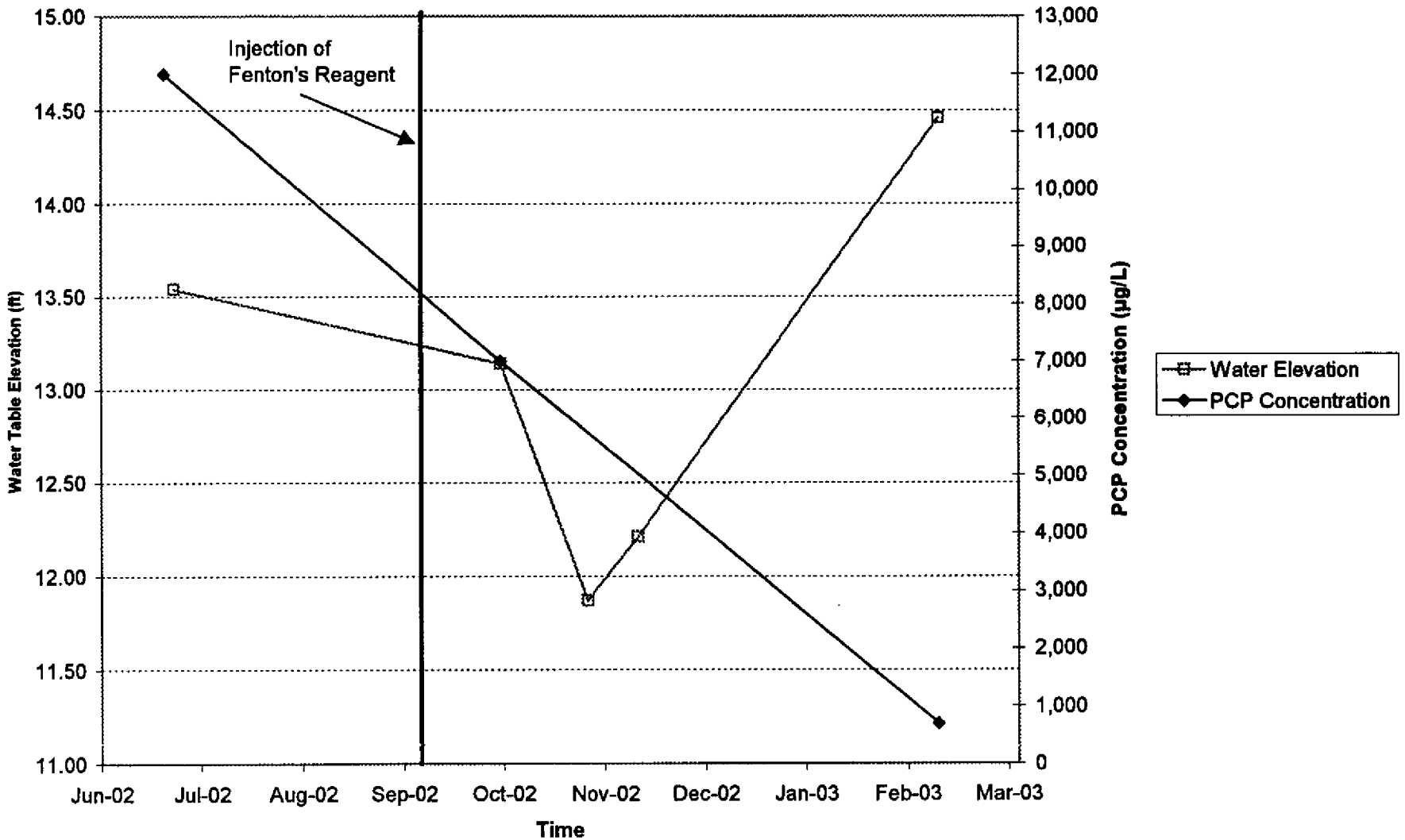
ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - RW-1 June 2002 through February 2003**	Figure 2



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ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - PZ-1 June 2002 through February 2003**	Figure 3

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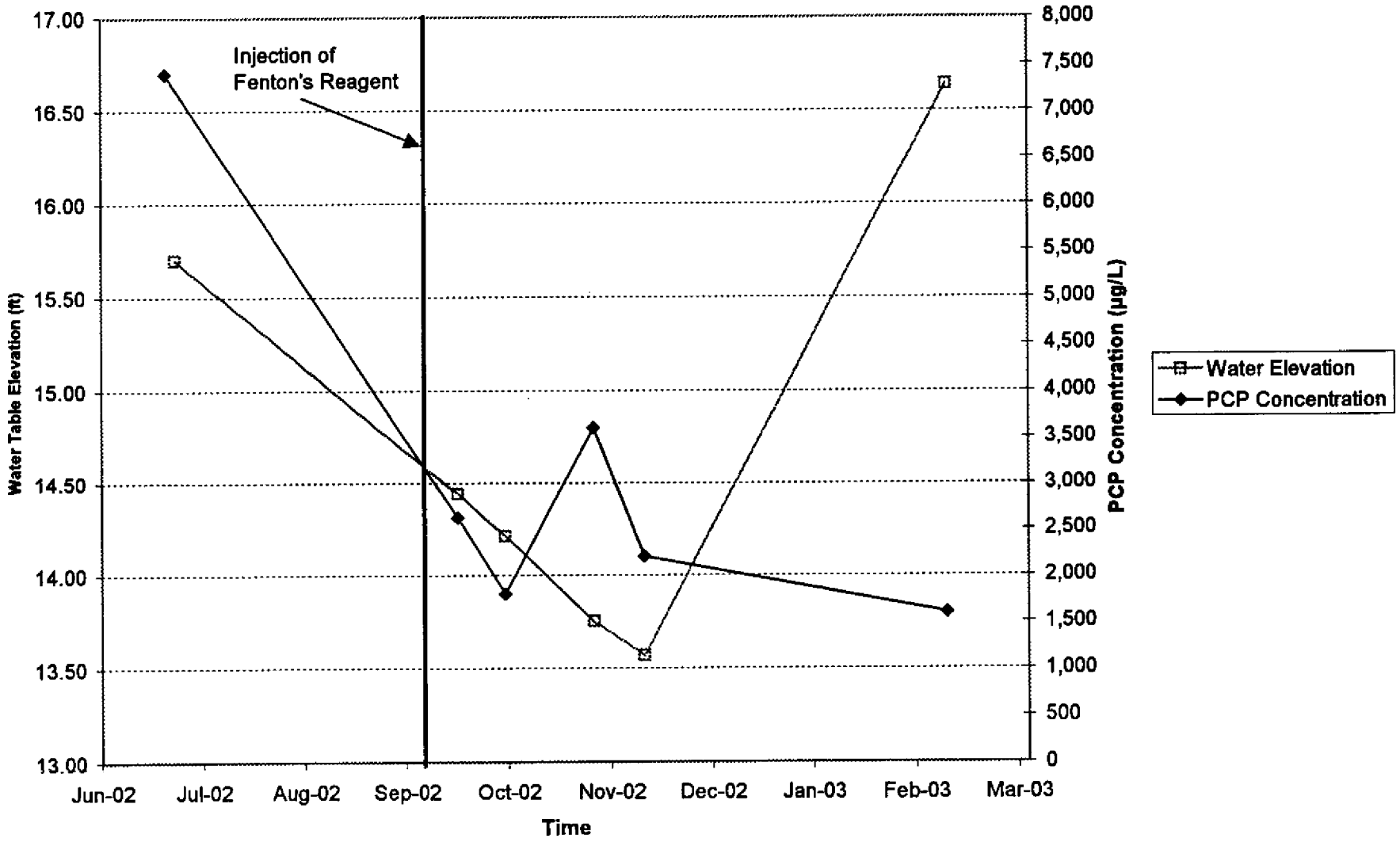

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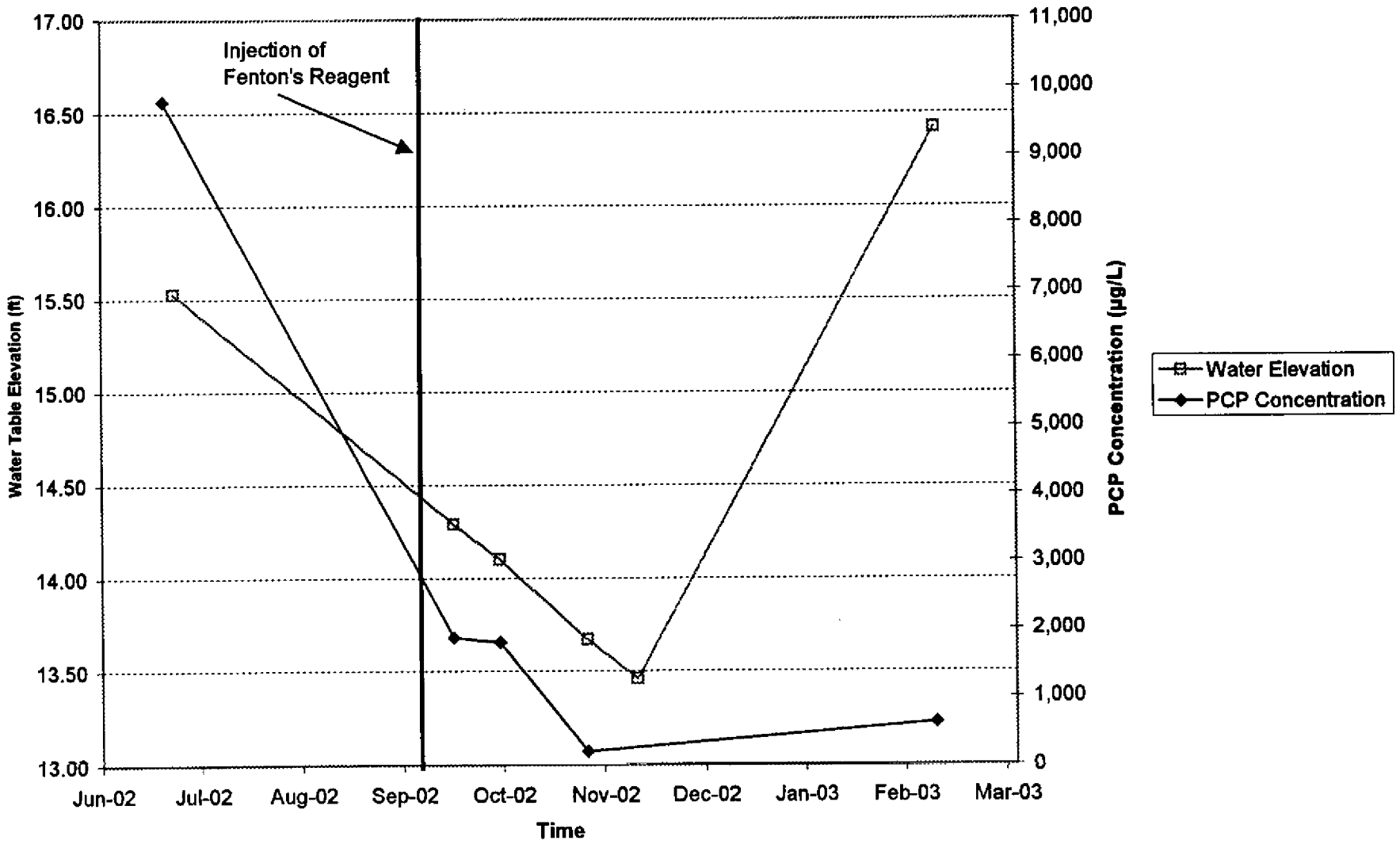
ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - LW-11S June 2002 through February 2003**	Figure 4



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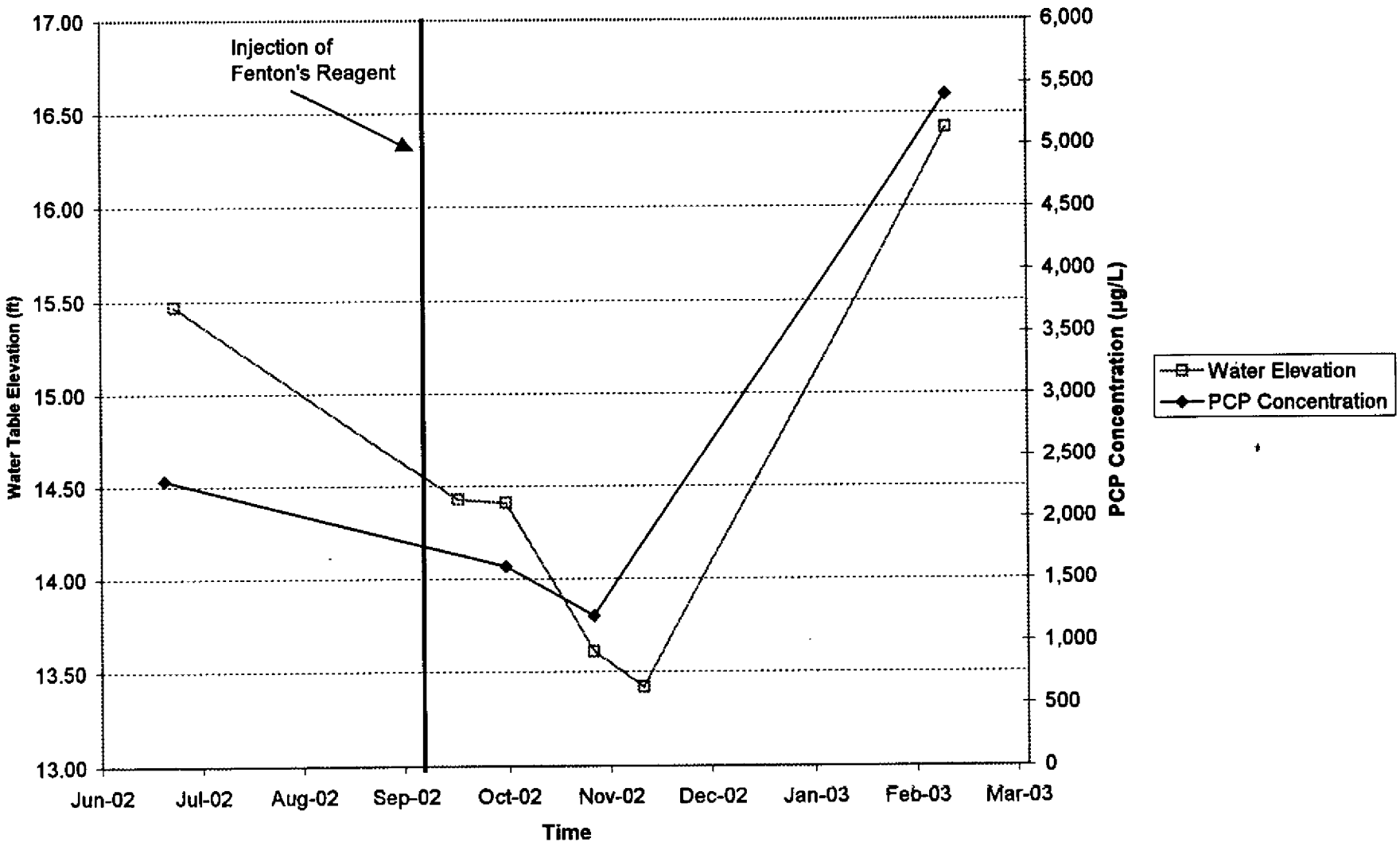
ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - OX-1S June 2002 through February 2003**	Figure 5



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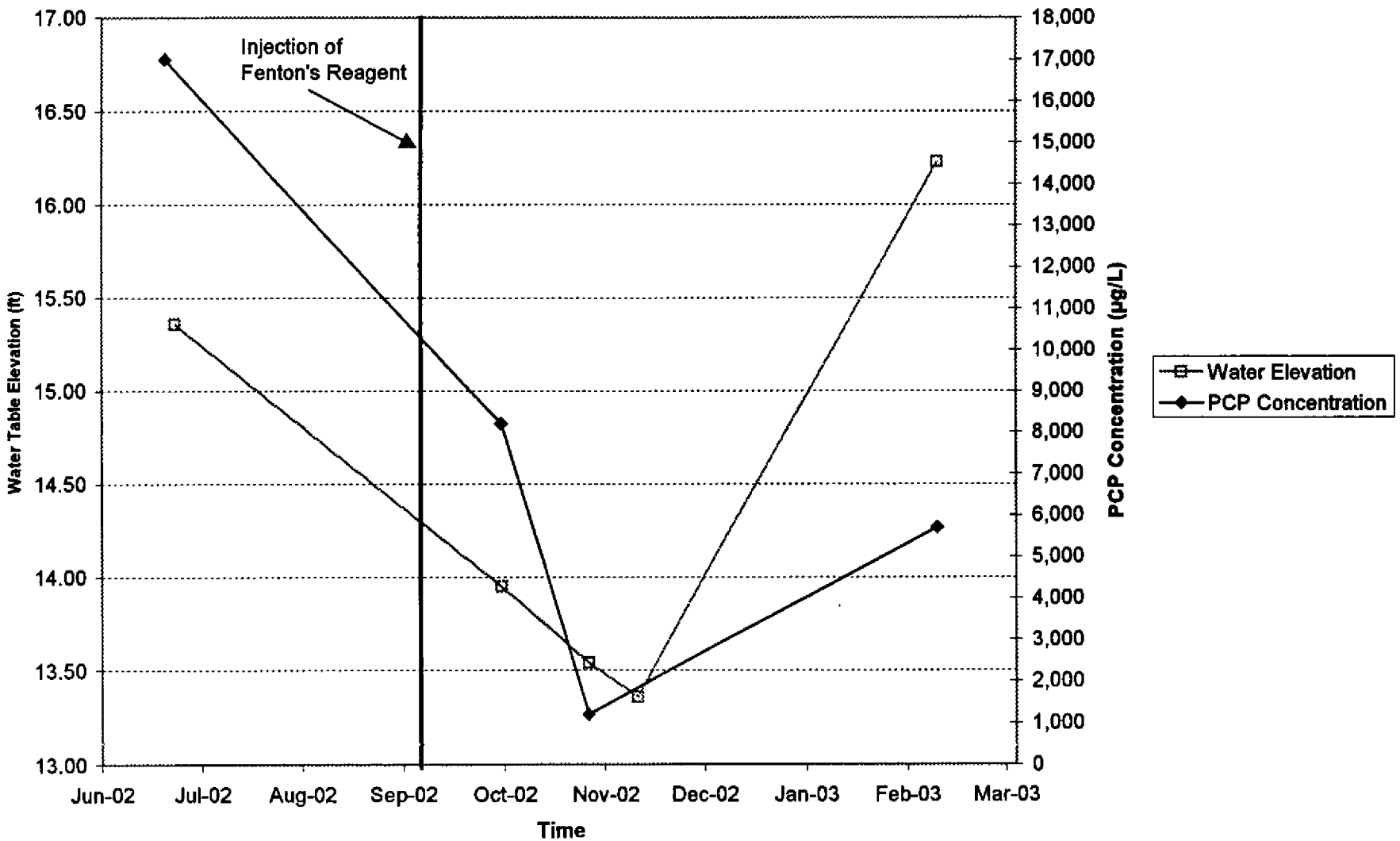
ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - OX-2S June 2002 through February 2003**	Figure 6



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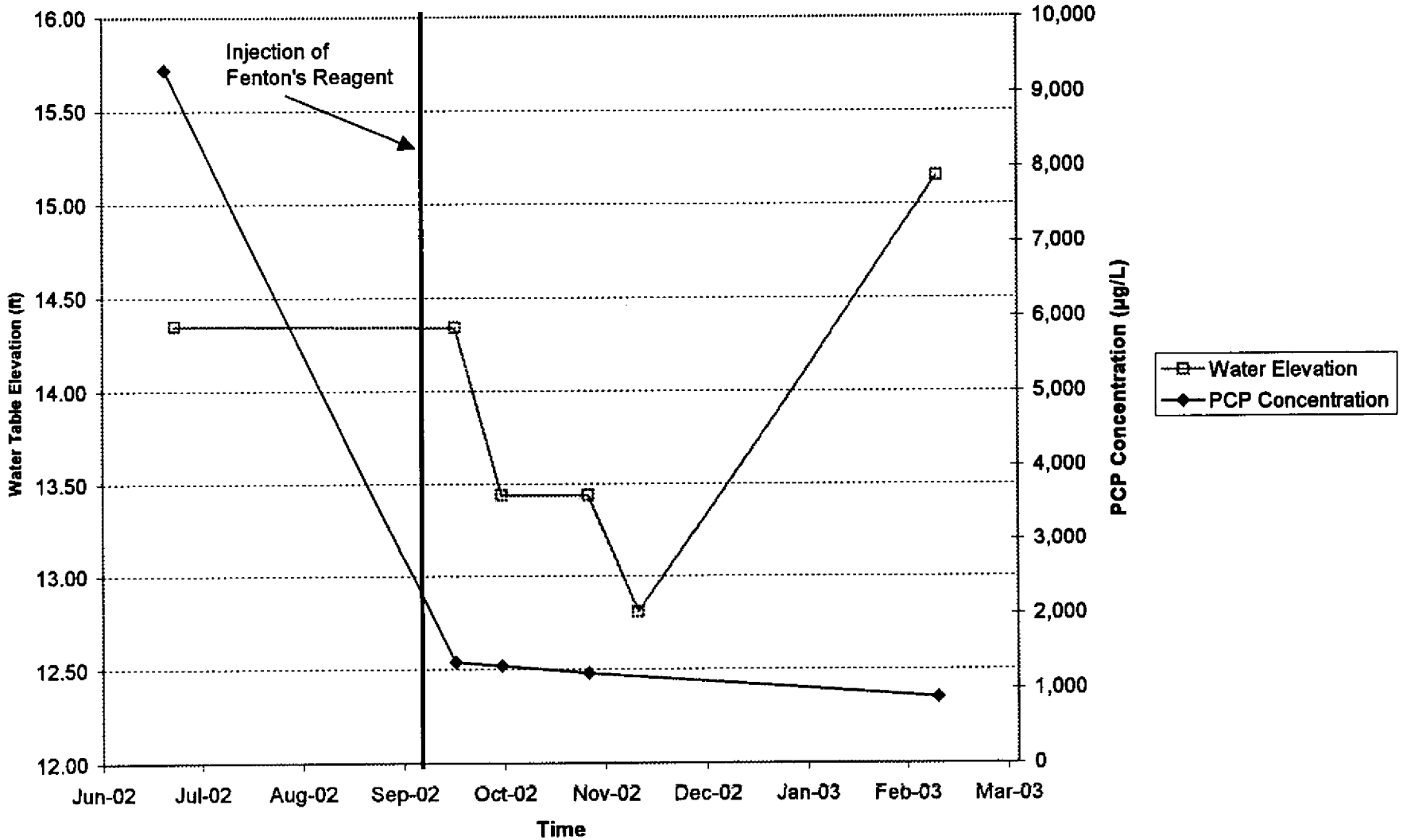
ISCO Observation Wells Time Northwest Terminal Portland, Oregon	**Comparison of PCP Concentrations & Groundwater Elevation vs Time - OX-3S June 2002 through February 2003**	Figure 7



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ISCO Observation Wells
Time Northwest Terminal
Portland, Oregon

Comparison of PCP Concentrations & Groundwater Elevation vs Time - OX-4S June 2002 through February 2003

Figure
8

TABLE 1
ISCO PILOT TEST EVALUATION
DISSOLVED PCP CONCENTRATIONS AND WATER TABLE ELEVATIONS
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Monitoring Well	Distance From Closest Injection Point	06/24/2002 Baseline (µg/L)	06/27/2002 Water Elevation (ft)	09/19/2002 Post Injection (µg/L)	09/19/2002 Water Elevation (ft)	10/03/2002 Post Injection (µg/L)	10/03/2002 Water Elevation (ft)	10/29/2002 Post Injection (µg/L)	10/29/2002 Water Elevation (ft)	11/13/2002 Post Injection (µg/L)	11/13/2002 Water Elevation (ft)	02/11/2003 Post Injection (µg/L)	02/11/2003 Water Elevation (ft)	Baseline vs First Quarter 2003 (% Reduction)
RW-1	17 ft.	1,700	14.13	NS	NR	140	13.36	1,500	12.78	5,400	12.61	2,800	14.96	-64.71
PZ-1	38 ft.	12,000	13.54	NS	NR	7,000	13.14	NS	11.87	NS	12.21	700	14.46	94.17
LW-11S	9 ft.	7,400	15.70	2,620	14.44	1,800	14.21	3,600	13.75	2,200	13.57	1,600	16.64	78.38
OX-1S	12 ft.	9,800	15.53	1,870	14.29	1,800	14.10	200	13.67	NS	13.46	620	16.42	93.67
OX-2S	16 ft.	2,300	15.47	NS	14.43	1,600	14.41	1,200	13.61	NS	13.42	5,400	16.42	-134.78
OX-3S	33 ft.	17,000	15.36	NS	NR	8,200	13.95	1,200	13.54	NS	13.36	5,700	16.23	66.47
OX-4S	9 ft.	9,300	14.35	1,350	14.34	1,300	13.44	1,200	13.44	NS	12.81	880	15.15	90.54

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TECHNICAL MEMORANDUM

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ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Tom Roick, Oregon Department of Environmental Quality

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CC: Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe Williamson & Wyatt
Mike Tischuk, Beazer East

FROM: Christy Johnson, Martin Powers, P.E., and Rebekah Brooks

DATE: August 15, 2003

RE: PLAN FOR REPLACEMENT WELL INSTALLATIONS AND WELL ABANDONMENTS PHASE II REMEDIAL INVESTIGATION TIME OIL NORTHWEST TERMINAL, PORTLAND, OREGON

INTRODUCTION

This technical memorandum presents a plan for installation of five replacement monitoring wells and the abandonment of three monitoring wells, as part of the Phase II Remedial Investigation (RI) at the Time Oil Northwest Terminal (terminal) in Portland, Oregon. The proposed installation methods for the five replacement monitoring wells and rationale for abandonment of the three monitoring wells are described herein. The proposed locations for the new monitoring wells are shown on Figure 1 and the proposed monitoring well abandonment locations (monitoring wells A, B, and C) are shown on Figure 2.

MONITORING WELL INSTALLATION

In support of future *in situ* interim remediation activities within the former pentachlorophenol (PCP) mixing area and adjacent areas, the installation of four upper zone monitoring wells (OX-5S through 8S) and one lower zone monitoring well (OX-8D) is planned. The proposed locations of these five monitoring wells are identified on Figure 1. The four upper zone monitoring wells will be used to monitor groundwater conditions before, during, and after implementation of the *in situ* interim remedial applications. The locations of the new upper zone monitoring wells will also allow for comparison of groundwater conditions within the PCP-impacted area to upgradient groundwater conditions. The lower zone monitoring well will be utilized to evaluate groundwater conditions beneath a semi-continuous silt confining layer that has been encountered at the site at an average depth of approximately 20 ft below ground surface (BGS).

The monitoring wells will be installed in accordance with the Oregon Water Resources Department (OWRD) Administrative Rules, Construction and Maintenance of Monitoring Wells (OAR 690-240) and the procedures outlined in the ISCO pilot study work plan for the upper zone wells (Landau

Associates 2002) and the Phase III Remedial Investigation (RI) Sampling and Analysis Plan (Landau Associates 2001) for the lower zone well. Monitoring wells will be constructed of flush-threaded 2-inch Schedule 40 PVC casing with PVC machine-slotted screen (0.020-inch). Proposed well construction specifications for the upper and lower zone monitoring wells are presented on Figures 3 and 4, respectively.

During installation of the monitoring wells, soil samples will be collected within the capillary fringe or at the top of the saturated zone (estimated to range between 13 and 19 ft BGS) and directly below the confining unit in the lower zone well in accordance with the ISCO pilot study work plan. The soil samples will be submitted to Specialty Analytical Inc. in Tualatin, Oregon for analysis of PCP using EPA Method 8270. Clean backfill placed in this area as part of the soil removal action will not be sampled.

MONITORING WELL ABANDONMENT

Three upper zone monitoring wells (A, B, and C), installed in February 1986 before initiation of RI/FS activities at the terminal, are planned for abandonment. The monitoring well locations are shown on Figure 2. These monitoring wells were hand-driven, are constructed of steel casing, and are located within 15 ft of other upper zone monitoring wells (K, B1, and L) that are sampled as part of the quarterly groundwater monitoring program for the terminal. Therefore, these locations offer redundant, less reliable groundwater information than the adjacent wells. Abandonment activities will be performed by a driller licensed within the State of Oregon using the following techniques, in accordance with OAR 690-240-0510:

- Monitoring Well A
  - Because the well is located in an area where access by a truck-mounted drill rig is not possible, a licensed well driller will request a variance from the OWRD to seal the monitoring well by pressure grouting before initiation of abandonment. The grout slurry will be placed from the bottom of the well casing upward using grout pipe to avoid segregation or dilution of the sealant. The grout slurry then will be pressurized by the use of compressed air to inject grout into the surrounding filter pack. The grout slurry will meet the requirements of OAR 690-240-0475(b).

- Monitoring wells B and C
  - The borehole will be redrilled, at a minimum, to the original drilled diameter and depth by a licensed well driller. All casing, screen, annular seal material, drill cuttings, debris, and filter pack material will be removed before sealing.

  - Following redrilling activities, a grout slurry will be used to seal the borehole, in accordance with the requirements in OAR 690-240-0475. The grout slurry will be placed from the bottom upward of the redrilled borehole using a side discharge grout pipe to avoid segregation or dilution of the sealant. The grout slurry used to abandon monitoring wells will meet the requirements of OAR 690-240-0475(b).

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Following completion of abandonment, the licensed driller will submit an abandonment record to the OWRD. At a minimum, the abandonment record will include the information required by OAR 690-240-0395, plus the method of abandonment, the well identification number, and well abandonment date.

Between monitoring well abandonment locations, downhole drilling equipment will be decontaminated, as outlined in the Phase III RI Sampling and Analysis Plan for the terminal. Decontamination will include, at a minimum, a hot water pressure wash of all equipment being used in downhole activities. Aboveground monuments and well casing will be disposed of as solid waste. Soil cuttings generated during redrilling activities will be stockpiled or containerized in drums onsite for characterization and disposal in conjunction with planned Phase III drilling activities.

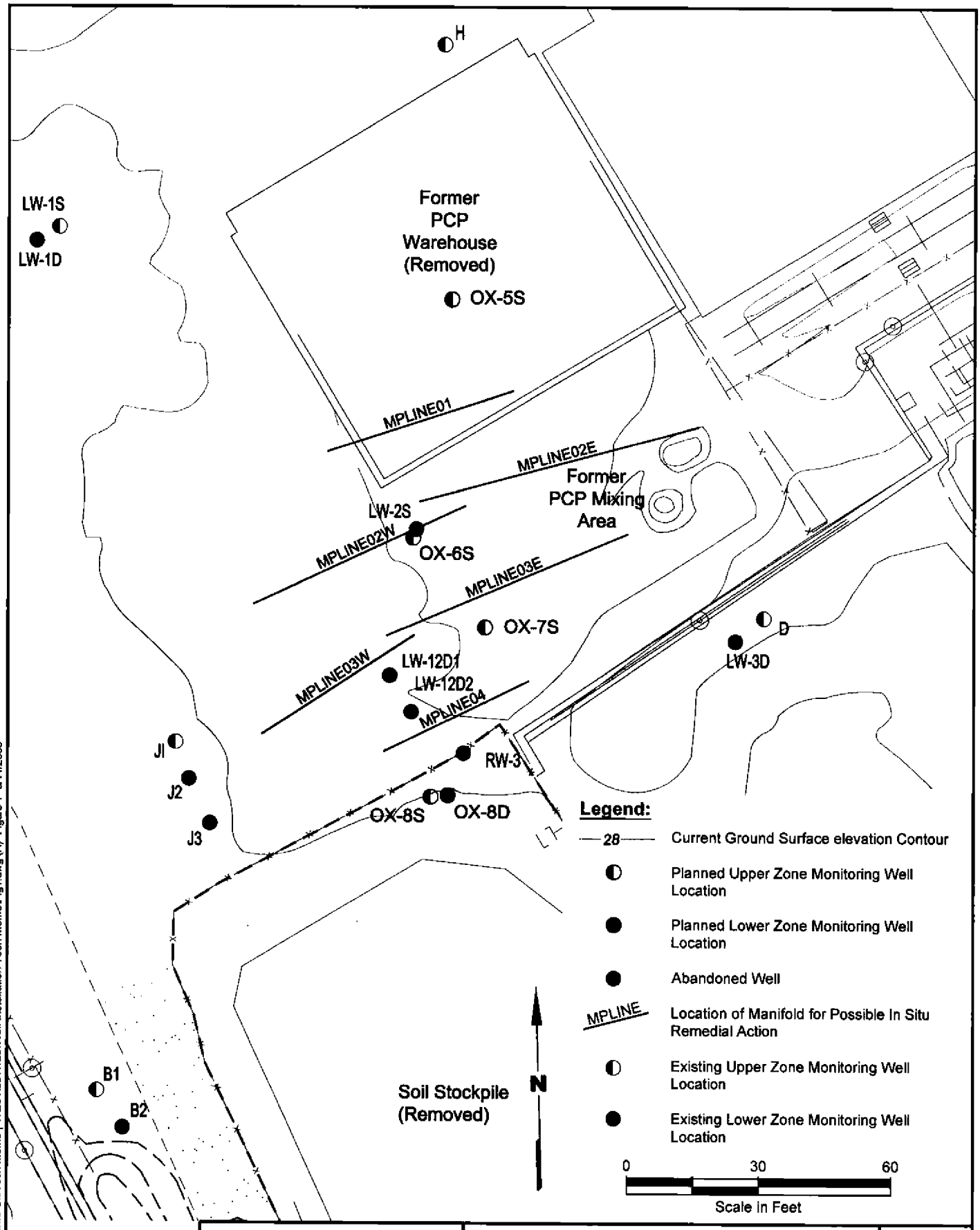
SCHEDULE

The monitoring well installations and abandonments described in this technical memorandum will be performed following DEQ approval of this plan. It is anticipated that the installations and abandonments will be conducted in conjunction with Phase III RI field activities, currently scheduled for early to mid September 2003.

REFERENCES

Landau Associates 2001. *Phase III Remedial Investigation Work Plan, Time Oil Northwest Terminal, Portland, Oregon*. June 18.

Landau Associates 2002. *In Situ Chemical Oxidation Pilot Study Work Plan, Time Oil Northwest Terminal, Portland, Oregon*. June 7.



Time Oil/Tech Memo | T:\231\001\1\129\Well installation Tech Memo\Fig1.dwg (A) "Figure 1" 8/11/2003

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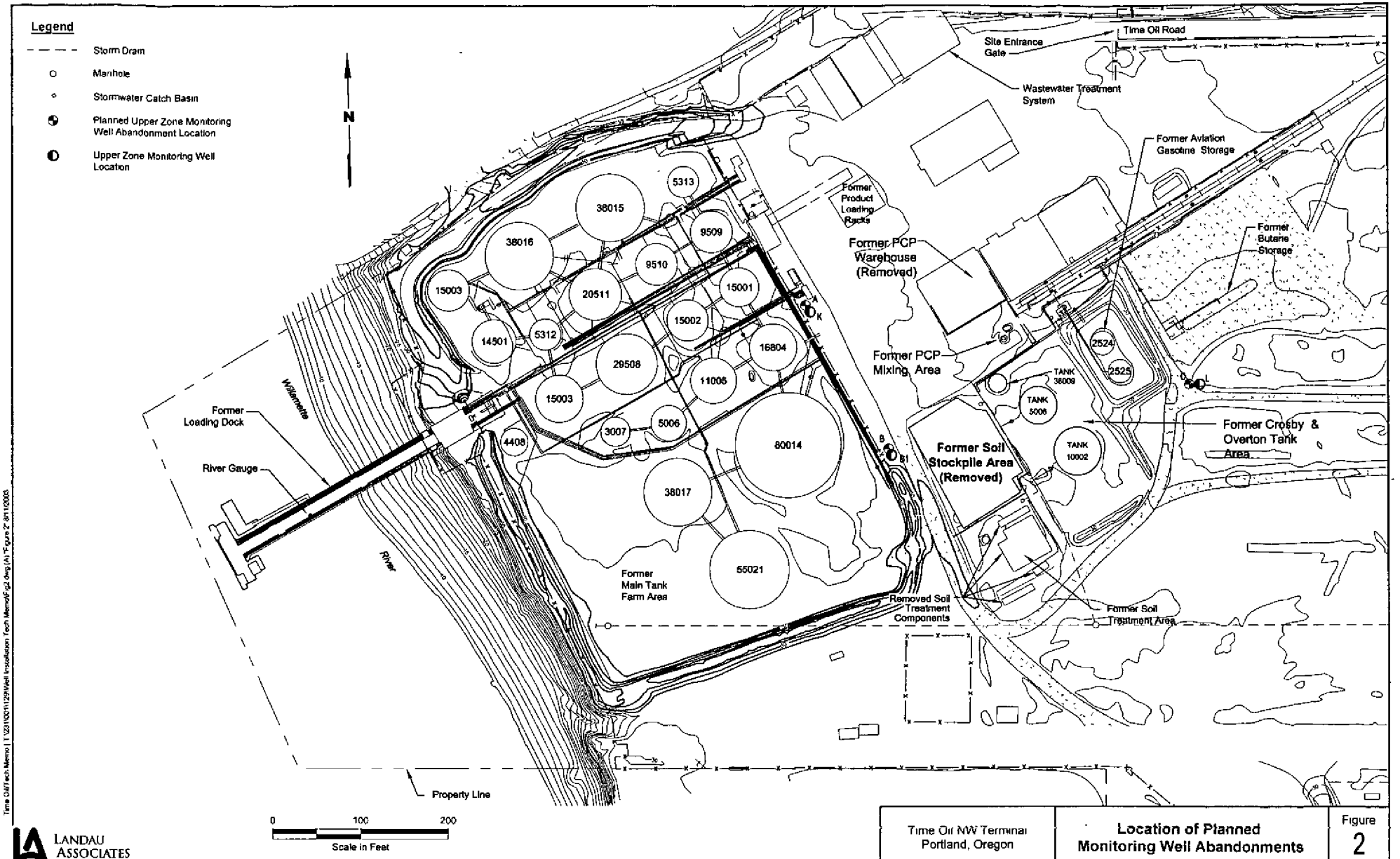
Time Oil NW Terminal Portland, Oregon	**Location of Planned Monitoring Wells**	Figure **1**



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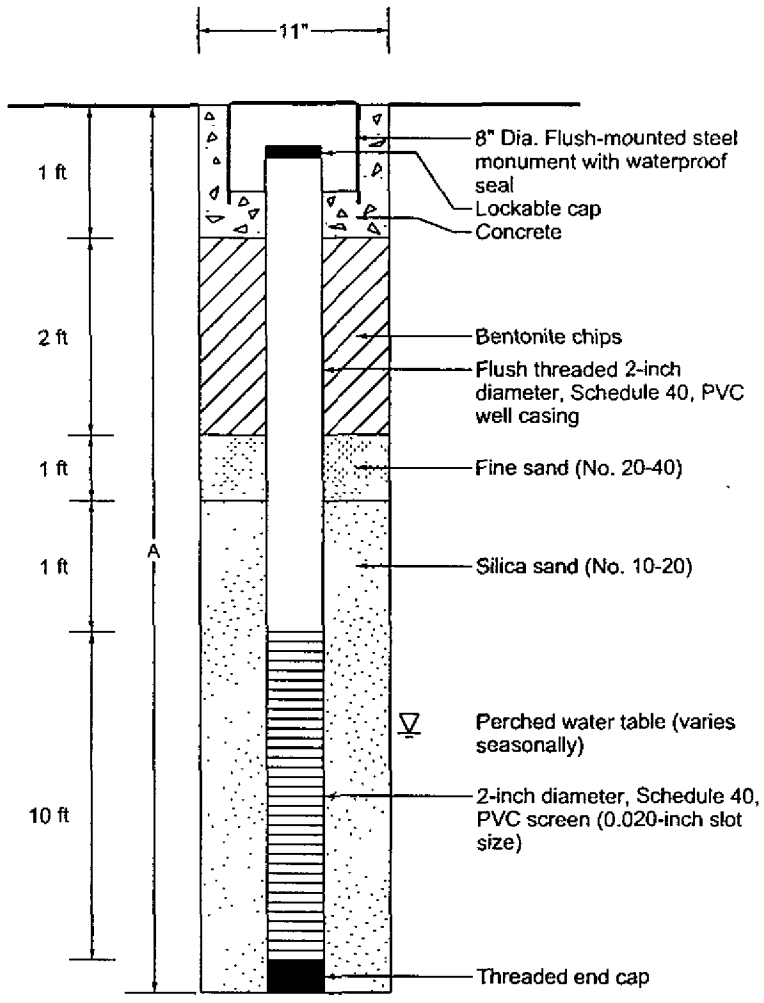
UPPER ZONE MONITORING
WELL WITH
FLUSH-MOUNTED
MONUMENT (1)



Note

1. The monument type (flush-mounted or aboveground) to be used at upper zone monitoring wells will depend on terminal traffic patterns.

2. Not to Scale

Time Oil/Tech Memo | T:\231\001\129\Well Installation Tech Memo\Fig3.dwg (A) "Figure 3" 8/11/2003

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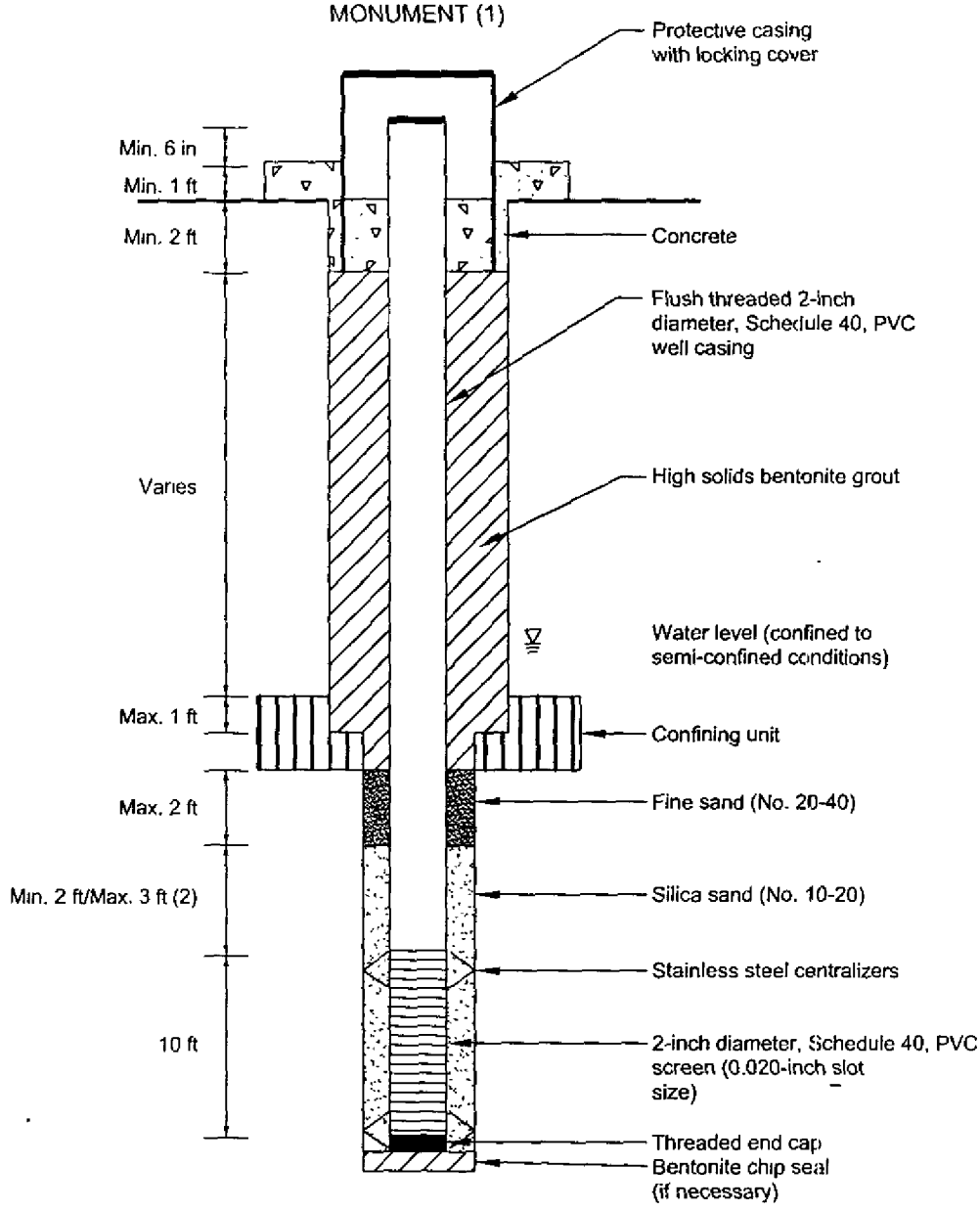
Time Oil NW Terminal Portland, Oregon	**Proposed Upper Zone Monitoring Well Construction Specifications**	Figure 3

LOWER ZONE MONITORING
WELL WITH ABOVEGROUND
MONUMENT (1)



Notes

1. The monument type (flush-mounted or aboveground) to be used at upper zone monitoring wells will depend on terminal traffic patterns.
2. If bentonite chips are used to fill the annular space instead of high solids bentonite grout, then 2 ft of No. 10-20 silica sand will be placed in the annulus above the well screen and a maximum of 1 ft of fine sand (No. 20-40) will be placed on top of the No. 10-20 sand.
3. Not to Scale

Time Oil/Tech Memo | T:\231\001\129\Well Installation Tech Memo\Fig4.dwg (A) "Figure 4" 8/11/2003

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Time Oil NW Terminal Portland, Oregon	**Proposed Lower Zone Monitoring Well Construction Specifications**	Figure 4