PROVIDED ON CONDITION THAT THIS BE KEPT CONFIDENTIAL AS PART OF A SETTLEMENT NEGOTIATION

Confidential Settlement Communication Subject to Rule 408

DRAFT/CONFIDENTIAL: 5/4/06

Discussion Points:

A. Contribution Protection:
- Protection afforded any given party subject to full performance by that party.

B. Cooperative Agreement:

1. Tolling/Standstill:
- Scope:
  - Tolling beyond statute of limitations—laches, estoppel, statutes of repose, any defenses based soley upon passage of time.
  - Claims related to costs incurred or to be incurred in performing RI/FS work and DEQ past costs
  - Claims for declaratory relief re liability for Portland Harbor response costs (beyond RI/FS)
- Forebearance:
  - "Performing Parties" not a single unit.
  - Scope: DSL may have other issues related to RI/FS work or remedy selection or implementation that are unrelated to recovery of response costs. Cooperative Agreement will not address such potential issues/claims.
  - Mutually forebear bringing specified claims and requesting or encouraging EPA or DEQ to pursue claims against DSL/Performing Parties.
- Disclaimers: No admission re proper statute of limitations, jurisdiction, liability etc.
- Term and Termination:
  - Forebear until completion of RI/FS work.
  - Termination of standstill after notice if: (1) ADR/allocation process terminated, (2) third party files claim against Performing Parties or DSL, or (3) any party to agreement fails to or ceases to participate in ADR/allocation (not just DSL).
  - Standstill agreement terminated as to all or less than all parties?
  - How to assess "participation" in ADR/Allocation? Party affirmatively withdraws or is expelled from allocation agreement?
  - Not automatically terminated by happening of certain events.
  - What type of notice required (form and timing)?

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- Require good faith effort to secure agreement to stay/standstill agreement from third party before termination based on third party claim?

- Signatories:
  - Potentially broader than Cooperative Agreement (i.e. tolling/standstill elements carved out into separate stand-alone agreement)?

2. Allocation Design:
   - DSL and Performing Parties participate in all efforts undertaken to explore and select method/process for non-judicial allocation
   - Design elements will include obligation to work to develop method for identifying and evaluating in-kind contributions from any party: land (sale of, access to, long or short term use of), materials, services.
   - Affirmative recognition of DSL as cooperating party.

3. Allocation Participation (as distinct from design):

4. Express provision that elements of cooperative agreement re records retention, information sharing etc. not conflict with analogous terms of subsequent allocation agreement (or otherwise limit options in allocation process design).

5. Records Retention:
   - Clear definition of applicable area (distinct from definition of area for other purposes)
   - Obligation of DSL and all Performing Parties
   - Notice before destruction
   - Copying costs paid by requestor
   - Privileged/confidential docs not included; Right to challenge claim
   - To extent allowed by law—need to get DSL records retention schedule revised consistent with language in agreement.

     Parties will retain, to the extent allowed by law, all records and documents in its possession or control, or in the possession or control of its employees, agents, or contractors, relating to the Portland Harbor Superfund Site, which for purposes of [this section] means the Study Area from Willamette River from River Mile (RM) 2.0 to RM 11.0 in Portland, Oregon, and any other areas in proximity to the Study Area necessary for the implementation of the response action, including upland areas that contain or are known to have contained sources of contamination to the sediments within the Willamette River for a minimum of 10 years after completion of the remedial action.

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Parties reserve the right to claim the attorney client privilege and/or attorney work product immunity for such documents, as well as the right to challenge any such claims made by other parties to this Agreement.

Beyond the initial 10-year period, Parties will provide each other at least ninety (90) days notice before any destruction or other disposal of such records and make such records available for inspection and copying upon request (and at the requesting party's expense).

6. Information Sharing:
   - Cooperate in development and exchange of non-privileged documents.
     - Does not create independent obligation to "create" or "recreate" data
   - Beyond LECG info summaries
   - Clarify expectations re sharing and extent of privilege etc.
   - General description or clarification of document types that would not be privileged?

7. Non-Signatory Funding of Response Costs:
   - Recognize common interest in exploring possibilities for additional funding and funding sources beyond signatories to agreement.
   - Not a discussion of CERCLA or EPA-funded orphan share.
   - Not intended to preclude or replace broader funding discussions (i.e. beyond limited group of signatories to cooperative agreement).

8. Regulatory Review:
   - DSL will undertake review of DSL rules related to property authorizations necessary to carry out or facilitate investigation, removal or remedial actions on submerged and submersible land or DSL's ability to deliver potential "in-kind" services and materials in conjunction with that work.
     - Potential rule revisions that might streamline (remove any unnecessary impediments in) DSL processes for evaluating and authorizing access and other long and short term uses of submerged and submersible lands.
     - Potential rule revisions that might streamline (remove any unnecessary impediments in) processes for evaluating and making available "in-kind" contributions by DSL.
   - Performing parties will cooperate in identifying issues stemming from the current rules, and possible resolution of those issues.
   - DSL actions and rule revisions to be consistent with all statutory and constitutional limitations on DSL and State Land Board.

9. Modification/Termination Provisions:
   - Whole agreement not necessarily coextensive with standstill. Standstill can be terminated independent of rest of agreement.

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- Addition of late-comers.

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ISOTEC

IN-SITU OXIDATIVE TECHNOLOGIES, INC.
5200 DTC PARKWAY, SUITE 150
ENGLEWOOD, COLORADO 80111
PHONE: 303-843-9079
FAX: 303-843-9094

FAX TRANSMITTAL SHEET

To:	Mike Tischuk	**From:**	Chris Nelson
Fax:	412-208-8809	**Pages:**	
Phone:		**Date:**	3/25/2002
Re:	Additional information regarding PCP Treatability	**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

- **Comments**

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Table 3: Results of Bench Scale Study
MW-2 Ground Water

	UNITS	Control	Treated
Catalyst Used		None	Cat-4260
Oxidant Used		None	Stab. H_2O_2
No. of Treatments		0	6
Volatile Aromatics			
Benzene	µg/L	2.3	ND<1.0
Toluene	µg/L	5.1	ND<1.0
Ethylbenzene	µg/L	1.2	ND<1.0
m-Xylene & p-Xylene	µg/L	3.0	ND<2.0
o-Xylene	µg/L	3.0	ND<1.0
Total BTEX	µg/L	14.6	ND<6.0
Base/Neutral-Acid SVOAS			
Naphthalene	µg/L	66	ND<10
Benzoic Acid	µg/L	1600 D1	15
2,4-Dichlorophenol	µg/L	16	ND<10
Pentachlorophenol	µg/L	8100 D1	24
Phenol	µg/L	74	ND<10
2,4,6-Trichlorophenol	µg/L	13	ND<10
2,4,5-Trichlorophenol	µg/L	170 D2	ND<10
Total Metals			
Arsenic	mg/L	0.10	0.082

Note:

- ND = Analyzed for but not detected at the method detection limit (MDL) indicated.
- NA = Parameter not analyzed for.
- mg/L = milligrams per liter; µg/L = micrograms per liter.
- mg/Kg = milligrams per kilogram; µg/Kg = micrograms per kilogram.
- * = Value represents the sum of positive values plus detection limit values for those BTEX components reported as non-detected.
- D1 = Analyte value determined from a 1:100 dilution.
- D2 = Analyte value determined from a 1:2 dilution.

Table 4: Results of Bench Scale Study
MW-3 Ground Water

	UNITS	Control	Treated
Catalyst Used		None	Cat-4260
Oxidant Used		None	Stab. H_2O_2
No. of Treatments		0	6
Volatile Aromatics			
Benzene	µg/L	1.0	ND<1.0
Toluene	µg/L	3.2	ND<1.0
Ethylbenzene	µg/L	ND<1.0	ND<1.0
m-Xylene & p-Xylene	µg/L	ND<2.0	ND<2.0
o-Xylene	µg/L	2.0	ND<1.0
Total BTEX	µg/L	9.2*	ND<6.0
Base/Neutral-Acid SVOAS			
Naphthalene	µg/L	ND,10	ND<10
Benzoic Acid	µg/L	ND<10	ND<10
2,4-Dichlorophenol	µg/L	ND<10	ND<10
Pentachlorophenol	µg/L	46	14
Phenol	µg/L	ND<10	ND<10
2,4,6-Trichlorophenol	µg/L	ND<10	ND<10
2,4,5-Trichlorophenol	µg/L	ND<10	ND<10
Total Metals			
Arsenic	mg/L	0.027	0.022

Note:

- ND = Analyzed for but not detected at the method detection limit (MDL) indicated.
- NA = Parameter not analyzed for.
- mg/L = milligrams per liter; µg/L = micrograms per liter.
- mg/Kg = milligrams per kilogram; µg/Kg = micrograms per kilogram.
- * – Value represents the sum of positive values plus detection limit values for those BTEX components reported as non-detected.
- D1 = Analyte value determined from a 1:100 dilution.
- D2 = Analyte value determined from a 1:2 dilution.

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Treatment of Pentachlorophenol-Contaminated Soils Using Fenton's Reagent

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ABSTRACT

The Fenton's reagent (hydrogen peroxide and iron (II)) treatment of pentachlorophenol (PCP) was investigated as a basis for the on site and in situ treatment of contaminated surface soils. Mineralization of PCP was demonstrated in a silica sand system by the removal of the parent compound and total organic carbon with corresponding stoichiometric recovery of chloride. The treatment of PCP was investigated in two natural soils of varying organic carbon content. Pentachlorophenol was degraded in the soils with and without iron (II) addition. The optimum treatment conditions were found at pH 2 to 3.

INTRODUCTION

The uncontrolled and accidental disposal of organic hazardous wastes on soils is recognized as a significant problem. Over 20,000 uncontrolled hazardous waste sites exist in the U.S., many of which are characterized by contaminated surface soils (1). In addition, over 18,000 accidental hazardous waste spills occur each year in the U.S. (2).

A large number of hazardous waste disposal and spill sites are characterized by surface soils contaminated with chemicals that are resistant to degradation. The fate of wastes disposed on soils is based on the properties of the contaminants and the soils. A number of contaminant properties affect the fate and transport of wastes disposed on surface soils; however, the most important are degree of halogenation, octanol-water partition coefficient (K_{ow}), and vapor pressure (3). Contaminants with a high degree of halogenation are slowly biodegraded in aerobic soils because of their existing high oxidation state. Contaminants with high K_{ow} tend to adsorb to soils and those with low vapor pressures volatilize slowly. Therefore, high degree of halogenation, high K_{ow}, and low vapor pressure are common characteristics of surface contaminants.

The on site and in situ treatment of contaminated soils has been proposed as a potentially safe and economical method of clean up (4). Bioremediation has been effective in treating soils contaminated with hazardous compounds. However, some waste components are toxic to microorganisms and many are slowly biodegraded; half-lifes of up to several months are not uncommon for some compounds during bioremediation efforts (5). The introduction of strong oxidants into contaminated soils may provide a means of destroying biorefractory contaminants over time periods less than required for biological treatment. A documented process for generating strong oxidants in aqueous solutions is

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Fenton's reagent, which is the reaction of hydrogen peroxide and iron (II) to generate hydroxyl radical (OH·) (6):

$$H_2O_2 + Fe^{2+} \longrightarrow OH\cdot + OH^- + Fe^{3+} \quad [1]$$

Hydroxyl radical is second only to fluorine in oxidation potential and is capable of nonspecific oxidations because it reacts with organic compounds with bimolecular rate constants of 10^7 to 10^{10} L/mole·sec (7). Fenton's reagent also involves numerous competing reactions (6, 8, 9):

$$H_2O_2 + Fe^{3+} \longrightarrow Fe^{2+} + H^+ + HO_2\cdot \quad [2]$$
$$RH + OH\cdot \longrightarrow H_2O + R\cdot \quad [3]$$
$$Fe^{2+} + OH\cdot \longrightarrow Fe^{3+} + OH^- \quad [4]$$
$$R\cdot + Fe^{3+} \longrightarrow Fe^{2+} + \text{products} \quad [5]$$
$$R\cdot + OH\cdot \longrightarrow ROH \quad [6]$$
$$R\cdot + H_2O_2 \longrightarrow ROH + OH\cdot \quad [7]$$
$$HO_2\cdot + Fe^{3+} \longrightarrow O_2 + Fe^{2+} + H^+ \quad [8]$$
$$OH\cdot + H_2O_2 \longrightarrow HO_2\cdot + H_2O \quad [9]$$

where RH represents an oxidizable substrate, R· is an organic radical and $HO_2\cdot$ is superoxide radical. The rate constant for Eq. 1 is 76 L/mole·sec. Rate constants for Eqs. 3, 5, 6, and 7 are substrate specific (8). The rate constant for Eq. 4 is 3×10^8 L/mole·sec (6); the rate constant for Eq. 8 is pH dependent and ranges from 2×10^4 to 1×10^6 L/mole·sec (9, 10).

The fundamental aspects of Fenton's chemistry have been well documented. For example, Walling and Johnson (11) investigated the conditions that favor hydrogen abstraction vs. hydroxyl radical addition to substituted benzenes. Ingles (9) provided similar information with low molecular weight aliphatic alcohols.

Fenton's reagent has recently been applied to the treatment of organic contaminants in aqueous solutions. Barbeni et al. (12) investigated the Fenton's oxidation of di- and trichlorophenols in aqueous solution. A mass balance in their system involving the measurement of residual chlorophenol, chloride, and total organic carbon showed that the chlorophenols were mineralized by the treatment. Fenton's reagent successfully oxidized a formaldehyde waste stream under bench scale conditions (13). The process has also been used to treat wastewaters containing sodium dodecylbenzenesulfonate (14), p-toluenesulfonic acid and p-nitrophenol (15), and azo dyes (16). However, few studies have systematically investigated the Fenton's reagent treatment of contaminated soils. As part of a comprehensive effort to study the Fenton's reagent treatment of soils, the purpose of this research was to document the degradation of pentachlorophenol by Fenton's reagent, and to determine the optimum pH during soil treatment. Most Fenton's reagent research has used H_2O_2 concentrations from 0.05% to 1.0% (9). However, this investigation used H_2O_2 concentrations in excess of what would be required to stoichiometrically oxidize the substrate in order to enhance mineralization.

METHODS AND MATERIALS

Model Contaminant

Pentachlorophenol, a widely-used wood preservative, was used as a model contaminant. Pentachlorophenol is moderately biorefractory. Mabey et al.(17) reported a biodegradation rate constant of 3×10^{-12} L/cell·hour, log K_{ow} of 5.01, and vapor pressure of 1.1×10^{-4} mm Hg at 20°C. The PCP was purchased from Aldrich Chemical Company and was of 99% purity. Among the 1% impurities were octachlorodibenzo-p-dioxin and other dioxin congeners.

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Soils

Commercially-available silica sand (80-100 mesh) and two natural soils were used. The soils were collected from the University of California Moreno Valley Field Station. Particle size analysis was determined by the pipette method (18). Organic carbon was determined by combustion at 900°C with evolved CO_2 trapped in KOH and measured by back titration of unreacted KOH (19). Crystalline iron and manganese oxyhydrides were determined by citrate-bicarbonate-dithionite extraction (20). Cation exchange capacity was established by saturation with sodium acetate at pH 8.2 (21). The soil characteristics are shown in Table 1.

TABLE 1
Soil Characteristics

	Soil I	Soil II
Classification	Ramona soil A horizon; fine-loamy, mixed, thermic, Typic Haploxeralfs	Ramona soil C horizon; fine-loamy, mixed, thermic Haploxeralfs
% sand	70.8	57.8
% silt	25.0	24.1
% clay	4.2	18.1
Crystalline Fe oxides (%)	0.46	0.28
pH	8.0	8.0
Organic Carbon (%)	0.58	0.05
Cation Exchange Capacity (meq/100g)	5.34	4.32

Procedures

The soils were spiked with 250 mg/Kg pentachlorophenol by adding a PCP-acetone solution to the soil; the acetone was allowed to evaporate to dryness. After evaporation, the acetone level was undetectable. The dried soil was mixed thoroughly by stirring and shaking. To evaluate the homogeneity of PCP in the soil, eight 2.5 g aliquots were extracted and analyzed for PCP. The results were within 2% of the mean extract concentration for all aliquots.

Experiments were conducted in batch, completely mixed systems. To 2.5 g of PCP-contaminated soil in a 40 mL borosilicate glass vial, 12.5 mL of 6.5% H_2O_2 were added followed by 1 mL of a $FeSO_4$ solution to provide a final amendment of 480 mg/L Fe (II, III) in the aqueous phase. The mole ratio of peroxide to PCP was 10,200:1 and the weight ratio of peroxide to soil was 0.327:1.

Separate experimental units conducted in duplicate vials were used to monitor treatment effectiveness at a minimum of 5 time periods over 24 hours. At the time designated for analyses, an aliquot of the soil-water was collected for hydrogen peroxide analysis. The reaction was then stopped by the addition of eight drops of concentrated sulfuric acid to the vials. The ability of concentrated H_2SO_4 to quench PCP oxidation was documented by monitoring pentachlorophenol degradation in acidified samples over 8 hours. No PCP

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degradation was observed. The sc slurries were shake-extracted with 3 , of ethyl acetate for 30 minutes and then centrifuged for 15 minutes at 1,200 rpm.

Soluble iron was measured in parallel samples by filtering the soil slurry through a GFC filter. Total organic carbon and chloride were also measured on experiments conducted in parallel. Total organic carbon was determined by conduct'ng the reactions in sealed TOC ampules. At selected times, evolved CO_2 was measured on an OI 700 TOC analyzer.

Analysis

Hydrogen peroxide concentrations were determined by iodometric titration with sodium thiosulfate. Residual pentachlorophenol was followed by gas chromatography after ethyl acetate extraction from the soil. A Hewlett-Packard 5890A gas chromatograph with a flame ionization detector and a 0.53 mm (ID) X 15m Supelco SPB-5 capillary column was used. Chromatographic conditions were: initial oven temperature 100°C; final oven temperature 240°C; program rate 30°C/min; injector temperature 200°C; detector temperature 240°C; and nitrogen carrier gas flow rate 20 mL/min. Soluble iron was analyzed using flame methodology on a Perkin Elmer 3030B atomic absorption spectrophotometer. Chloride was determined using a Fisher chloride electrode paired with a double junction reference electrode.

RESULTS AND DISCUSSION

Treatment Kinetics and Stoichiometry

Hydrogen peroxide consumption and PCP degradation during a typical treatment experiment (250 mg/Kg PCP, 6.5% H_2O_2, and pH 3) as a function of time are shown in Fig. 1. The data of Fig. 1 show that the PCP and H_2O_2 first decomposed rapidly, with a slower decomposition rate after 3 hours of reaction. The expected rate in a Fenton's system is zero order because hydroxyl radical generation should approach steady state (Eq. 1) with PCP present in high concentrations; however, all decomposition rates, regardless of the hydrogen peroxide and iron amendments, were not linear. The soluble iron concentrations as a function of time are also shown in Fig. 1. Only 23% of iron added to the system could be recovered in solution at time zero. In addition, the soluble iron concentration decreased over the first three hours of treatment and the

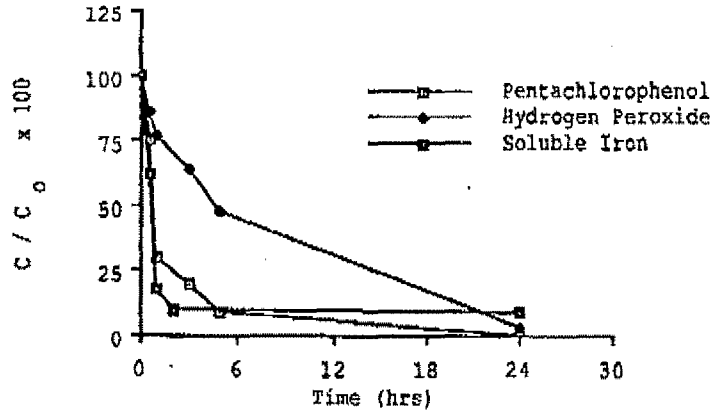

FIGURE 1. Relative pentachlorophenol, hydrogen peroxide, and soluble iron concentrations as a function of time during Fenton's reagent treatment with 0.048% iron amendment.

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concentration remained relatively constant thereafter. A possible mechanism for iron precipitation may be defined:

$$Fe^{2+} + 1/2\ O_2 + 2OH^- \longrightarrow \gamma\text{-}FeOOH + H_2O \qquad [10]$$

which has a reaction half-life of 25 minutes at neutral pH (22). The concentration of OH^- in the Fenton's system at pH 3 is four orders of magnitude less than in a system at neutral pH; a half-life adjusted for the difference in OH^- concentration may explain the 3 hour time requirement to reach the quasi-equilibrium soluble iron concentration of 9 mg/L.

The importance of soluble iron in catalyzing Fenton's reactions has been well documented (6). Because the concentrations of PCP, H_2O_2, and soluble iron changed over time in the silica sand systems, rate quantitation was difficult. A turnover number commonly used in catalysis could not be used because the soluble catalyst concentration decreased over the course of the reaction. Therefore, PCP and H_2O_2 concentrations as a function of time were fit to zero, first, and second-order models (23). The first-order model provided the best fit of the data with $R^2 > 0.90$ for plots of the natural logarithm of concentration as a function of time. First-order fit of experimental data is a common practice for quantifying complex environmental processes, such as biochemical oxygen demand (24). The reactions occurring in the Fenton's system are complex; however, the empirical fit of experimental data to the first-order model provided the most accurate means of comparing different treatment conditions.

The concentrations of PCP, total organic carbon, and chloride over the course of the reaction followed in Fig. 1 are shown in Fig. 2. These data show that greater than 99.9% of the original PCP was degraded in 24 hours and that the removal of total organic carbon closely followed PCP degradation. These results are similar to those obtained by Barbeni et al. (12), who demonstrated the mineralization of di- and trichlorophenols in aqueous systems. The phenomenon that organic carbon was removed rapidly after PCP degradation suggests that hydroxyl radical attack on the products is more rapid than on the parent compound. High rates of product degradation may be explained by the lower oxidation state of the ring as it is hydroxylated and the increased water solubility of the products. Substrate water solubility has been implicated in Fenton's reagent treatment reactivity (25). The high oxidation state of halogenated organics also significantly affects reactivity with oxidizing species (26).

First-order rate constants for PCP degradation and H_2O_2 decomposition as a function of pH in silica sand are shown in Figures 3 and 4 for experiments conducted without and with iron (II) addition, respectively. The data of Figure

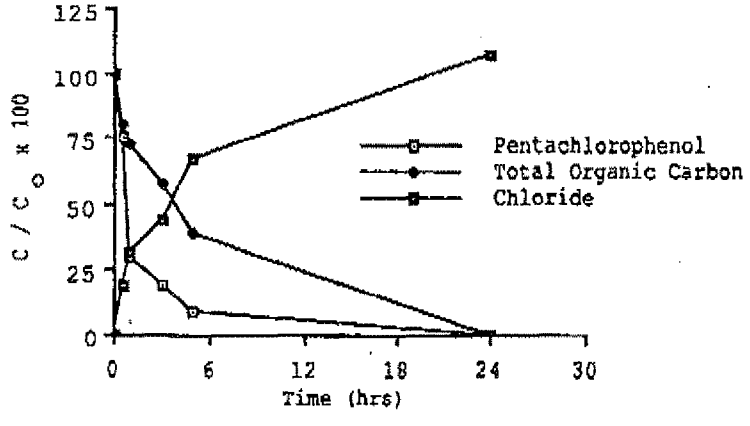

FIGURE 2. Pentachlorophenol, chloride, and total organic carbon concentrations as a function of time with an initial peroxide concentration of 6.5% and 0.048% iron amendment.

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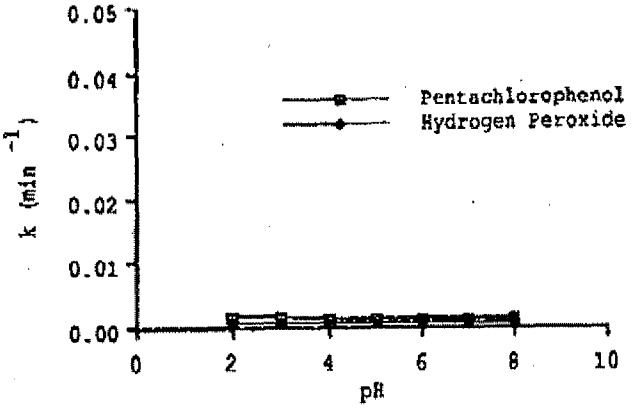

FIGURE 3. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in silica sand with no iron addition.

3 show that the rate of PCP oxidation by H_2O_2 is negligible. In addition, peroxide decomposition rates were minimal. However, with iron (II) addition, PCP degradation rate constants increased significantly at low pH. Pentachlorophenol degradation was evident above pH 6 but at lower rates. The higher PCP degradation rate constants at low pH are probably related to the requirement of soluble iron in the system (6). In addition, the pH regime may enhance the cycling of iron (II) as described by Eqs. 2, 5, and 8. While hydroxyl radical generation is enhanced at low pH, oxygen evolution is the predominant route of H_2O_2 decomposition at neutral pH (27):

$$H_2O_2 \longrightarrow 1/2\ O_2 + H_2O \qquad [11]$$

Hydroxyl radical is most reactive in the aqueous phase and there is little evidence that adsorbed species are degraded by Fenton's reagent. The pK_a of PCP is 4.5, and the solubility of PCP increases above the 14 mg/L value of the unionized species. The increased solubility above pH 4.5 should increase the $OH\cdot$ reactivity toward PCP; however, PCP degradation rates were lowest at pH $\geq$ 5 suggesting that the water solubility did not enhance PCP degradation. However, reactivity toward hydroxyl radical may be greater for PCP in the unionized state.

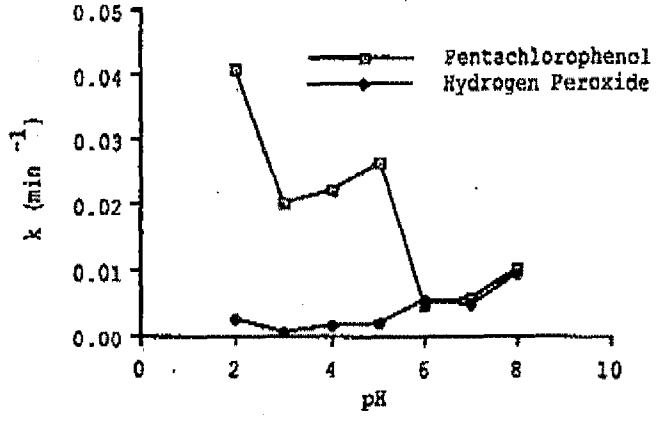

FIGURE 4. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in silica sand after iron addition.

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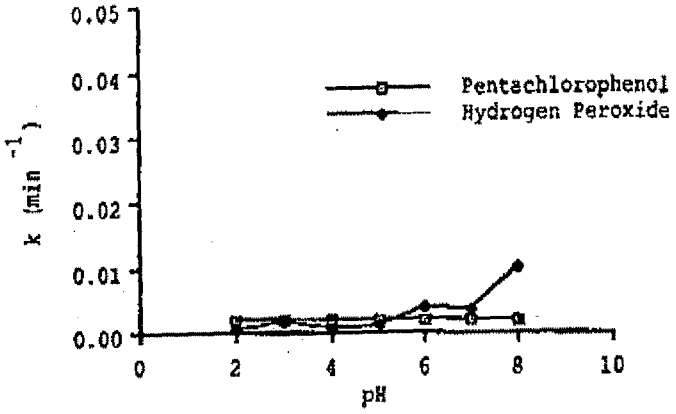

FIGURE 5. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in soil I with no iron addition.

Figures 5 and 6 show PCP and H_2O_2 decomposition rate constants for reactions conducted without the $FeSO_4$ amendment in soils I and II, respectively. These data show that Fenton's oxidations proceeded in natural soils without the addition of soluble iron. The reactions may have been promoted by the dissolution of iron oxides (e.g., hematite, magnetite, goethite) or by heterogeneous catalysis occurring at the mineral surfaces.

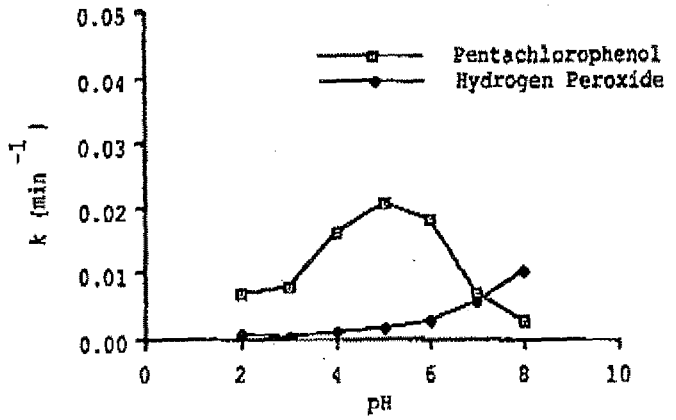

FIGURE 6. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in soil II with no iron addition.

Figures 7 and 8 show PCP and H_2O_2 decomposition rate constants for reactions conducted with the addition of 480 mg/L iron (II) amendment to soils I and II, respectively. These data show that PCP degradation rates were increased by the addition of iron (II) to the system. However, the rate of H_2O_2 consumption also increased.

The primary cost of Fenton's reagent treatment is hydrogen peroxide at $1.72/gallon for a 50% (wt.) aqueous solution. Therefore, the optimum treatment conditions will be characterized by a high rate of contaminant degradation with a minimal rate of H_2O_2 consumption. An empirical measure of Fenton's reagent treatment efficiency may be described by the ratio of the first-order rate constant for PCP degradation to the rate constant for H_2O_2 consumption

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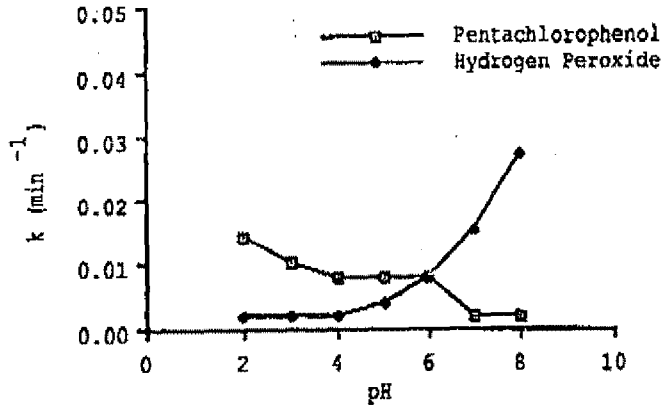

FIGURE 7. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in soil I after iron addition.

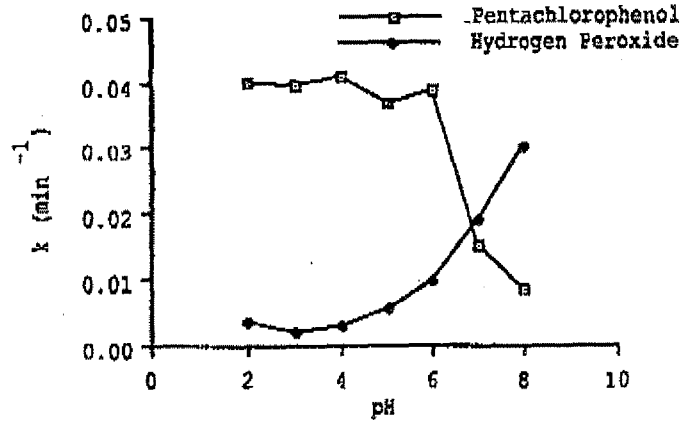

FIGURE 8. Effect of pH on the rates of Fenton's treatment of pentachlorophenol and hydrogen peroxide decomposition in soil II after iron addition.

($k_{PCP}/k_{H_2O_2}$). Fenton's reagent treatment efficiencies for the silica sand system with iron addition and the two natural soils with and without iron addition for the seven pH regimes are shown in Table 2.

No efficiency data are available for the silica sand system without iron addition because PCP and H_2O_2 degradation rate constants were negligible. The efficiency data show that, regardless of the iron addition, the optimum pH was 2 to 3. In some cases PCP degradation rate constants at pH 4, 5, and 6 were higher than rate constants at pH 2 and 3. However, the corresponding rate constants for H_2O_2 decomposition were higher above pH 3, which resulted in lower treatment efficiencies. Therefore, the optimum pH regime for the three soil systems investigated was in the range of pH 2 to 3.

Fenton's reagent has been effective in degrading chlorophenols and formaldehyde in aqueous solutions (12, 13). The results of this research show that Fenton's reagent is also effective for treating PCP in soils. Previous studies did not determine the optimum pH conditions for the optimum treatment. This research shows that the most effective pH for reducing peroxide requirements is pH 2 to 3.

The data of Table 2 show that optimum system pH was the same with or without iron amendment for the two natural soils. Table 2 data also show that the optimum treatment efficiencies at pH 2 and 3 for soils I and II without iron

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TABLE 2
Fenton's Reagent Treatment Efficiencies

	$k_{PCP}/k_{H_2O_2}$						
pH	2	3	4	5	6	7	8
Silica + Fe	13.7	25.0	10.5	11.6	0.9	1.2	1.1
Soil I 0 Fe	12.5	4.0	6.7	0.67	0.63	0.18	0.12
Soil I + Fe	5.0	3.4	2.0	1.4	1.0	0.13	0.082
Soil II 0 Fe	8.0	17.6	2.0	11.0	4.5	1.1	0.36
Soil II + Fe	7.3	11.3	8.2	4.6	3.7	0.72	0.30

addition were greater than those with iron addition. Therefore, the Fenton's reactions may be slowed by adjusting the pH to the optimum range and not adding iron without a loss of treatment efficiency. A potential use of the reaction without iron addition would be the in situ treatment of a deeply contaminated surface soil. Under these conditions, the peroxide would be able to penetrate the soil and reach deeper layers. However, a longer time would be required for the treatment without iron addition. Based on the first-order rate constants for PCP degradation in Soil I, 5 hours and 39 hours would be required for 99% PCP degradation at pH 3 with and without iron addition, respectively.

The optimum pH based on the empirical efficiencies (Table 2) was pH 3 for both the silica sand system and soil I, and pH 2 for soil II. The physical and chemical properties of the soil (i.e., particle size distribution, cation exchange capacity, iron and manganese oxides, and soil organic carbon content) will likely affect the optimum pH and the efficacy of Fenton's reagent treatment. The greatest difference between the soil characteristics listed in Table 1 is organic carbon content (0.58% and 0.05% for soils I and II, respectively). The high organic carbon content of soil I may have contributed to competition for hydroxyl radical resulting in lower PCP degradation rate constants. Soils are a complex media in which the interactive effects of the matrix will require detailed study to elucidate mechanisms which affect Fenton's treatment efficiencies.

Because of the complexity of Fenton's treatment systems, bench-scale treatability studies will be necessary to assess the effectiveness of Fenton's reagent treatment on a site by site basis using a matrix of pH regimes and iron amendments. Such bench scale treatability studies are commonplace in assessing the potential for bioremediation of surface soils and groundwater (18). Further Fenton's research will provide predictive treatability models based on chemical structure-reactivity, catalysis by iron minerals, and the effect of soil organic carbon.

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Marriott Downtown Waterfront, Portland, Oregon -- May 24, 2006

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Project Update
Portland Harbor RI/FS

May 24, 2006

Portland, OR

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Lower Willamette Group

- Formed 2001
- Signed AOC: Arkema; Chevron; City of Portland; ConocoPhilips; Gunderson; NW Natural; Oregon Steel Mills; Port of Portland; Time Oil Co. and Union Pacific Railroad.
- LWG management: Jim McKenna, Bob Wyatt – co-chairs; Rick Applegate; Fred Wolf - Treasurer

LWG
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LWG Consultant Team

Integral Consulting – Remedial investigation

Anchor Environmental – Feasibility Study

Kennedy/Jenks – Human Health Risk Assessment

Windward Environmental – Ecological Risk Assessment

Archeological Investigations Northwest – Cultural Resources

West Consultants – Hydrodynamic Modeling

Harris & Smith Public Affairs – Public Involvement

LECG, LLC – PRP Issues

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Project Timeline

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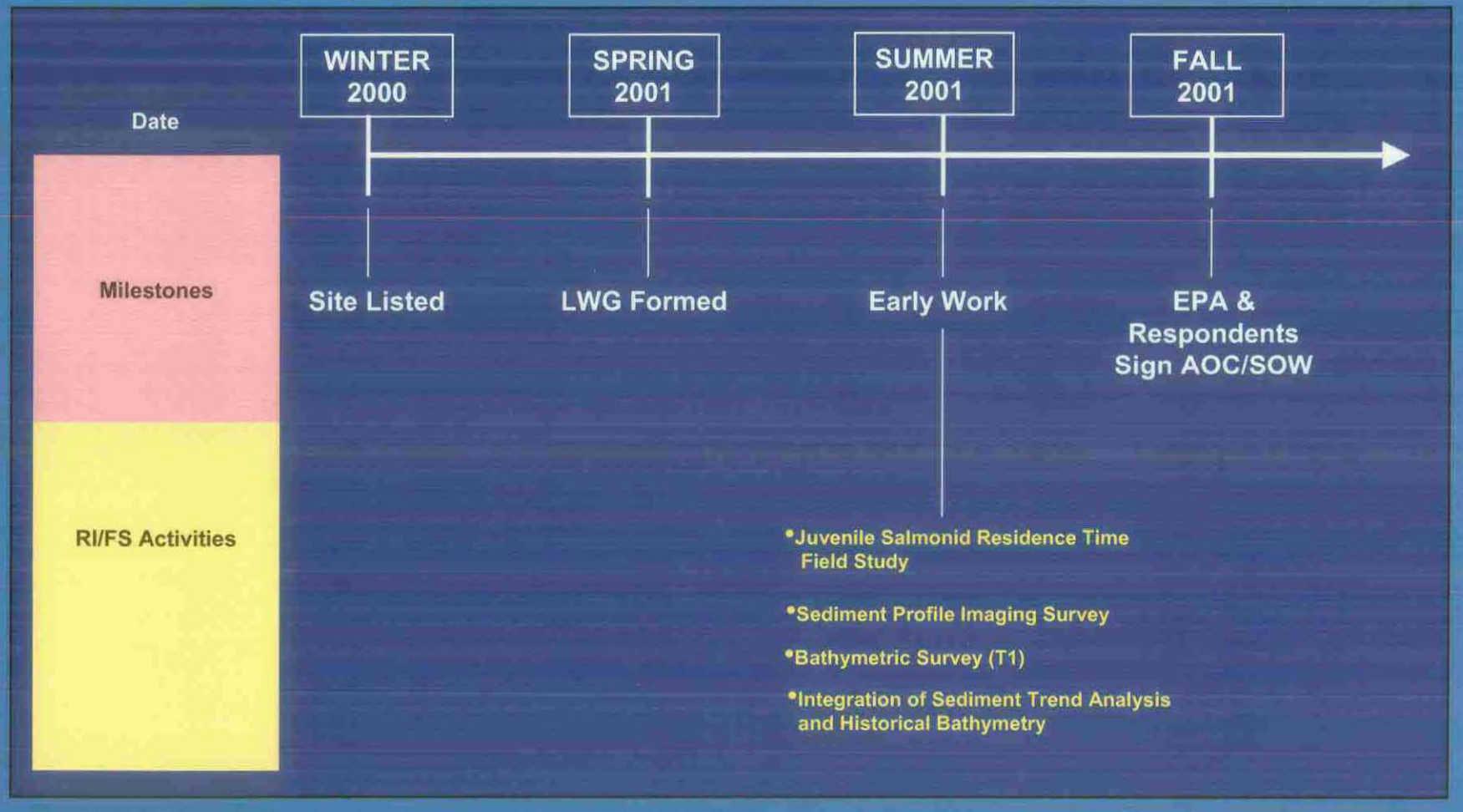

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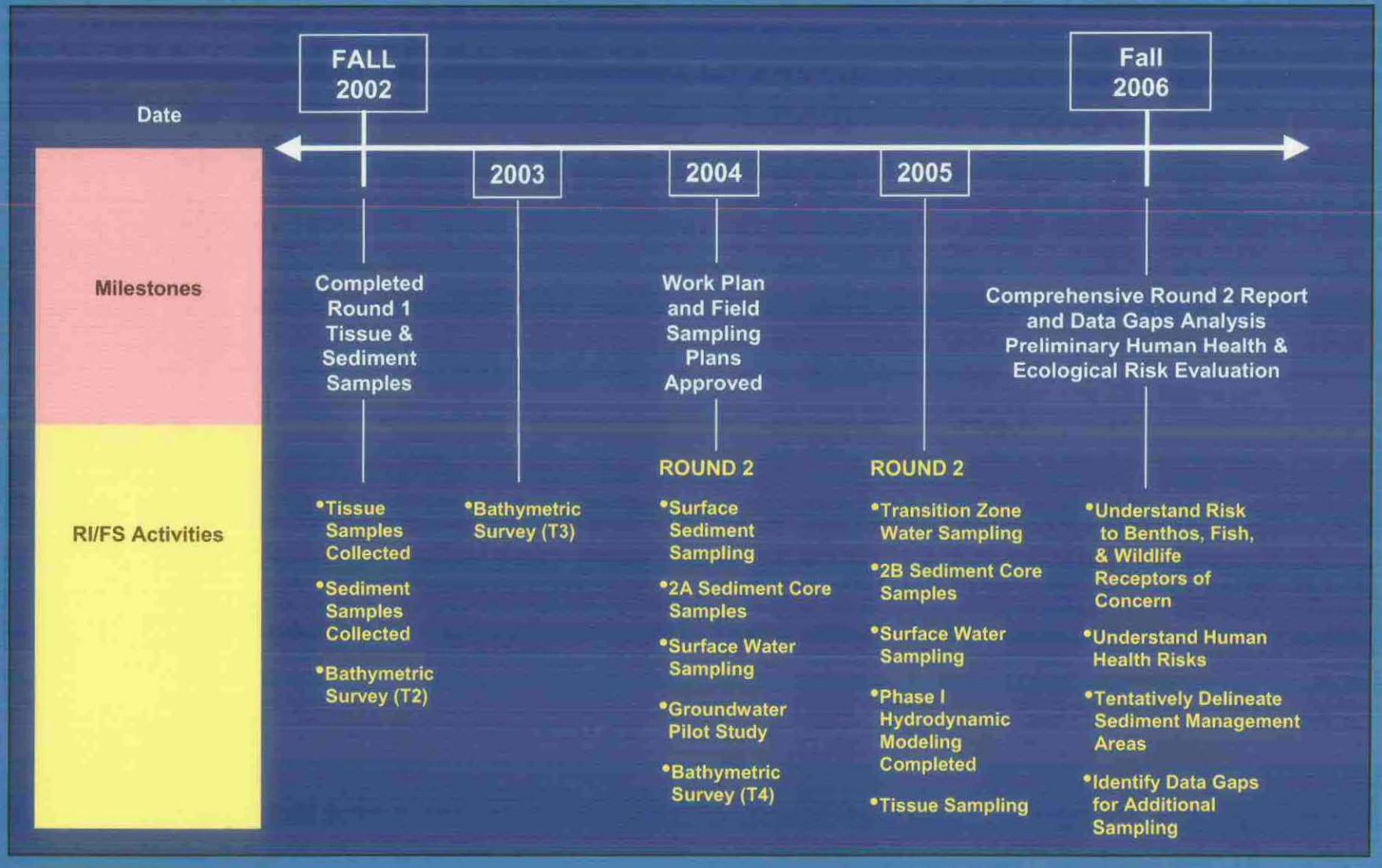

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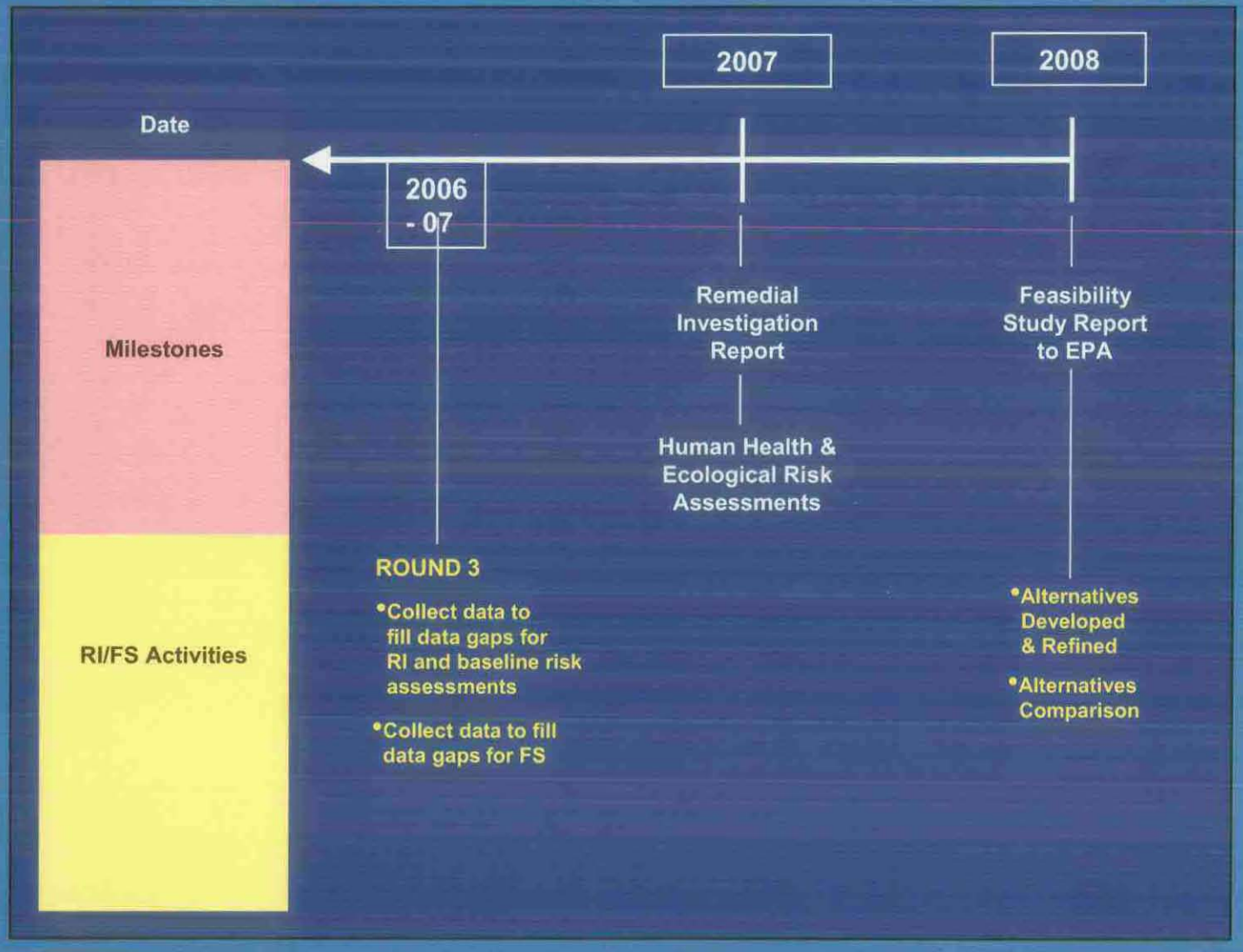

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Upland and In-Water Investigation

- EPA In-water
- DEQ Uplands
- LWG – responsible for investigation of both
  - Conceptual Site Model
  - Groundwater
  - Transition zone water
- Manage per EPA national guidance - CSTAG

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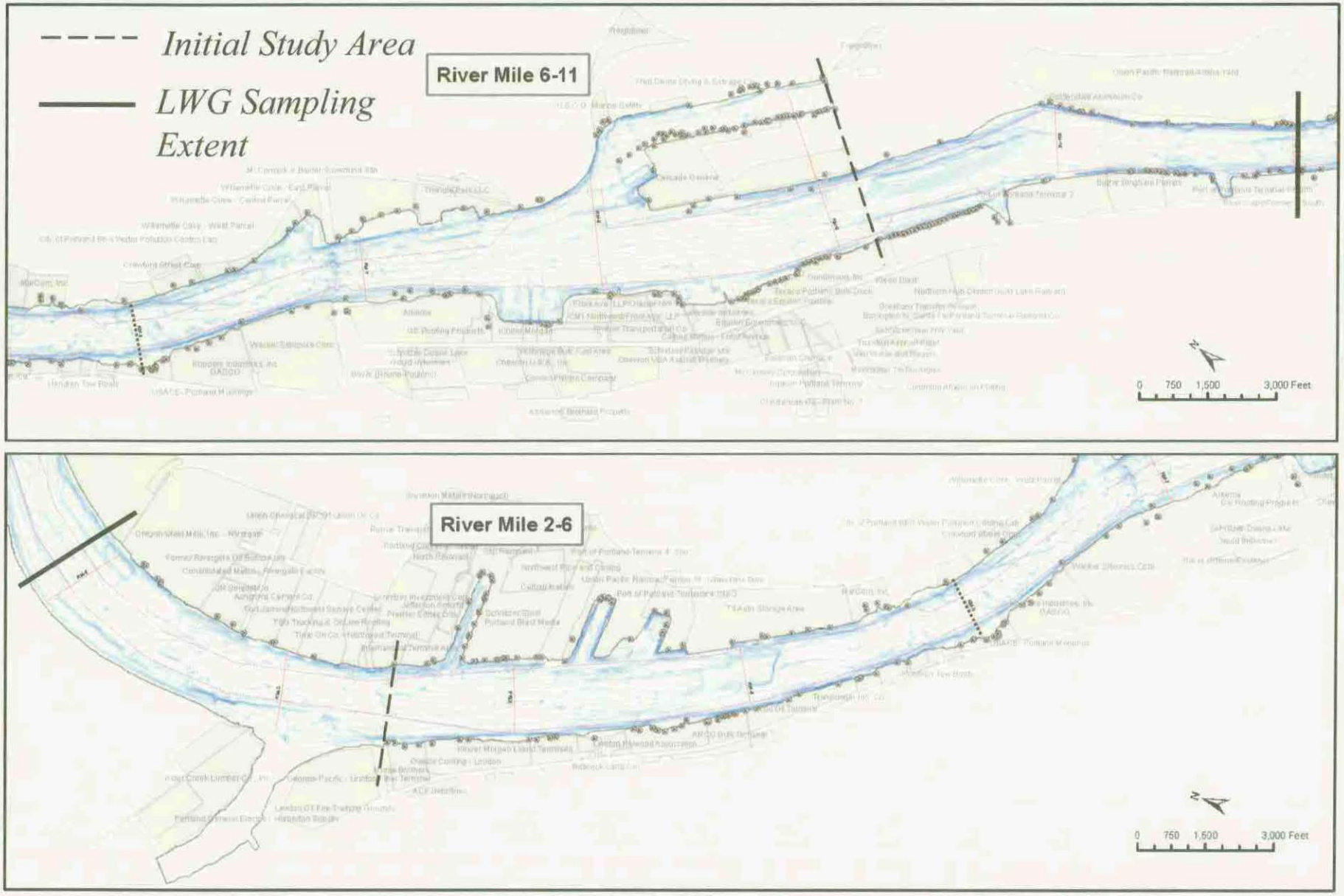
Portland Harbor RI/FS Study Area



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Physical System

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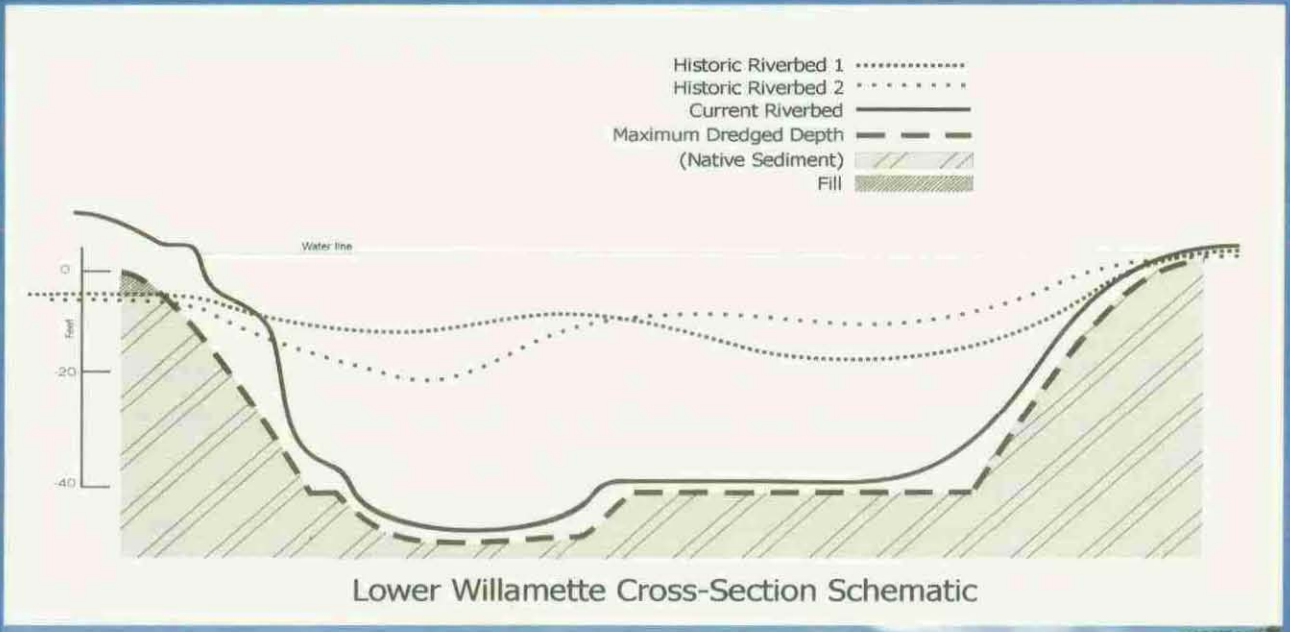
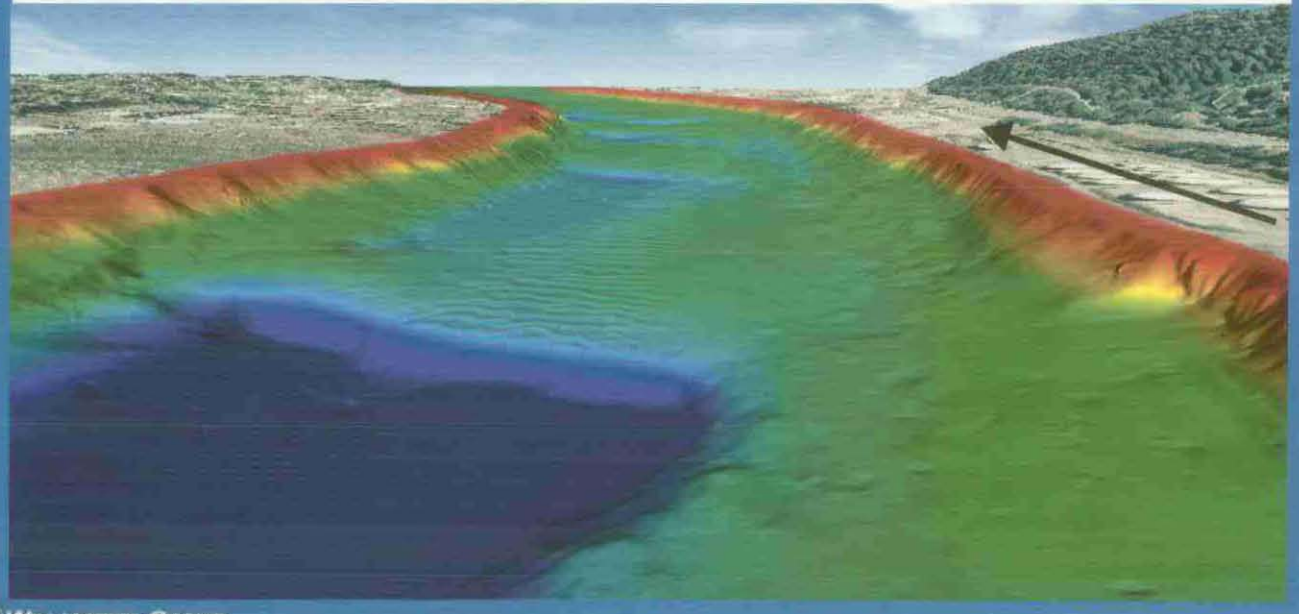
Physically-altered Riverbed



Lower Willamette Cross-Section Schematic



Looking upstream from RM 5

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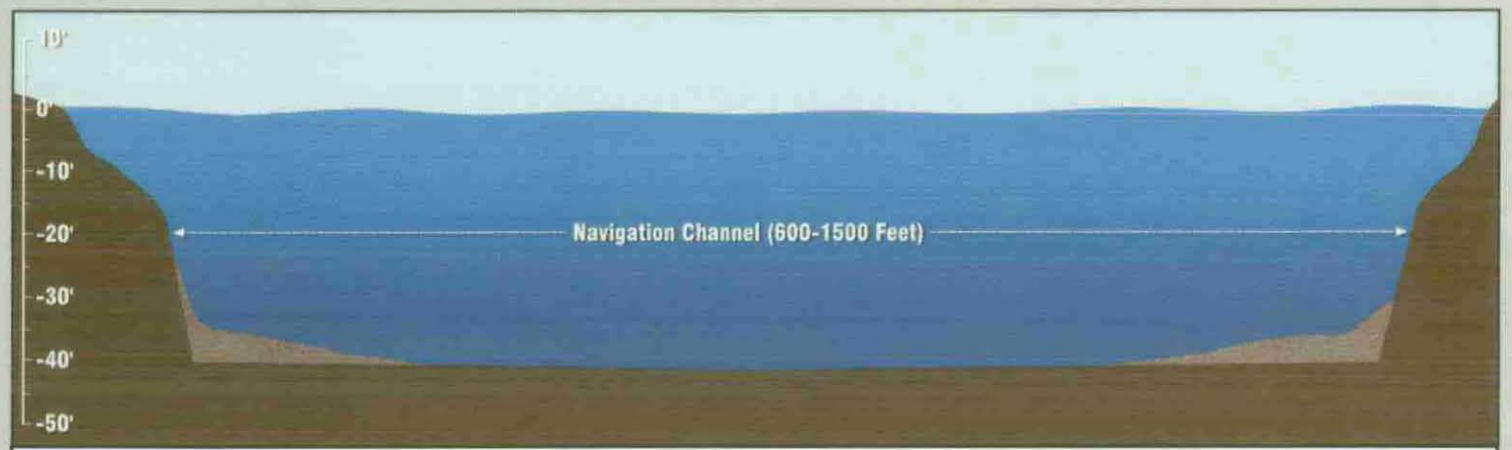
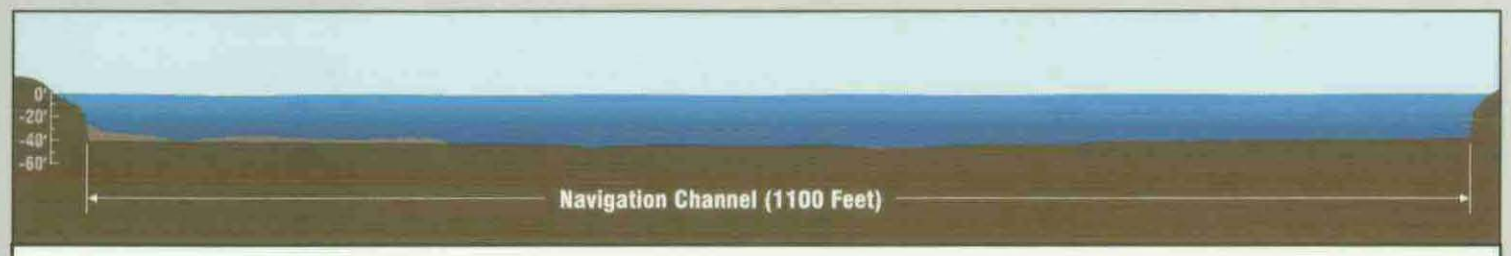
Channel versus Nearshore Areas



A **Hypothetical Willamette River Cross Section**



B **Willamette River Cross Section at River Mile 9**

RM 9

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Remedial Investigation Data Collection

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Fish Sampling

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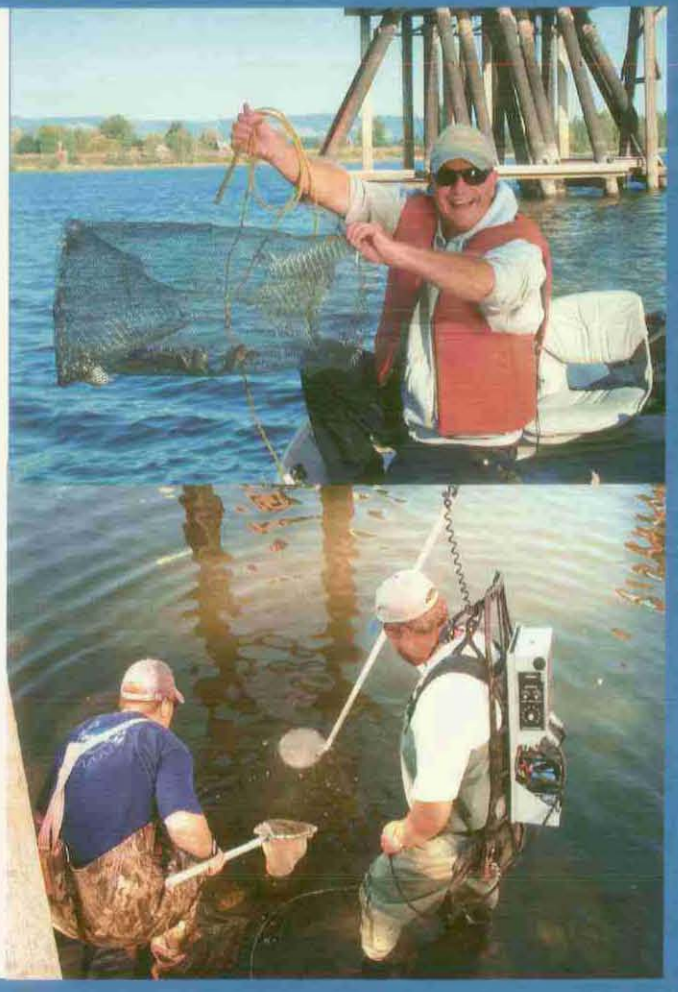
Fish Tissue Sampling Period

Subyearling Chinook	June 24 - 27, 2002
Remaining species	July 22 - November 10, 2002
Site Characterization Report	October 12, 2004

Fish Collection

(Total Number of Fish Collected: 1,451)

	Collected			Composites		
	Fillet	Wholebody	TOTAL	Fillet	Wholebody	TOTAL
Small Mouth Bass	24	66	90	5	14	19
Yellow Bullhead	9	9	18	---	---	---
Brown Bullhead	33	31	64	6	6	12
Carp	37	41	78	6	6	12
Juv Chinook	---	92	92	---	7	7
Black Crappie	23	25	48	4	4	8
Lamprey	---	3	3	---	---	---
Peamouth	---	30	30	---	4	4
Northern Pike Minnow	---	35	35	---	6	6
Sculpin	---	863	863	---	27	27
Largescale Sucker	37	91	128	---	6	6
Walleye	2	---	2	---	---	---



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Sediment Sampling

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LWG Sediment Sample Collection

Rounds 1 and 2 (2002 and 2004) Surface Samples

- hand cores (0-15 cm) - shoreline or beach samples (45 locations)
- grab samples - riverbed surface sediments (560 locations)

Round 2 Subsurface Samples

- 218 cores collected at 200 locations
- cores sectioned and analyzed based on lithology, field lab screens, visual observations

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Portland Harbor Sediment Sample Numbers and Types

	Coverage	Time Frame	Surface Samples	Subsurface Samples
Non-LWG	RM 1-12	**1990-2004**	**849**	**729**
USACE DMMP	RM 2-12	**2005**	**86**	**72**
LWG Data				
Round 1	RM 2-10	**2002**	**74**	**0**
Round 2A	RM 2-11	**2004**		
0-30cm			**555**	
30-200cm				**333**
200-400cm				**247**
400+cm				**29**
Total Samples			***1564***	***1410***

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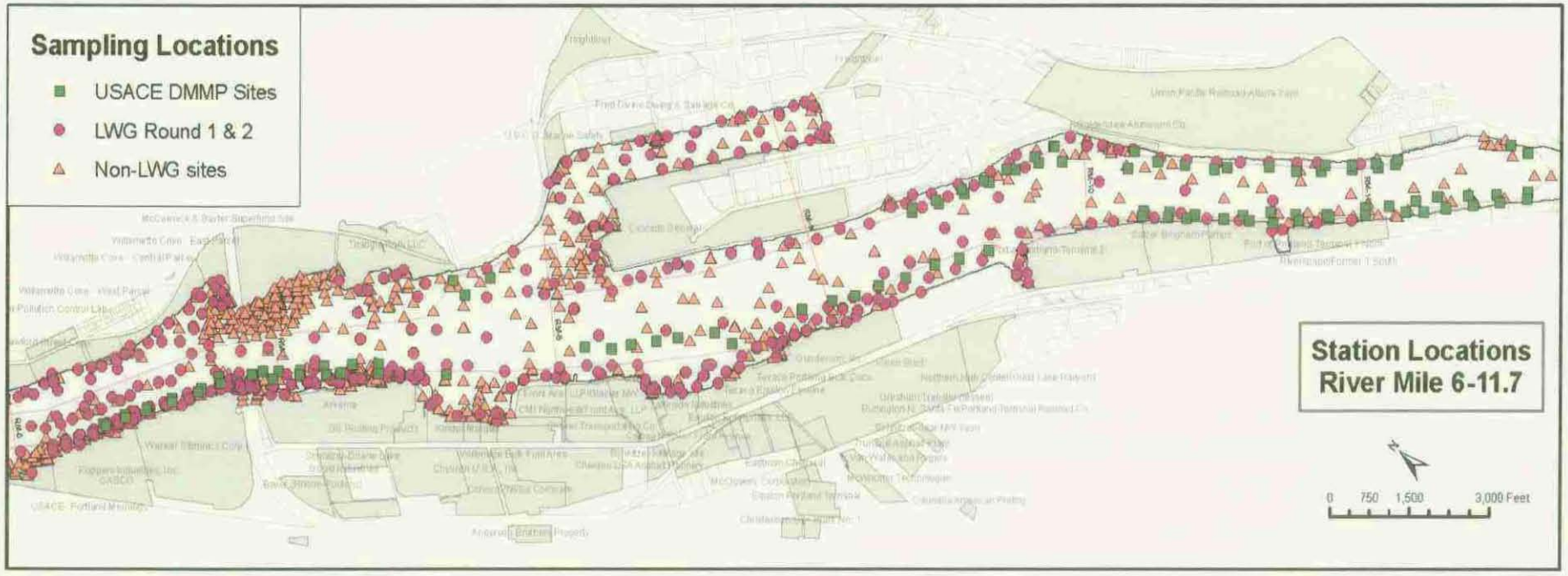

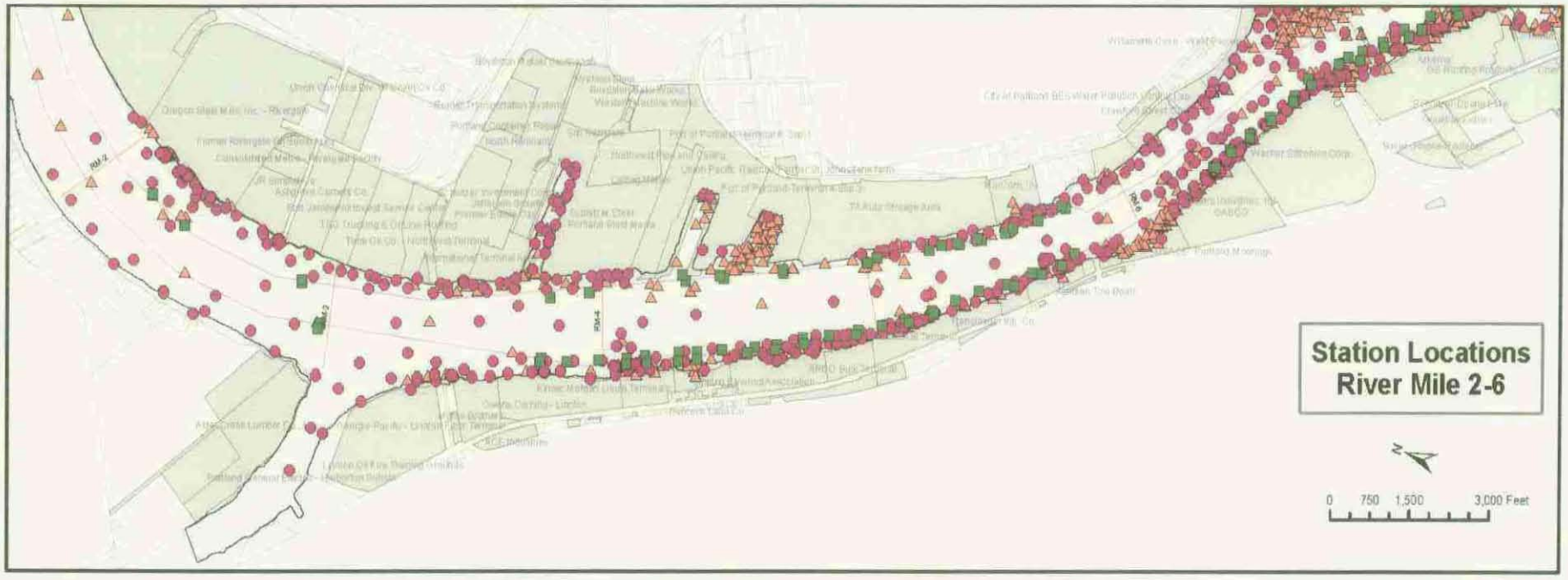

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Nature and Extent Summary

- Many near-shore locations with elevated chemicals
- Very few channel locations with elevated chemicals
- Surface and subsurface spatial trends consistent with historic data set and known sources

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Nature and Extent Summary (cont.)

- Upstream and downstream ends of sampled area (including stations in Multnomah Channel) show generally low concentrations of detected analytes
- Subsurface high concentrations in some areas consistent with depositional patterns

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Human Health Risk Assessment

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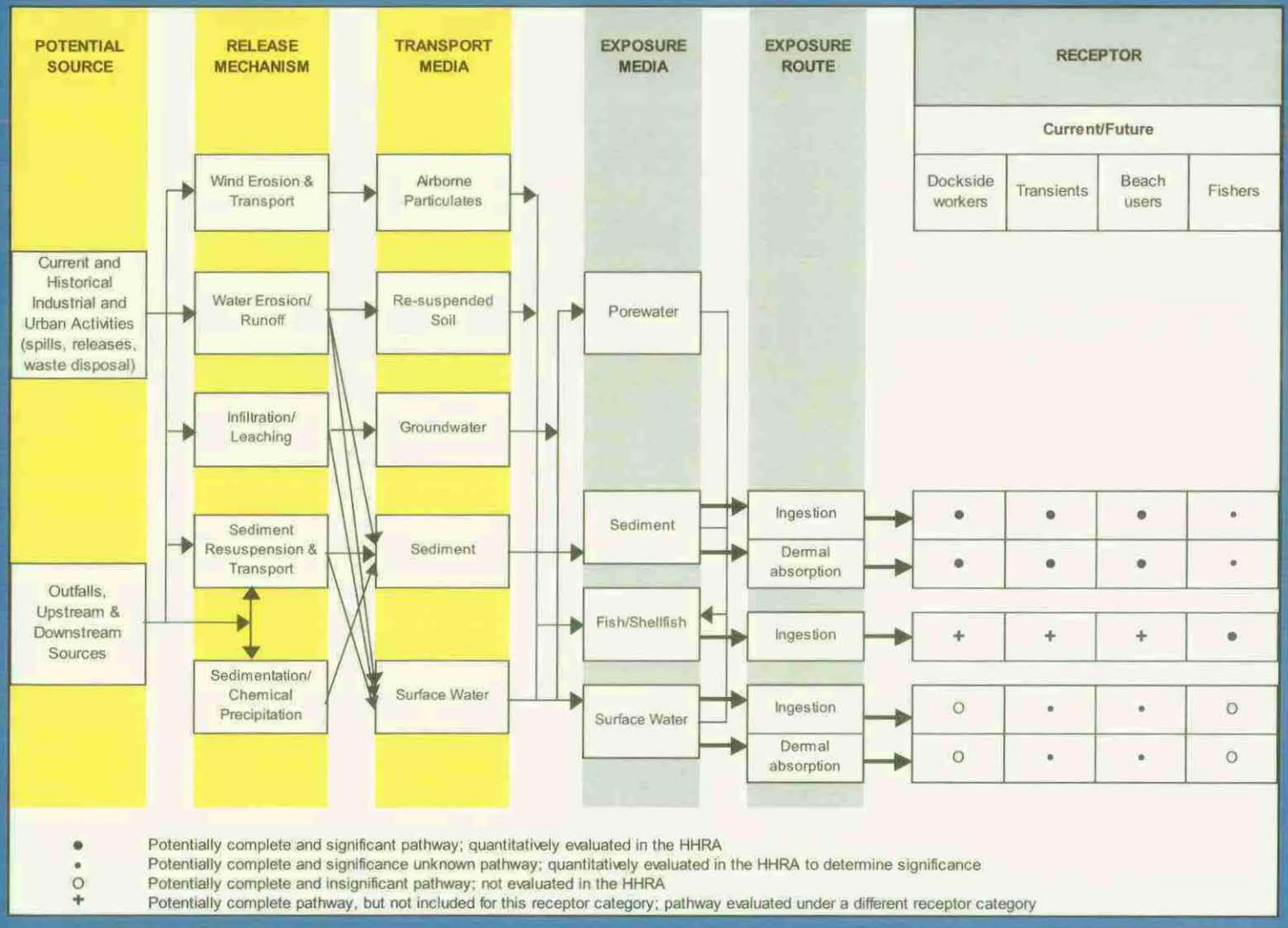
Human Health Conceptual Site Model



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Potentially Complete Exposure Pathways

- Risks for the following human health exposure pathways will be calculated in the Human Health Risk Assessment (HHRA):

	Beach Sediment: Ingestion and dermal absorption	In-water Sediment: Ingestion and dermal absorption	Surface water: Ingestion and dermal absorption	Groundwater Seeps: Ingestion and dermal absorption	Fish/ Shellfish: Ingestion
Workers	X	X			
Transients	X		X	X	
Beach users	X		X	X	
Fishers	X	X			X

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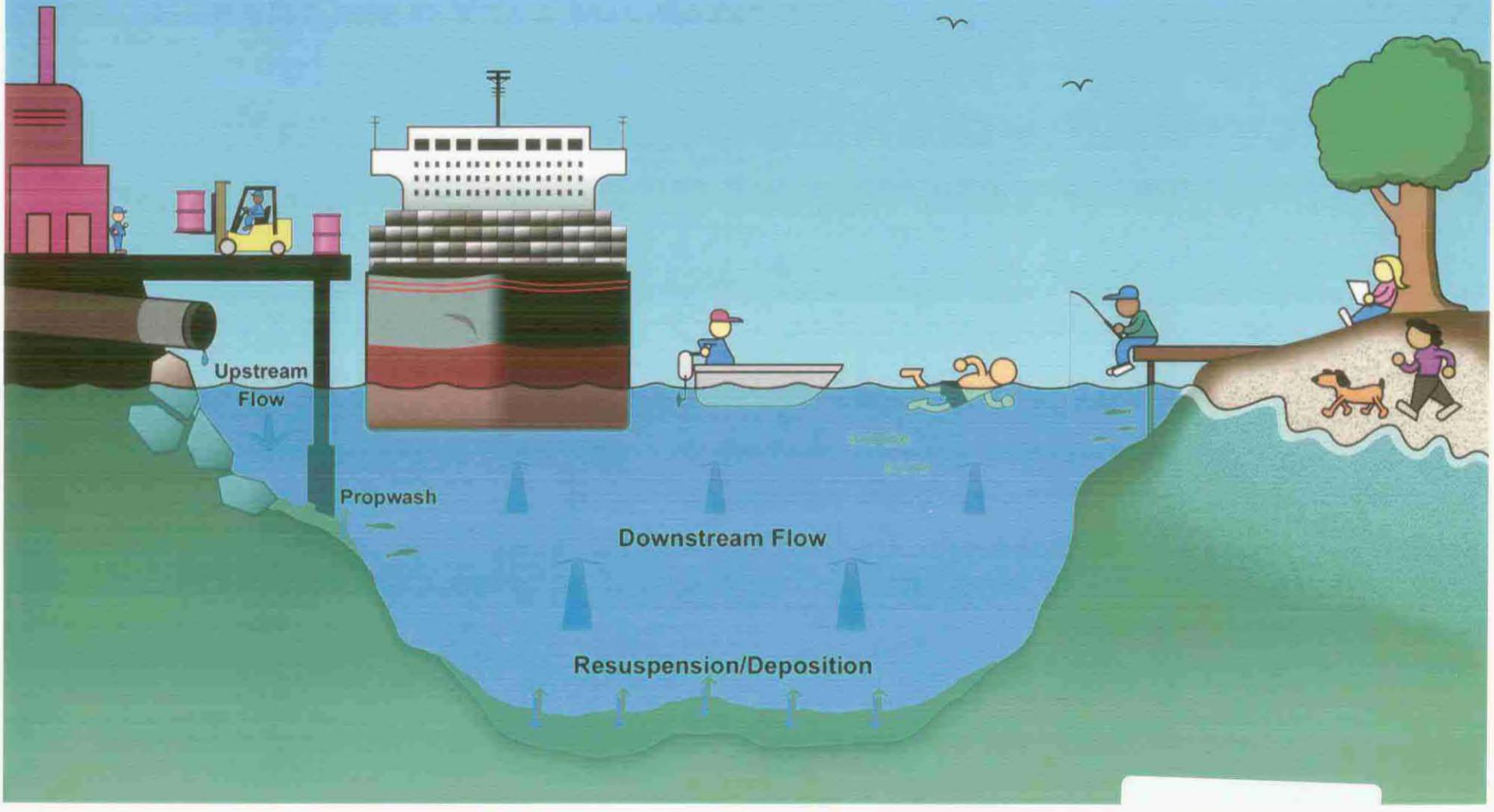
Human Health Conceptual Slide Model



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Ecological Risk Assessment

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Eco Risk Assessment Endpoints

Survival, growth, and reproduction of:

- Aquatic plant populations
- Benthic invertebrate and shellfish populations
- Fish (selected receptors: largescale sucker, white sturgeon, carp, sculpin, juvenile chinook salmon, peamouth, smallmouth bass, northern pikeminnow, lamprey ammocoetes)
- Amphibian and reptile populations
- Birds (selected receptors: spotted sandpiper, hooded merganser, bald eagle, osprey)
- Mammals (selected receptors: mink and river otter)

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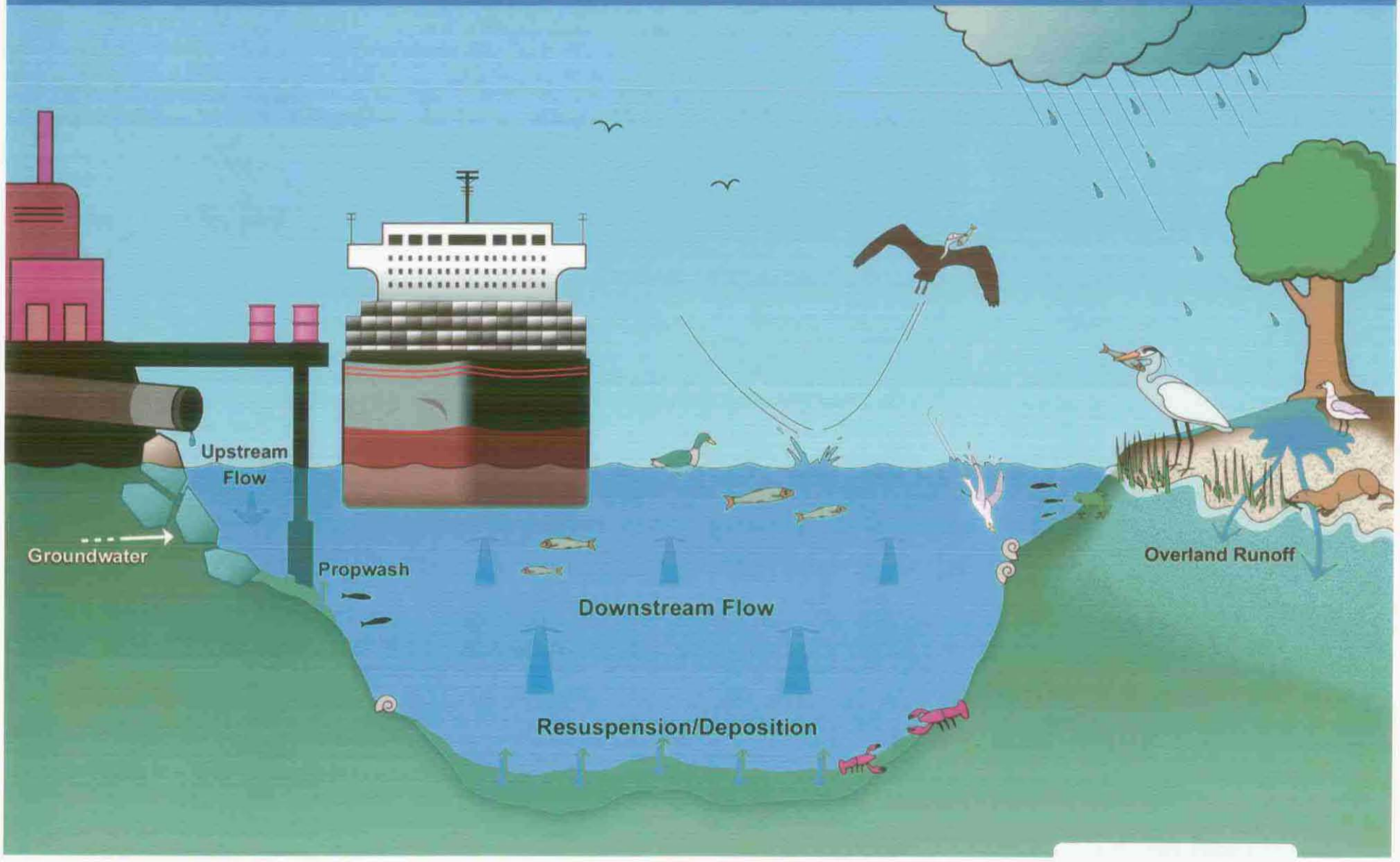
Eco Risk Conceptual Site Model



LWG00097

Comprehensive Round 2 Site Characterization and Data Gaps Analysis Report

- Summarize LWG and non-LWG sample data
- Refine the conceptual site model
- Present preliminary human health and ecological risk evaluations
- Identify chemicals and media that may pose unacceptable risks
- Identify preliminary AOPCs
- Identify potential historical and ongoing sources of contamination

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Remaining Primary Project Elements

1. Comprehensive Round 2 Report and Data Gaps Analysis
2. Round 3: collect data for FS and RI/RA data gaps
3. RI & RA Reports
4. Feasibility Study

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Feasibility Study Approach

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Work Plan FS Approach

- Complete Baseline Risk Assessments
- Refine Remedial Action Objectives
- Identify Areas (Sediment Management Areas) and Volumes of Sediment
- Refine Remedial Technologies
- Assemble Remedial Alternatives
- Screen Remedial Alternatives
- Evaluate Remedial Alternatives

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Inputs to Define Future Sediment Management Areas (SMAs)

- Complete risk assessments and refine areas with unacceptable risks
- Detailed analysis of sediment depths and related volumes
- Overlay physical environment
- Overlay habitat types and restoration opportunities
- Overlay river and shoreline uses and potential future uses
- Source differences (e.g., groundwater vs. overwater source)

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Conclusion

- Major sampling efforts completed
- Physical, chemical, and biological systems understood
- Data gaps and FS data needs to be filled
- Risk Assessments next
- Individual member Early Actions underway
- Feasibility Study
- Focus to manage scope, schedule and budget

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As a reminder, this meeting constitutes a settlement negotiation protected by Federal Rule of Evidence 408 and Oregon Evidence Code Rule 408. All oral and written information provided in this meeting is confidential and is inadmissible for any purpose.

Invitation for Participation and Cooperation

Remedial Investigation and Feasibility Study
Portland Harbor Superfund Site

LWG
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May 24, 2006
Portland, Oregon

LWG00104

BZTO104(e)015389

Agenda

I. Introduction

II. EPA's Notice and Request for Cooperation

III. DEQ's Notice of Settlement Opportunity

IV. RI/FS Overview and Status

V. Federal and State Entities as PRPs

VI. Q & A for Federal and State Representatives

Break – Conclude U.S./Oregon Participation

VII. Offer for RI/FS and Group Participation

VIII. LECG's Prior and Planned Work

IX. Port of Portland's Demand Letter

X. Additional Q & A and Proposed Next Steps

LWG00105

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RI/FS Participation Offer – Key Terms

- Join LWG as a "Voting" or "Funding" Member
- Voting Membership
  - Sign EPA Settlement Agreement
  - Interim Shares Assigned to Existing Voting Members Range from 1 to 7
  - Single (1.0) Interim Share Assigned to April 2006 Notice Recipients
  - Voting Power is Generally Proportionate to Interim Shares Assigned to Each Voting Member

LWG00106

Key Offer Terms (Cont'd)

- Funding Membership
  - No Requirement to Sign EPA Settlement Agreement
  - Three-Quarter (0.75) Interim Share Assigned
  - Contractual Obligation to Fund RI/FS through Completion Pursuant to a Share-Weighted Interim Allocation
  - No Liability Resolution
- All Members Make Periodic Payments to Fund RI/FS and Group Activities:

$$\$ \text{ Required } x \frac{\text{Shares Held}}{\text{Total Shares}} = \text{Payment by Member}$$

LWG00107

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Key Offer Terms (Cont'd)

- Interim Allocation: Total Current Group Shares = 29.0

	Only You Join	All Other Private Notice Recipients Join as Voting Members
You Participate as a Voting Member	$\frac{1}{30} = 3.33\%$	$\frac{1}{50} = 2.00\%$
You Participate as a Funding Member	$\frac{0.75}{29.75} = 2.52\%$	$\frac{0.75}{49.75} = 1.51\%$

- All Costs Allocated on an Interim Basis Subject to Reallocation (or "True Up") in Accordance with a Final Allocation (by Agreement, ADR, Judicial Determination or Otherwise)
- Members Waive Contribution Protection as to Claims Asserted by Other Members (for Costs Incurred Under the LWG Agreement)

LWG00108

Key Offer Terms (Cont'd)

- Dealing with Past Costs

  Option A: Make "catch-up" payment as if an original member (installment terms negotiable); other members thereafter barred from asserting "cooperation" as a final allocation factor against the interests of the new member selecting Option A (new member deemed "Fully Cooperating").

  10% interest on past due amount

  Option B: Make no catch-up payment, but other members may later assert "cooperation" as a final allocation factor against the interests of the new member selecting Option B.

LWG00109

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Key Offer Terms (Cont'd)

- Offer Closes June 30, 2006
- Due Diligence Opportunity
  - Repository Inspection - Achor Enviro in Lakeoswego
  - Additional Meetings or Conference Calls (Legal, Technical, Participation Terms, etc.)
  - Disclosure of Participation Agreement Subject to Confidentiality Agreement
  - Communications with LWG-Designated Contacts (or others as appropriate)

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LECG Activities

- Waterfront History Development
- Focus on Group Expansion:

  Track 1: Previously Noticed Parties and Properties

  Track 2: Federal and State Entities

  Track 3: All Other PRPs
- Support Settlement Initiatives

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From: Perry Lynne [lynne.perry@doj.state.or.us]
Sent: Thursday, June 01, 2006 4:50 PM
To: Dost, Patty; Ashton, David; BHengemihle@lecg.com
Cc: PURCHASE Steve; YOUNG Cyril; Whitman Richard; Burkholder Kurt
Subject: Draft Cooperative Agreement

Cooperative greement.pdf (399.

I am circulating a draft of the proposed cooperative agreement for review in advance of tomorrow's meeting. Patty or David--could you please circulate this to the parties likely to participate (or forward an updated working list so that I can do so). Many thanks.

I will be in meetings out of the office until about 11 or so tomorrow, but should be in after that if you have any questions. Lynne

*****CONFIDENTIALITY NOTICE*****

This e-mail may contain information that is privileged, confidential, or otherwise exempt from disclosure under applicable law. If you are not the addressee or it appears from the context or otherwise that you have received this e-mail in error, please advise me immediately by reply e-mail, keep the contents confidential, and immediately delete the message and any attachments from your system.

****

LWG00175

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Confidential Settlement Communication Subject to Rule 408

COOPERATIVE AGREEMENT FOR PORTLAND HARBOR SUPERFUND SITE

This Cooperative Agreement (Agreement) is entered into on the ___ day of July, 2006 by and between the State of Oregon, acting by and through the Oregon Department of State Lands (DSL), and the Performing Parties identified in Attachment 1, who have signed this Agreement and related Consent Judgment with the Oregon Department of Environmental Quality (DEQ). DSL and the Performing Parties are referred to collectively hereinafter as the "Cooperating Parties."

I. PURPOSE

The mutual objective of the Cooperating Parties is to encourage and facilitate the investigation and remediation of the Portland Harbor Superfund Site (Site).[1]

The Cooperating Parties have or may later have causes of action against one another for recovery of response costs associated with environmental response actions that have been or may later be taken in connection with the Site under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601 *et seq.*, the Resource Conservation and Recovery Act, 42 U.S.C. § 9601 *et seq.*, Oregon Revised Statutes chapters 465, 466 and 468B, and other statutory and common law theories (Claims).[2]

The Cooperating Parties seek to facilitate the investigation and remediation of the Site through collaborative efforts as more fully outlined herein. The Cooperating Parties also seek to resolve the Claims to the greatest extent possible through a non-judicial allocation of response costs (Allocation), thereby avoiding or minimizing litigation and allowing the Cooperating Parties better to focus their efforts and available resources on investigation and remediation of the Site.

[1] The Portland Harbor Superfund Site (Site) consists of the areal extent of contamination, and all suitable areas in proximity to the contamination necessary for implementation of a response action, at, from and to the Portland Harbor Assessment Area??, including the current Study Area from approximately Willamette River Mile (RM) 2.0 to 11.0, as well as upland areas that contain sources of contamination to sediments at, on or within the Site.

[2] "Claims" encompasses claims for recovery of response costs and remedial action costs incurred in the investigation, removal or remediation of the Site whether styled as direct cost recovery claims, contribution claims, claims for declaratory relief, or otherwise. "Claims" do not include enforcement matters, including those seeking civil penalties.

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II. AGREEMENT

In consideration of the covenants contained herein and the mutual benefits to be derived therefrom, the Cooperating Parties agree as follows:

A. Tolling

1. The Cooperating Parties agree that the time period from and including _____, 2006 (Effective Date) to and including completion of the Remedial Investigation and Feasibility Study (RI/FS) for the Site (the "Tolling Period") will not be included in calculating the application of any statute of limitations to the Claims, except as otherwise provided in Paragraph II.B.4, below. For purposes of calculating the Tolling Period, the RI/FS will be deemed completed upon written approval by the U.S. Environmental Protection Agency (EPA) of the certification of performance submitted pursuant to Section XXXVIII of the Administrative Order on Consent for Remedial Investigation and Feasibility Study (AOC), dated September 28, 2001, as amended.[3]

2. The Cooperating Parties further agree not to assert, plead, or raise any defense or avoidance based on the running of any applicable statute of limitations during the Tolling Period, or any defense or avoidance based on laches, estoppel or any other principle concerning the timeliness of commencing a civil action with respect to the Claims based on any failure of a Cooperating Party to file a complaint during the Tolling Period.

3. The Cooperating Parties each reserve the right to assert, plead or otherwise raise any defense based on the running of any applicable statute of limitations, or any defense based on laches, estoppel or other principle concerning the timeliness of commencing a civil action, so long as any such argument or defense is not based upon the passage of time during the Tolling Period.

B. Standstill

1. The Cooperating Parties agree not to file suit against one another with respect to a Claim before the end of the Tolling Period, except as expressly provided in Paragraphs II.B.2 and B.3., below.

2. A Cooperating Party may withdraw from this Agreement, after notice, if:

   a. The Allocation process does not commence by [date];
   b. The Allocation process is formally terminated; [better definition of this?]
   c. A third-party files a claim for response costs against that Cooperating Party; or

[3] This should be Section XXVIII. Pertinent section is captioned "Termination and Satisfaction."

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d. Any other Cooperating Party fails or ceases to participate in the Allocation.[4]

3. Withdrawal from this Agreement shall be effective on the thirtieth calendar day after the withdrawing party provides written notice of intent to withdraw (in accordance with Paragraph II.B.2 above) to the remaining Cooperating Parties, unless such notice of withdrawal is earlier retracted in writing. Notice of withdrawal shall be given to all other Cooperating Parties by certified mail, return receipt requested, at the addresses set forth in Attachment A. The thirty-day time period shall commence on the date of receipt by the notice recipient as shown on the certified mail receipt returned to the sender.

4. Notwithstanding Paragraph II.A.1., any applicable statute of limitations shall recommence running against the withdrawing party on the thirty-first calendar day following the date of receipt by the recipient of a notice of withdrawal from participation in this Agreement.

5. Withdrawal from participation in this Agreement shall be effective only as to the Cooperating Party(ies) giving notice.

6. If litigation is commenced or threatened against a Cooperating Party by a third party before the end of the Tolling Period, the Cooperating Parties shall afford the third party an opportunity to execute a stand-alone tolling and standstill agreement consistent with the tolling and standstill provisions in this Agreement before giving written notice of withdrawal of participation from this Agreement; the tolling period in such an agreement to commence upon the effective date of the stand-alone agreement.

7. If litigation is commenced against a Cooperating Party by a third-party before the end of the Tolling Period, the defending party shall file a motion, within 60 days after the filing of the suit, requesting a stay of the proceedings of six months, or such longer period of time as mutually agreed upon by the litigating parties, to enable implementation of a non-judicial process for allocation of the response costs at issue.

8. Cooperating Parties seek to resolve Claims through the Allocation process, to the greatest extent practicable. To that end, the Cooperating Parties each agree to forbear from requesting or encouraging (through act or omission) DEQ, EPA, or any third party to bring or take any action against, or demand any action of, any Cooperating Party during the term of this Agreement with respect to liability for or payment of response costs incurred at or associated

[4] For purposes of Subsection II.B., a "third party" is any party that is not then a Cooperating Party, whether or not earlier a Cooperating Party. For purposes of Subparagraph II.B.2.c., a Cooperating Party fails or ceases to participate in the Allocation when that party affirmatively withdraws or is expelled from the operative allocation agreement.

LWG00178

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with the Site. Notwithstanding the foregoing, nothing in this Agreement constitutes or shall be construed to bar, waive, or delay enforcement of agreements entered into and orders issued by EPA or DEQ with respect to investigation of the Site, including without limitation the AOC, as amended, or agreements or orders for upland remedial action work or to prevent or interfere with DEQ's ability to file a complaint in conjunction with the Consent Judgment between DEQ and the Performing Parties.

9. Nothing in this Agreement limits or shall be construed to limit the authority of State of Oregon to undertake any action other than an action on any Claims, including without limitation, action pursuant to state laws and regulations administered by DSL with respect to the management of state-owned lands and administration of the State's removal/fill program by DEQ or the Oregon Department of Fish & Wildlife with respect to natural resource damages, and by DEQ with respect to its regulatory oversight or enforcement authorities (including actions for civil penalties and injunctive relief).

10. Neither the execution of this Agreement nor anything contained in it is intended to be, nor will it be construed to be an admission of liability, an admission of the existence of facts upon which liability could be based, or an admission that any claims or defenses actually exist. Except as specifically provided herein, nothing in this Agreement alters the rights or liabilities of any Cooperating Party with respect to any pending or potential litigation.

C. Allocation Design and Process

1. The Cooperating Parties agree that DSL will be allowed to participate in the development and selection of the methods and processes to be used in the Allocation. The Cooperating Parties agree that the allocation design process will include development of methodologies for identifying and evaluating in-kind (non-cash) contributions, including without limitation the sale of, access to, long or short term use of land, and provision of other materials and services.

2. DSL will be allowed to participate fully in all stages of the Allocation process.

D. Records Retention

1. Each Cooperating Party shall retain, to the extent allowed by law, all records and documents in its possession or control, or in the possession or control of its employees, agents, or contractors, relating to the release or threatened release of hazardous substances to the sediments in the Lower Willamette River at, on, or within the Site for a minimum of 10 years after completion of the remedial action at the Site. Beyond the initial 10-year period, the Cooperating Parties will provide each other at least ninety (90)

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days notice before any destruction or other disposal of such records and make such records available for inspection and copying upon request (and at the requestor's expense).

2. The Cooperating Parties each reserve the right to claim the attorney-client privilege and/or attorney work product immunity for such documents, as well as the right to challenge any such claims made by any other Cooperating Party.

3. DSL shall request that the Secretary of State revise its approved record retention schedules consistent with the record retention obligations herein, and undertake in good faith to secure such revisions.

E. Regulatory Review

1. DSL agrees to undertake a review of DSL rules related to property authorizations necessary to carry out or facilitate investigation, removal or remedial actions on state-owned submerged and submersible lands, as well as DSL's ability to deliver potential "in-kind" services and materials in conjunction with that work. The goal of such a review is to identify potential rule revisions that may streamline (remove any unnecessary impediments in) DSL processes for (a) evaluating and authorizing access to and other long and short term uses of submerged and submersible lands, and (b) evaluating and making available "in-kind" contributions by DSL, consistent with all statutory and constitutional limitations on DSL and State Land Board.

2. The other Cooperating Parties will together assist DSL by providing review of the current rules and evaluating and sharing their collective experience to identify potential issues or impediments stemming from the current rules, as well as possible resolution of those issues or impediments, consistent with all statutory and constitutional limitations on DSL and State Land Board.

F. Other

1. This Agreement contains the entire understanding between the Cooperating Parties, and may not be modified in any way without written consent of the Cooperating Parties. No statement, promise or inducement made by any Cooperating Party, or any agent of such Cooperating Party, that is not set forth in this Agreement shall be valid or binding. This Agreement may not be enlarged, modified or altered except in writing signed by the Cooperating Parties and endorsed herein.

2. Nothing in this Agreement is intended to or shall be construed to conflict with or supercede analogous terms of the AOC, agreements and Orders entered into

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or issued by EPA or DEQ, or any subsequent allocation process agreement (or to otherwise limit options in any subsequent allocation process design).

3. This Agreement may be executed in one or more counterparts, each of which shall be deemed to be an original, but all of which together shall constitute one and the same instrument.

4. This Agreement is effective as to each Cooperating Party when signed by both that party and DSL.

5. This Agreement will inure to the benefit of, and be binding on, the assigns and successors in interest of the Parties.

6. Each person signing below covenants and warrants that he or she is authorized to sign on behalf of the Cooperating Party purportedly represented, that such Cooperating Party is authorized to enter into this Agreement, and that such Party is authorized to bind any successor or assign to the Cooperating Party signing this Agreement.

[SIGNATURE PAGES]

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ATTACHMENT 1

[LIST OF PERFORMING PARTIES]

LWG00182

BEAZER MATERIALS & SERVICES, INC. – PRP INFORMATION SUMMARY
(Part 1 of 2: Time Oil Facility)
Portland Harbor Superfund Site Study Area

1A. Service Address/Contact Information:

Jill M. Blundon
President
Beazer East, Inc./Beazer Materials & Services, Inc.
1 Oxford Centre #3000
Pittsburgh, Pennsylvania 15219

1B. Initial Convening Contact:

Anthony G. Hopp, Esq.
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229
312.201.2537

2. Site/Facility Name and Address:

10350 Time Oil Road, Portland, Oregon 97203 (Address changed in 1995; formerly 12005 N. Burgard St.)

3. LECG Base Map No. and River Mile: 162; RM 3.25

4. Ownership and Acreage: The Time Oil Co. property consists of four tax parcels. One of the tax parcels, identified below, contained a facility formerly used for pentachlorophenol ("PCP") product formulation and storage. This single tax lot parcel and the associated PCP formulation facility is the subject of this document.

Base Map No.	Tax Lot No.	Multnomah Cty. Property ID	Acres
162	2N1W135-01800	R325487	10.32

5. Dates of Operation for Subject PRP at Facility:

From 1943 to 2001, Time Oil Co. or its predecessor, Northwest Terminal, owned and operated the site at Base Map No. 162 as a petroleum bulk storage and distribution terminal. On March 1, 1967, Wood Treating Chemicals Company ("WTCC") entered into a chemical formulating agreement with Time Oil Co. for PCP product formulation and storage in on-site above ground storage tanks (the "Formulation Agreement"). Koppers Company, Inc. acquired WTCC in 1971, and continued operations under the Formulation Agreement until 1982. Beazer Materials & Services, Inc. is the successor to the liabilities of Koppers Company, Inc.[1] (See Formulation Agreement at p. 1; see also Landau Associates Final Phase III Remedial Investigation Report ("Phase III RI") at p. iii; and *Jones-Hamilton Co. v. Beazer Materials & Services, Inc.*, 959 F.2d

[1] For purposes of this document, WTCC and its successors are referred to collectively as "Beazer."

126 (9th Cir. 1992), establishing CERCLA liability for a chemical supplier under a similar chemical formulation agreement involving a California site.)

Under the Formulation Agreement, Beazer retained ownership of the raw materials (including the PCP), formulated products and all wastes and by-products. (See, Formulation Agreement at p. 2.) Further, the terms of the Formulation Agreement contemplated that loss of product would occur as a result of normal formulating and storage operations. (Id. at p. 4-5.) In *Jones-Hamilton*, the Ninth Circuit found Beazer to be liable as an "arranger for disposal" under CERCLA for PCP formulation and storage activities performed by Jones-Hamilton Co., on behalf of Beazer. (See, *Jones-Hamilton* 959 F.2d at 131.) Consistent with the Formulation Agreement with Time Oil, under the *Jones-Hamilton* agreement Beazer maintained ownership of the raw materials (including the PCP), formulated products and all wastes and by-products. In addition, Beazer's agreement with Jones-Hamilton contemplated loss (e.g., spillage) of 2% of the chemicals formulated and/or stored (by comparison, the Formulation Agreement with Time Oil contemplated a loss of 0.75%). (See, Formulation Agreement at p. 5.) Favorably citing *United States v. Aceto Agric. Chem. Corp.*, 872 F.2d 1373, 1380-81 (8th Cir. 1989), the *Jones-Hamilton* court found Beazer to be liable under CERCLA as an arranger for disposal of hazardous substances.

6. Description of Facility Operations Involving Use, Generation and/or Release of Hazardous Substances:

As discussed above, Beazer entered into a Formulation Agreement with Time Oil for the formulation of PCP products at Time Oil's terminal. (See 2002 Landau Associates Phase I Removal Action Plan ("Landau Report") at DEQ020778.) Under the Formulation Agreement, solid PCP granules and various petroleum-based carrier liquids and additives used for mixing with PCP were to be delivered to the terminal dock. These chemicals were stored in a PCP warehouse and product tanks (specifically Tank Nos. 20001, 20002, 20003 and several smaller horizontal tanks) located within the former PCP mixing area.[2] (Warehouse and tanks can be seen in a USACE 1972 aerial photograph; see also DEQ File Summary at DEQ020847 and Figure 4 DEQ020864; and Formulation Agreement at p. 14 and "Amended Schedule" thereto.)

As part of Beazer's specified formulations for wood treating chemicals, heated PCP granules were mixed with paraffin wax, mineral spirits, ketones and other solvents. The PCP-based products were stored in the tanks specified under the Formulating Agreement and transferred to drums or other containers for offsite transportation to Beazer's customers. (See Landau Report at DEQ020778-79; see also DEQ File Summary at DEQ020847.)

Time Oil conducted petroleum bulk storage operations during the period of PCP formulation activities, and Time Oil leased certain tanks at the terminal to other tenant operators, such as Crosby and Overton, who conducted waste oil storage activities in the 1980s. (See ECSI Site Summary accessed May 2, 2005 ("ECSI Site Summary") at p. 1.) However, no other PCP formulation or storage activities are known to have occurred at the Time Oil Co. terminal.

In approximately 1993, Time Oil installed a wastewater treatment system that collected wastewater into a conveyance system with discharge to a settling/separation tank. After treatment, the wastewater was discharged to the City of Portland sewer system. In addition,

[2] Technical grade PCP has historically contained dioxins (e.g., tetra-, hexa- and octocholordibenzo-p-dioxins) and hexacholorobenzene as manufacturing by-products. (See, Toxicological Profile of PCP.)

two non-industrial areas of the terminal discharged stormwater through a permitted outfall to the Willamette River. (See 1999 Time Oil letter at DEQ027944-45.)

7. Preliminary Information on Known or Potential Hazardous Substance Discharges or Other Connection to River Sediment Conditions:

A. DEQ Has Attributed Soil Contamination to PCP Blending Operations and Petroleum Storage

DEQ reported that spills and/or past handling practices in the former PCP mixing area, the waste oil tank area and tank farm have led to soil contamination at the facility. (See ECSI Site Summary at p. 1.) DEQ noted that drums and PCP materials were identified in an undeveloped eastern portion of the facility in 1996. (See ECSI Site Summary at DEQ020883.)

B. Contaminated Soil Removed from the Time Oil Facility Contained PCP, Dioxins/Furans and Other PCP Degradation Products

Removal of certain PCP-contaminated soils occurred at the facility beginning in 1985. In 1989, approximately 3,000 cubic yards of PCP-contaminated soil were excavated and stockpiled onsite, in an area southwest of the PCP mixing area and north of an inactive soil treatment (bioremediation) area. The PCP products were observed to have seeped to a depth of at least 13 feet below ground surface (coinciding with the approximate depth of the water table) within the former PCP mixing area. (See Landau Report at DEQ020778-79; see also Phase III RI at p. viii.) Also, soil within the PCP warehouse and former PCP mixing area were determined to contain dioxins/furans and other PCP degradation products, such as trichlorophenol and tetrachlorophenol. (See, Landau Associates Remedial Action Plan - Warehouse Demolition and Soil Excavation at DEQ020793.)

Subsequent removal actions occurred in 1996, 1997 and 1999, culminating with the addition of approximately 610 cubic yards of PCP-contaminated soils to the stockpile. (See Landau Associates Removal Actions Completion Report ("RA Completion Report") at p. 2-2 – 2-3.)

In 2002, DEQ-approved soil removal activities were conducted at the facility, including the removal and disposal of approximately 9,700 tons of soil, including the PCP-contaminated soil stockpile. (See RA Completion Report at p. 3-1.)

C. PCP Detected in Groundwater Monitoring Well

As part of the Phase II Remedial Investigation, groundwater monitoring has been performed at the site since 2001. Monitoring well sample analyses detected PCPs with the highest levels in Monitoring Well RW-1, located just south of the former soil stockpile area. PCPs have been detected in both the upper and lower water-bearing zones. Other contaminants (such as methylphenol, bis(2-ethylhexyl)phthalate, acetone, benzene, toluene, ethylbenzene, naphthalene, arsenic, chromium, copper, lead and zinc) were also detected in the upper and lower water-bearing zones. (See Phase III RI at pp. x-xi, 8-1; see also Landau Associates 2001 Groundwater Report at DEQ020614; 20640-643.) Landau Associates reported that PCP plumes have migrated into the Time Oil tank farm area and further downgradient to the west-southwest area of the facility, i.e., in the direction of the Willamette River. Landau Associates stated that a storm drain running east-west along the length of the Time Oil property may have provided a pathway for PCP-contaminated groundwater to the Willamette River, although current groundwater treatment measures, consisting of an *in situ* chemical oxidation process,

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are believed to be containing the plume. Also, PCP has not been identified consistently in laboratory analysis of groundwater from the monitoring wells located closest to the river since the groundwater treatment measures were initiated in 2002. (See Phase III RI at pp. xiii; 2-15, 8-1 – 8-2, 8-7.)

D. Contaminated Sediments Are Adjacent to Time Oil Company Terminal

The preliminary second round sampling (Round 2a) results, conducted by the Lower Willamette Group under the Administrative Order on Consent for the Portland Harbor NPL Site, have identified the presence of the following hazardous substances (among others) in adjacent/receiving river sediments: acetone, arsenic, benzene, bis(2-ethylhexyl)phthalate, chromium, copper, ethylbenzene, hexacholorobenzene, hexachlorodibenzo-p-dioxin, lead, napthalene octochlorodibenzo-p-dioxin, tetrachlorodibenzo-p-dioxin and zinc. As previously noted, these hazardous substances have also been found in facility soils and/or groundwater. (See, Landau Report at DEQ020778-79; see also ECSI Site Summary at p. 2; Preliminary Round 2a Surface and Subsurface Sediment Sampling Results; and, Historic Round 1 and 2a Sediment Samples Figure.)

8. Documents/Information Considered

A. References Cited

1. Wood Treating Chemicals & Time Oil Co., *Formulation Agreement*, March 1, 1967.

2. Landau Associates, Inc., *Final Phase III Remedial Investigation Report*, July 19, 2005.

3. Landau Associates, Inc., *Phase I Removal Action Plan*, Feb. 8, 2002.

4. ETOXNET, *Toxicological Profile of PCP*, June 1996.

5. US Army Corps of Engineers, *Aerial Photograph*, 1972.

6. Oregon Department of Environmental Quality, *DEQ File Summary*, Oct. 3, 1995.

7. Oregon Department of Environmental Quality, *ECSI Site Summary Report – Details for Site Id. 170*, May 2, 2005.

8. Time Oil Co., *Response to Site Assessment Information Request*, March 31, 1999.

9. Oregon Department of Environmental Quality, *ECSI Site Summary Report – Details for Site Id. 170*, Jan. 25, 2003.

10. Landau Associates, Inc., *Removal Action Plan – Warehouse Demolition and Soil Excavation*, July 2, 2002.

11. Landau Associates, Inc., *Removal Actions Completion Report*, Nov. 10, 2003.

12. Landau Associates, Inc., *Second Quarter 2001 Groundwater Report*, Oct. 12, 2001.

B. Information Sources

LECG reviewed and considered the following record sources, if available, in the course of preparing this PRP Information Summary.

City of Portland. PortlandMaps at http://www.portlandmaps.com/.

City of Portland. Bureau of Development Service, Plumbing Connection records.

City of Portland. Bureau of Environmental Services, personal communication and assistance with pretreatment files.

Department of Environmental Quality. Environmental Cleanup Site Information records containing numerous correspondence, memoranda and technical reports.

Department of Environmental Quality. Water Quality records containing numerous correspondence, memoranda and technical reports.

Multnomah County. Taxation and Assessment Office personal communications and GIS assistance.

Multnomah County. Property Records Database.

National Archives and Records Administration.

Oregon Secretary of State, Corporate Databases.

US Army Corps of Engineers. Dredge Permitting records.

US Army Corps of Engineers. Aerial Photography Collection.

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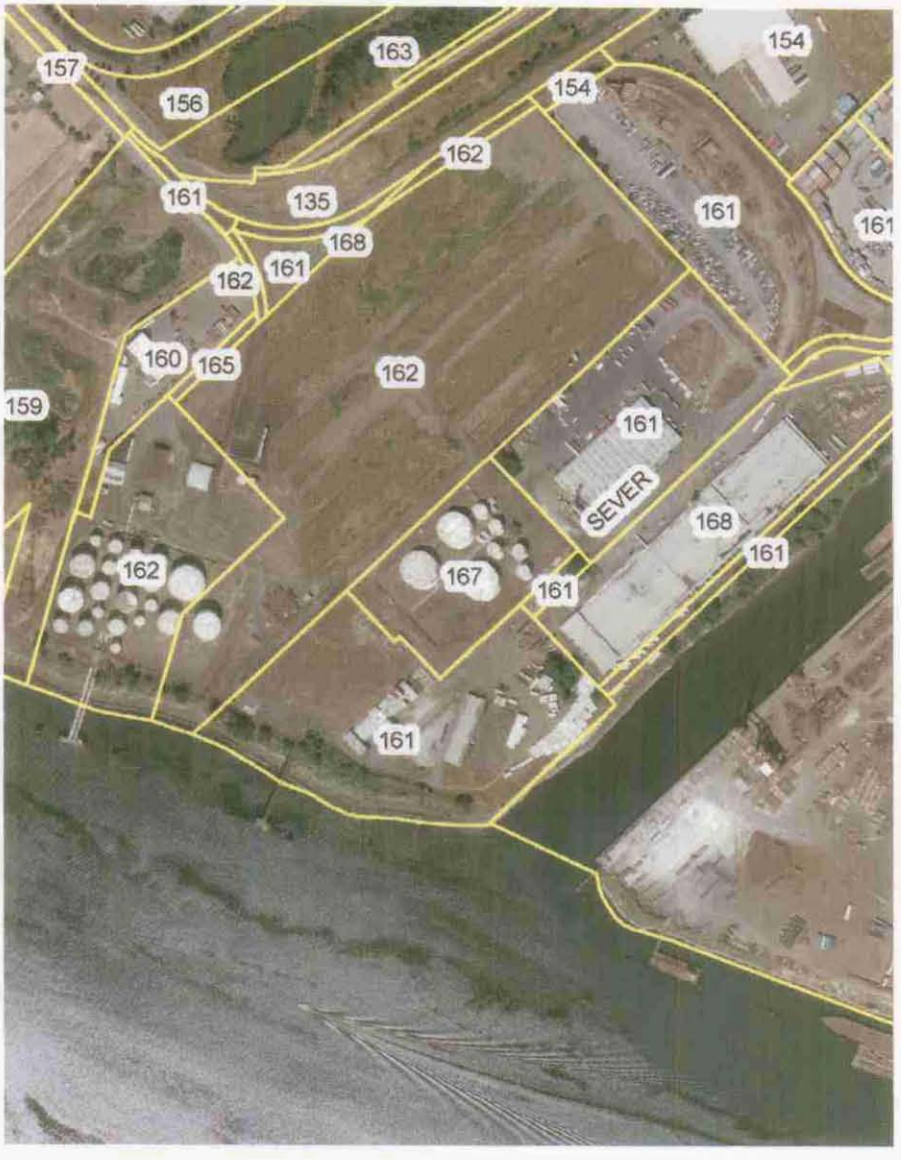
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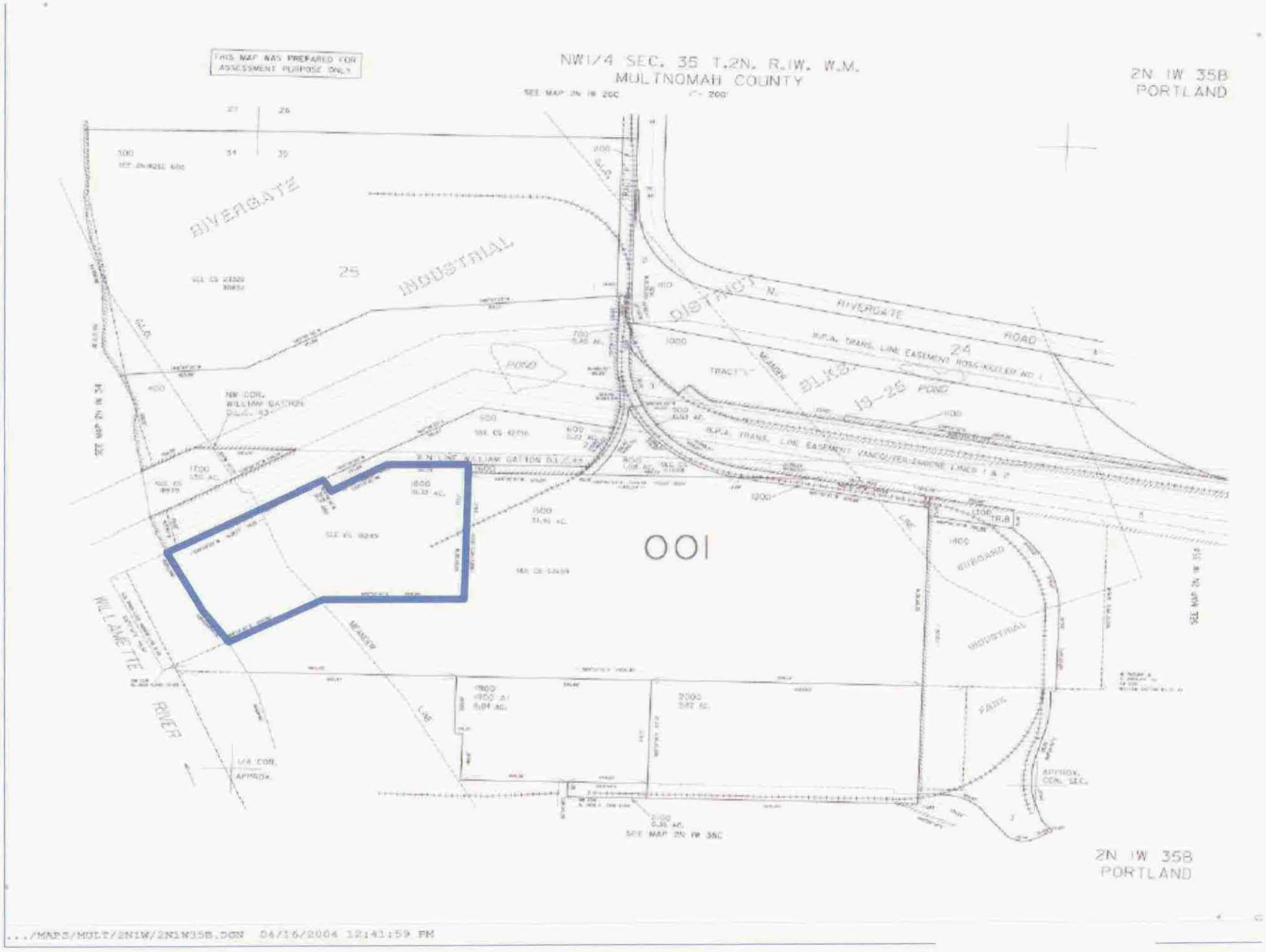

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A G R E E M E N T

THIS AGREEMENT, made and entered into this 1st day of March, 1967, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington, and WOOD TREATING CHEMICALS CO. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Missouri.

WITNESSETH:

For and in consideration of the mutual covenants and conditions contained herein, it is agreed as follows:

A. FACILITIES.

1. Operator shall provide and furnish to Customer during the term of this Agreement facilities, storage tanks, blending tanks, equipment, improvements and warehouse space as set forth in the Schedule attached hereto and as set forth in this Agreement (all hereinafter called "Facilities").

2. Operator shall retain possession of the Facilities and shall keep and maintain the same in good order and repair and clean and fit for the storage and handling of the Products. Customer shall have the right to inspect the Facilities and the Products stored therein at all times during the hereinafter defined Regular Hours, and during other reasonable times, but no such inspection shall relieve Operator of any of its obligations under this Agreement. Operator shall advise Customer in writing in advance of any changes or alterations in or to the Facilities (excluding, however, maintenance and repairs) which are used for the receipt, storage, blending, handling or redelivery of the Products.

B. SERVICES.

1. Operator shall provide and furnish to Customer during the term of this Agreement any and all labor and services necessary or reasonably incidental to receive, store, handle, blend and redeliver the Products at, to and from the Facilities in a safe, efficient, clean and prompt manner (all hereinafter called the "Services").

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2. Operator shall receive the Products from trucks and rail cars, store the same in the storage tanks, transfer such Products to the blending tanks as directed by Customer, and redeliver such Products into trucks and rail cars, as and when directed by Customer. Operator shall follow the procedures outlined in the booklet entitled "Monsanto Warehousing and Terminaling Unified Procedures" and all reasonable amendments thereof and additions thereto, applicable to the Products involved. A copy of such booklet is attached hereto as Exhibit A and made a part hereof. Operator shall keep complete and accurate records of the type and quantity of the Products received into, transferred out of, and remaining in said Facilities at all times and of all shipments of the Products made at Customer's request, and such records shall be open to inspection by Customer at all reasonable times. Operator shall make reports to Customer with respect to such receipts, shipments and inventories, at such times and in such manner as may be reasonably prescribed by Customer.

3. The Services shall be performed from 7:00 a.m. to 4:30 p.m., five days per week, Monday through Friday, except for the holidays hereinafter mentioned, herein called the "Regular Hours." The holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas. Upon the request of Customer, Operator shall perform such services beyond Regular Hours at an additional charge of $4.25 per man hour.

C. PAYMENTS. So long as Operator shall meet its obligations hereunder, Customer shall make payments to Operator during the term of this Agreement according to the Charges on the attached Schedule.

D. GENERAL.

1. Neither Operator, nor any person or party claiming by, through or under Operator, shall ever have or assert any right, title, claim, lien or interest in or to any of the Products.

2. In no event, anything in this Agreement to the contrary notwithstanding, does Operator intend to lease, sublease or assign to the Customer all or any part of the Facilities referred to herein, and neither this Agreement, nor any provision thereof, shall be so construed.

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3. Operator shall indemnify and hold harmless Customer from and against any and all liabilities, claims, actions, damages, losses, costs or expenses arising out of injury to or death of any person or damage to or loss or destruction of any property, caused by or connected with: (a) any negligence, or wrongful act or omission of Operator, its employees or agents in the receipt, storage, handling or redelivery of the Products, or any of them; (b) the performance or nonperformance of any of its obligations or operations under this Agreement; or (c) any default of Operator hereunder.

4. Operator shall obtain and maintain, at its expense, during the term of this Agreement, the following insurance in insurance companies satisfactory to Customer:

(a) Workmen's compensation insurance in an amount equal to the limit of liability and in the form prescribed by the laws of Oregon, for all Operator's employees engaged in any operations under this Agreement. In the event that any employees are not protected by a workmen's compensation statute, Operator shall provide employer's liability insurance in an amount not less than $100,000 for injury to or for death of any one employee, and subject to the same limitation for each employee, in an amount not less than $300,000 on account of any one accident.

(b) Public liability insurance sufficient to cover the obligations assumed by Operator pursuant to Section D.3 of this Agreement and claims for injury to or death of persons or damage to property arising from any activities or operations of Operator under this Agreement in amounts of:

(i) not less than $150,000 for injury to or death of any one person and not less than $500,000 in respect to any one accident; and

(ii) not less than $100,000 for damage to or destruction of property on account of each accident.

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Operator shall furnish Customer with certificates of insurance which certificates shall provide that the foregoing insurance coverage shall not be terminated or reduced without the insurance carrier first giving Customer ten (10) days' prior written notice thereof.

5. Operator shall be liable and responsible for any loss, destruction, spoilage, spillage, pollution, evaporation, shrinkage, line-loss, clingage, discoloration or contamination of, or damage to, any Products arising out of its receipt, storage, handling, blending, mixing or redelivery thereof, or of any of the Services performed or to be performed hereunder resulting from the negligence or wrongful act or omission of Operator, its employees, agents or representatives, or default of Operator under this Agreement.

6. In the event that the Facilities are partially or totally damaged or destroyed or become unfit by reason of fire, explosion, accident, casualty or any other similar cause, or if any of the Facilities are taken or condemned by eminent domain proceedings (all of the foregoing being hereinafter for convenience collectively called "Casualty") so that the same shall be rendered unsuitable or unavailable for the receipt, storage, handling and redelivery of any of the Products, Operator shall immediately notify Customer thereof. Not later than ten (10) days after the occurrence of such Casualty, Operator shall also notify Customer as to whether the Facilities will be restored to their former condition within a period of time not longer than six (6) months measured from the date of such Casualty. If such notice is not given, or if given and the Facilities are not restored by the end of said six (6) month period, Customer may terminate this Agreement at any time thereafter upon notice to Operator, and thereupon Customer shall be relieved of all duties and obligations hereunder.

7. (a) Losses of any Product for which Operator is responsible hereunder shall be determined monthly at the end of each month, commencing with the date of the first receipt of such Product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals of such Product during the period for which the accounting

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is made, plus the stock of such Product on hand at the end of such period, from the sum of the total receipts of such Product during such period plus the stock of such Product on hand at the beginning of such period.

(b) Operator shall not be liable for actual losses resulting from normal spillage and evaporation not in excess of the loss allowance hereinafter described. The term "loss allowance" shall mean actual losses resulting from normal spillage and evaporation not exceeding 3/4 of 1% per month of the aggregate of the receipts per month or 3/4 of 1% of the maximum amount of Products stored in any one month, whichever is greater, of any such Product as determined under Section D.9(b) of this Agreement.

8. While on Operator's terminal premises, Customer shall comply at all times with any and all rules established as of the date of this Agreement by Operator in connection with the operation of the terminal A copy of such rules is attached hereto as Exhibit B to this Agreement. Such rules shall not hereafter be amended except by consent of Customer.

9. (a) If the average wage rate in effect at the terminal for all employees of Operator employed full or part time at the terminal as of the first day of any month shall exceed $2.71 per hour, then, with respect to such month, the handling and transfer charges set forth in the schedule(s) shall be increased by a percentage equal to 25 per cent (25%) of that percentage of $2.71 which the excess of the average wage rate of $2.71 constitutes. "Average wage rate" means the amount derived by dividing (a) the total of (i) the rates for the single-rate classifications of wage rates applicable to Operator's personnel and (ii) the mid-points or wage rates for all rate-range classifications applicable to Operator's personnel by (b) the

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number of classifications applicable to Operator's personnel.

(b) The quantity of Product received into or withdrawn from storage tanks shall be determined by Operator's representatives by checking and gauging said tanks at the time of receipt or withdrawal of said Product. Customer may assist, supervise, or participate in all aspects of such checking and gauging, but in the absence of such participation, gauges taken by Operator shall be conclusive, unless such gauges are proven to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually acceptable calibration charts of the rail car or truck tanks. The cost of such work done by Operator's representatives or licensed inspectors shall be borne by Customer. In the event of any disagreement as to quantities of Products received, it shall, upon written notice of either party to the other, be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date the case is submitted, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto and the law of Missouri shall govern the arbitration and award.

(c) If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and deliver such samples to Customer and the cost of containers for such samples paid by Operator and the freight charges for deliveries thereof to Customer shall be reimbursed to Operator by Customer each month. Samples shall be taken in accordance with the procedure specified by Customer.

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(d) All quantities of Product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees Fahrenheit (60°F) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. Gallons at sixty degrees Fahrenheit (60°).

(Next paragraph number 10 on following page #7)

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10. Without relieving Operator from any of its duties or obligations under this Agreement, for each day or portion thereof that:

(a) The Facilities are unsuitable for the receipt, storage, blending, handling or redelivery of any of the Products by reason of any Casualty or for any other similar or dissimilar reason, and/or

(b) Operator fails or refuses to provide and furnish the Services,

then, and in either event, the Charges set forth in the Schedule shall be suspended for such period or periods; furthermore, if Operator fails or refuses to redeliver any of the Products within five (5) days after Customer's request therefor, Customer shall have the right to enter upon the Facilities and remove such Products from the storage area.

11. Customer agrees to examine Operator's tanks, pipelines and equipment prior to Customer's acceptance and use of their Facilities hereunder and by such use agrees that said Facilities are acceptable for rendering of the Services referred to herein. Operator may substitute other suitable facilities in lieu of those which are designated hereunder provided Operator pays any costs incurred by Customer in regard to such substitution.

12. Customer shall use the Facilities furnished hereunder for the storage, blending and handling of only the Products and commodities specified in said Schedule; provided, however, that anything in this Agreement to the contrary notwithstanding, Customer shall not store and/or handle or cause to be stored and/or handled in any of these Facilities (a) any commodity other than those listed on such Schedule containing hydrogen sulphide or other corrosive materials, (b) any commodity other than those listed on such Schedule which would in any way be injurious to any of the Facilities, or (c) any commodity other than those listed on such Schedule which would render any of the Facilities unfit, after cleaning, for the proper storage and/or handling of water white oils. Customer shall be responsible for any damages resulting from the storage and/or handling in any of these Facilities of any commodity other than those listed in the Schedule which may not be stored and/or handled therein under the terms hereof.

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13. (a) Subject to the terms of Sections 6 and 10 hereof, neither party shall be liable to the other for, and each shall be excused from, any failure of or delay in performance under this Agreement, caused by any acts of God or the public enemy, war, floods, storms, earthquake, lightning, or other act of the elements, accidental fires, explosion, strikes, labor disturbances, riots, insurrection, civil commotion, governmental acts or regulations, accidents, failure or delay of transportation or delivery facilities or supplies, failure or delay of manufacturers or persons from whom such party is obtaining machinery, equipment, materials or supplies to deliver the same, or any other cause beyond the control and without the fault or neglect of such party, whether similar or not to the foregoing causes. For each day or portion thereof that either party shall fail or be unable to perform by reason of any of the foregoing events, the said charges set forth in the Schedule shall be suspended for such period or periods. Each party shall, in the event it shall fail or be unable to perform by reason of any of the foregoing events, promptly notify the other party thereof. Upon cessation of any such event, performance shall be resumed promptly and the other party shall be notified immediately thereof.

(b) Should the County or City, in which Operator's Facilities are located, or any other government agency, local or federal, prohibit operation of any then existing Facilities used in performing this Agreement, or shall in any way deprive Operator of the right to use any such Facilities or any property in connection therewith, or shall require the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall pay for the cost of replacing any such Facilities or property of

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which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such government agency.

(c) The cost of any Armed Guard Services and/or other protective services or facilities required by Customer or by any government agency shall be for the account of Customer.

14. Operator shall bill Customer monthly in advance and Customer agrees to pay Operator within 10 days after presentation of invoice. All payments hereunder shall be made to Operator at its office at 12005 N. Burgard St., P. O. Box 03117, Portland, Oregon 97203, or at such other place as Operator may notify Customer in writing.

15. Customer agrees promptly upon expiration or termination of this Agreement, to remove all of its Products, either bulk or packaged, from Operator's premises. All such Products not removed within 60 days after the expiration or termination of this Agreement may be sold at auction by Operator and Operator shall return to Customer the proceeds of any such sale, less the amount owed Operator by Customer under the terms of this Agreement and Operator's reasonable expenses in selling said Products.

16. (a) The initial term of this Agreement shall commence as of April 1, 1967 and, if not earlier terminated as herein provided, shall end on March 31, 1972. Upon the expiration of the initial term of this Agreement, this Agreement shall be automatically renewed for a term of five years, and automatically renewed thereafter for successive terms of five years each; provided, however, that either party, at its option, shall have the right to terminate this Agreement at the end of its initial term or at the end of any renewal term by furnishing written notice to the other party at least one year prior to the designated termination date.

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16. (b) Provided that Customer may, at its option, terminate this Agreement at any time during the initial term of this Agreement by making a payment to Operator which is equal to Operator's total expenditures for storage, blending tanks, heating elements, warehouse improvements or improvements to any such Facilities which were expended by Operator for the purpose of furnishing storage or blending tanks and Facilities to Customer, less 20% of the total expenditures for each full year that this Agreement has been in full force and effect. The Operator represents that the amount expended covering the above is $ 4,220.00.

(c) Should Operator fail or refuse to discharge any of its obligations under this Agreement, Customer may, at its option and in addition to any other remedies provided for herein, terminate this Agreement immediately upon giving notice to Operator.

17. Should Customer go into bankruptcy, voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly storage and handling charges for the whole unexpired term hereof together with all accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement and, after giving 15 days' notice to Customer, Operator may sell all or any portion of such Products, at public or private sale, but Operator may not be purchaser at such sale or sales. Customer shall pay for and indemnify Operator against its reasonable expenses of such sale, including reasonable attorney's fees, incurred by Operator for the sale of Customer's Products as above provided, for storage, handling services and other amounts due and owing Operator. Any proceeds of such sale less any amounts due and owing from Customer to Operator under this Agreement and the reasonable expenses of such sale, shall be promptly remitted by Operator to Customer.

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18. In the event Customer decides to reduce the quantity or eliminate the handling, blending or storage of any of the Products so that the Facilities are not used or required, Operator shall, at Customer's request, use all reasonable efforts, and otherwise cooperate with Customer, to find and make arrangements with another party or parties to utilize such unused or unrequired Facilities to the extent and as designated by Customer. Operator shall, however, have the right to establish reasonable fees and charges in connection with such arrangements. Customer shall be entitled to a credit against all fees (but not exceeding any amounts due from Customer) to the extent of payments made by such other party or parties pursuant to said arrangements.

19. Customer shall pay any and all taxes, charges and/or assessments on or with respect to the Products. Operator shall pay any and all taxes, charges and/or assessments on or with respect to the Facilities and/or Services.

20. Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

21. Operator is not and shall not act or purport to act as an employee, agent or representative of Customer, but is and shall act as an independent contractor.

22. Operator shall obtain and maintain all legally required state and local licenses and permits required for construction, maintenance or operation of the Facilities and/or the Services or Operator's performance of this Agreement.

23. Operator agrees to assume liability for any demurrage on rail equipment or truck equipment, which occurs directly as a result of Operator's operations. Any demurrage accruing on rail equipment or truck equipment, through no fault of Operator shall be paid by Customer; provided, however, Operator shall, in good faith, furnish Customer with all evidence and information known to Operator with respect to the facts, circumstances and causes connected with rail or truck demurrage.

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24. Except for any transfer or assignment, in whole or in part by Customer to the Monsanto Company or to any subsidiary company in which Customer owns or controls at least a 50% interest or to an associated company in which the Monsanto Company owns or controls at least a 50% interest, neither party shall transfer or assign this Agreement, or any of its rights hereunder, in whole or in part, without the prior written consent of the other party, and any attempt to do so without such consent shall be void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

25. Except as otherwise provided in this Agreement, any notice required or permitted to be given under this Agreement shall be in writing and shall be sufficiently given when delivered in person or when deposited in the United States mails (registered or certified), postage prepaid, addressed as follows:

If to Operator, addressed to:

Time Oil Co.
5150 Wilshire Boulevard
Los Angeles, California 90036

and a copy to:

12005 N. Burgard Street
P. O. Box 03117
Portland, Oregon 97203

If to Customer, addressed to:

Wood Treating Chemicals Co.
5137 Southwest Avenue
St. Louis, Mo. 63110
Attn: R. M. Morriss, Jr.

or to such other address as may be specified from time to time in a written notice given by such party. Both parties agree to acknowledge in writing receipt of any notice delivered in person. Routine operating instructions, requests, directions and other similar routine communications shall not require a notice as above provided and may be given in such manner and to such persons as may be customary or practicable.

26. This Agreement constitutes the sole agreement between the parties pertaining to the Facilities and/or Services.

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27. The section and paragraph headings in this Agreement are inserted for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections or paragraphs to which they refer.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first hereinabove written.

TIME OIL CO.

ATTEST:

Asst. Secy

BY R W. Chindlott Pres.

WOOD TREATING CHEMICALS CO.

ATTEST:

J. Russell Clyde Jr.
Secretary

BY H L Manchales
President

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SCHEDULE

TERMINAL: TIME OIL CO., Portland, Oregon.

DATE OF AGREEMENT: March 1, 1967.

INITIAL TERM OF AGREEMENT: April 1, 1967 to March 31, 1972.

OPERATOR: TIME OIL CO.

CUSTOMER: WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED: Mineral spirits with additives.

FACILITIES: Operator will furnish Customer the following Facilities:

Storage Tanks: Three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of additives on pallets in drums and bags. Additives being pentchlorophenol in bags and Customer's additive #316 in drums.

SERVICES:

Storage and handling:

Operator shall receive the Products from tank cars and/or transport trucks and shall deliver such Products into storage tanks.

Operator shall deliver the Products and commodities into transport trucks and/or tank cars. Transport trucks to be driver loaded.

Operator shall receive additives from freight cars and/or trucks.

Operator shall blend additives for mixing with mineral spirits at a temperature not to exceed 180°F.

CHARGES: The only Charges for the Facilities and Services herein are the following:

$440.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One-half cent (.005) per gallon on all liquid products received at the terminal with 200,000 gallons minimum receipts guaranteed annually, to be billed at the 1st of each month for the prior months' receipts and paid by Customer within 10 days after receipt of invoice, and plus --

One-half cent (.005) per gallon on all liquid products shipped from the terminal with 200,000 gallons minimum shipments guaranteed annually to be billed at the 1st of each month for the prior months' shipments and paid by Customer within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9(a) and 13(c) of the Agreement to which this Schedule is annexed and of which it is a part.

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AMENDED SCHEDULE

TERMINAL:	TIME OIL CO., Portland, Oregon.
DATE OF AGREEMENT:	March 1, 1967 August 1, 1970 amended schedule.
INITIAL TERM OF AGREEMENT:	April 1, 1967 to March 31, 1972.
OPERATOR:	TIME OIL CO.
CUSTOMER:	WOOD TREATING CHEMICALS CO.
PRODUCTS TO BE STORED:	Raw materials in bulk, drums and bags for wood preservatives. Finished products in bulk and drums. Also, such other raw materials and finished products specified by the Customer and accepted by the Operator.
FACILITIES:	Operator will furnish Customer the following facilities: Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.
SERVICES: Storage and Handling	Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse. Operator shall deliver the finished products into storage, trucks and/or railroad cars. Operator shall mix or blend products at a temperature not to exceed 180 deg. F.
HANDLING AND TRANSFER CHARGES:	The only charges for the facilities and services herein are the following: $615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice. One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

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CHARGES: cont.

1. Woodtox Preprime RTU
2. Woodtox 140 RTU
3. Presstreat
4. Woodtox 109 RTU
5. Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

1. Timbertox 40 Concentrate
2. WR 340 Concentrate
3. Woodtox Preprime Concentrate
4. Woodtox 140 Concentrate
5. Inhibitor L
6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

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On page 2, Paragraph 3, line 6. The amount $5.8125 shall be substituted for the amount of $4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. " Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of $2.71 is stated the amount of $3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

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All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

_____

By _____
R. D. Abendroth, President

Witness:

WOOD TREATING CHEMICALS CO.

Evelyn L. Wright

By Lowell E. Gutzler
Asst. Secretary

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Volume I - Final
Phase III Remedial Investigation Report
Time Oil Northwest Terminal
Portland, Oregon

July 19, 2005

Prepared for

Time Oil Co.
2737 West Commodore Way
Seattle, WA 98100-1233

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

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EXECUTIVE SUMMARY

Beginning in the fall of 2001, Landau Associates conducted the third phase of a remedial investigation (RI) for Time Oil Co. (Time Oil) at its Northwest Terminal (Terminal) in Portland, Oregon. This third phase of the RI (referred to as the Phase III RI) followed Phases I and II of the RI and was conducted to complete the assessment of the nature and extent of contamination in soil and groundwater at the Terminal. The earlier phases addressed soil and groundwater within an area of the Terminal where a pentachlorophenol (PCP) mixing operation was formerly located and where waste oil was formerly stored (Phase II), and where a stockpile containing soil excavated from the former PCP mixing area was temporarily placed (Phase I). Investigations for the third phase focused on areas where petroleum products were stored and handled. This report comprehensively describes the nature and extent of soil and groundwater contamination throughout the Terminal, as defined by all three phases of the RI. Each RI phase has been conducted in accordance with the State of Oregon's Hazardous Substance Remedial Action Rules (OAR 340-122), with oversight by the Oregon Department of Environmental Quality (DEQ), under the provisions of the voluntary cleanup program (VCP) agreement between Time Oil and DEQ dated September 5, 1996. The information obtained in this Phase III RI will be used with information obtained during Phase II of the RI in a human health and ecological risk assessment and a subsequent feasibility study of potential remedial actions.

FACILITY DESCRIPTION

The Time Oil Terminal is a former bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. Time Oil ceased operations at the Terminal on October 31, 2001. From 1943 to 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. Historically, Time Oil leased tank space to Crosby & Overton for storage of waste oils, and the Koppers Company leased tanks and property at the Terminal for the formulation of PCP-containing wood treatment products. Within the Terminal, the specific areas of focus for the Phase III RI include:

- **Northwest Terminal tank farm areas** where various petroleum products were stored and handled. Bulk product Terminal areas are located in the western and southern portions of the facility adjacent to the Willamette River. The tank farm areas include 21 aboveground storage tanks (ASTs) in the Main Terminal Tank Farm area and 10 ASTs in the Bell Terminal Tank Farm area. The storage tanks range from 3,000 to 80,000 barrels in size. Currently, all tanks are empty except for tank 16804 in the Main Terminal Tank Farm area, which temporarily stores water from the groundwater interim action wells RW-2 and HRW-1 and water collected from the groundwater intercept system in the east-west trending storm drain at SDM-1 prior to treatment by the onsite wastewater system. At the Bell Terminal Tank

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Farm area, a strip of land approximately 80 ft wide along the entire western property boundary and outside of the tank farm wall was apparently used by owners/operators of the adjacent property to the west for approximately 25 years, ending in 2000, based on historical aerial photographs.

- **Butane and aviation gasoline storage areas** located to the southeast of the Terminal office. These areas include two ASTs formerly used for storage of aviation gasoline and one AST formerly used for butane storage. Currently, all tanks are empty.

- **Former petroleum transfer and receipt facilities** include above- and below-ground piping; product receipt facilities via rail, truck, and vessel; and product distribution facilities via truck and rail (loading racks), and via marine vessels (a 380-ft dock in the Willamette River). A former rack for loading trucks is located just west of the Terminal office. A former loading rack for rail transfer and receipt is located at the terminus of the rail spur to the east of the Terminal office. A former loading rack for the Bell Terminal Tank Farm area is located at the eastern side of the Bell Terminal Tank Farm area. Historically in these areas, product was transferred from the railcar, truck, or vessel to the above-ground tanks through pipelines located near each of the receipt/distribution locations. None of the equipment in these areas is currently in use.

- **Wastewater treatment system** located in the northern portion of the facility where groundwater recovered from the two groundwater interim action recovery wells, the groundwater intercept system in the storm drain, and investigation-derived groundwater from purging of monitoring wells during quarterly sampling events is treated before discharge to the City of Portland's sanitary sewer.

- **Entrance, former office, warehouses, and equipment maintenance area** located in the northern portion of the facility.

- **Undeveloped area of the Terminal** located in the eastern portion of the Terminal. This area is a currently and historically undeveloped area. Only the western portion of this area was included in the Phase III RI. The remaining portion of this area (referred to as the East Property) was studied outside of the RI and has been granted a conditional No-Further-Action (NFA) determination by DEQ.

Other features located within the Terminal that were not the focus of the Phase III RI, but have been included in earlier phases of the RI, include:

- **Former PCP 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, which were removed by 1982). During a soil removal action in fall 2002, 6,400 yd^3 of PCP-impacted soil were excavated from these areas for offsite incineration and disposal. The Phase II RI report describing this area was submitted to DEQ on February 9, 2001. The soil removal actions completion report was submitted to DEQ on November 10, 2003.

- **Former Crosby & Overton tank area** located directly south of the former PCP mixing area where waste oils were previously stored in two ASTs. The tanks have since been removed from this area. During a soil removal action in fall 2002 (in conjunction with the former PCP

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- In the loading rack/entrance area of the Main Terminal Tank Farm area, zinc and gasoline-range petroleum hydrocarbons are detected at concentrations exceeding preliminary screening levels. Elevated concentrations of gasoline-range petroleum hydrocarbons are associated with a composite sample collected at the capillary fringe in an area (biased area B3) where trucks were formerly loaded.

- PAHs and metals were detected in the soil in the eastern portion of the Phase III study area. Concentrations exceeding preliminary screening levels are most frequently found at the 0 to 0.5-ft depth interval. These concentrations appear to be associated with historic road oiling for dust suppression in this area. Diesel-range petroleum hydrocarbons were also detected in the surface soil, but not at concentrations exceeding the preliminary screening level.

- Within the asphalt-paved road area, TPH, PAHs, and metals were detected in the surface soil. At depths greater than 0.5 ft BGS, only metals were found in soil in this area. Contaminants found in the surface soil likely result from the presence of these constituents in the roadbase material of the asphalt road.

- Within the Phase II study area, PCP concentrations ranging from nondetect to 180 mg/kg potentially remain in soil at depths at and greater than about 13 ft BGS. This soil was not excavated during the removal action performed in the former PCP mixing area due to limitations in excavating soil below the water table and the plan to use *in situ* chemical oxidation (ISCO) to remediate soil and groundwater at this depth. Residual levels of PCP will be determined following completion of the full scale ISCO injection events. Other constituents associated with the PCP-formulating operations (diesel-range, motor oil-range, and gasoline-range TPH, PAHs, VOCs, and metals) are present in the surface soil and at depths at or deeper than the capillary fringe. Concentrations of several of the constituents exceed preliminary screening levels.

Nature and Extent of Contamination: Groundwater

The nature and extent of contamination in groundwater was evaluated by the same operational areas. Preliminary screening levels, based on various published federal and state criteria, were used for comparison to the observed groundwater concentrations. A summary of the Phase III groundwater results follows:

Main Terminal Tank Farm Area

- Diesel-range and gasoline-range petroleum hydrocarbons are present throughout the upper zone groundwater in the Main Terminal Tank Farm area at concentrations ranging from nondetect to 24 mg/L for the October 2003 event and ranging from nondetect to 6.5 mg/L for the November 2004 sampling event. Constituents typically associated with diesel-range and gasoline-range petroleum hydrocarbons (i.e., PAHs and VOCs) are also present in the upper zone groundwater in the Main Terminal Tank Farm area, but these plumes are not as widespread as the TPH plumes. Metals were detected in the upper zone groundwater throughout the Main Terminal Tank Farm area at concentrations typically less than site-specific background concentrations.

- The gasoline-range petroleum hydrocarbon and VOC plumes present in upper zone groundwater in the Main Terminal Tank Farm area extend into the western portion of the loading rack/entrance area.

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area. This contaminant distribution supports the presence of different sources than in the Bell Terminal Tank Farm area.

- The maximum concentration of petroleum hydrocarbons in upper zone groundwater in the Bell Terminal Tank Farm area (796 mg/L for diesel-range hydrocarbons) was found near the western property boundary based on a direct-push sample collected in 2001. Constituents associated with diesel-range and gasoline-range petroleum hydrocarbons (i.e., PAHs and VOCs) are also present in the upper zone groundwater in the Bell Terminal Tank Farm area; however, the areas of impacted groundwater for these constituents appear to be smaller than the areas of groundwater impacted by petroleum hydrocarbons. Petroleum hydrocarbon concentrations increase across the western property boundary and on the former PEO property to maximum concentrations of 6.8 mg/L for diesel-range hydrocarbons and 38.7 mg/L for gasoline-range hydrocarbons at direct push location B-60.

- No LNAPL was observed on upper zone groundwater in the Bell Terminal Tank Farm area. LNAPL has consistently been observed between 2001 and 2003 (only data available) in well MW-4 located on the former PEO property near the locations of the former diesel ASTs.

- Except for diesel-range petroleum hydrocarbons and metals, contaminants are not present in the lower zone groundwater in the Bell Terminal Tank Farm area. A low level concentration of diesel-range petroleum hydrocarbons (0.35 mg/L) was observed at well LW-32D. Metals (chromium, copper, nickel, and zinc) were observed at three lower zone monitoring well locations at concentrations ranging from 0.004 to 0.01 mg/L.

- Lower zone groundwater concentrations in the Bell Terminal Tank Farm area for diesel- and gasoline-range TPH, benzene, and ethylbenzene are much less than the upper zone concentrations. Diesel- and gasoline-range TPH concentrations are much less in upper zone groundwater in the Bell Terminal Tank Farm area than in the Main Terminal Tank Farm area.

- Concentrations of petroleum constituents in the lower zone increase significantly to the east of the extent of the confining unit boundary on the former PEO property. Based on the most recent data available (1996 and 1998 for TPH, and January 2003 for BTEX), elevated diesel-range hydrocarbon concentrations were observed with a maximum concentration of 35 mg/L at direct-push location G. Gasoline-range hydrocarbon and ethylbenzene concentrations exceeding the preliminary screening levels were also observed in this area with maximum concentrations of 44.5 mg/L at direct push location B-9 and 1,500 mg/L at well MW-5, respectively.

Eastern Portion of Phase III Study Area

- Although petroleum hydrocarbons were not analyzed for in the upper zone groundwater in the eastern portion of the Phase III study area, no VOCs or PAHs were detected in the upper zone groundwater.

Phase II Study Area

- The only significant plume of contamination in the upper zone groundwater in the Phase II study area is PCP. Based on the fourth quarter 2003 groundwater data, PCP

concentrations in this plume range from 0.61 µg/L to 2,100 µg/L and extend approximately 450 ft downgradient from the PCP mixing area. In November 2004, the overall size of the PCP plume had diminished and concentrations within the plume had decreased significantly with the previous maximum concentration decreasing to 624 µg/L. These decreases in PCP concentrations appear to result from a large-scale soil removal action in 2002 as well as two full-scale ISCO injection events within the PCP plume area. Historical PCP concentrations within the upper zone have been as high as 23,000 µg/L at well LW-11S.

- The Phase III RI results also indicate that separate plumes of diesel-range and gasoline-range petroleum hydrocarbons and VOCs are observed in the upper zone groundwater within and downgradient of the Phase II study area. These concentrations do not appear to originate in the tank farm areas and are likely related to the presence of PCP carrier oils (e.g., mineral spirits) as light non-aqueous phase liquid (LNAPL) and to the partitioning of these constituents into groundwater.

- Occasional observations of LNAPL have also been recorded for upper zone groundwater monitoring wells within the Phase II study area. These wells include OX-1S, OX-2S, OX-3S, LW-8S, and LW-11S and piezometer PZ-2. LNAPL thicknesses at these locations since the soil removal action have ranged from 0.04 to 0.37 ft. LNAPL occurring in this area appears to be related to activities performed in the former PCP mixing area and not related to LNAPL observed in the Main Terminal Tank Farm area. LNAPL presence is also related to seasonal groundwater fluctuations.

- PCP is detected in the lower zone groundwater within the Phase II study area, the southern portion of the Main Terminal Tank Farm area, and the western portion of the asphalt-paved road area at concentrations less than preliminary screening levels. This distribution of PCP concentrations in lower zone groundwater in this area reflects downgradient movement from a historically high PCP concentration area and the influence of recovery well RW-2. Detections of diesel-range petroleum hydrocarbons are observed in the lower zone groundwater in these areas at concentrations up to 3.1 mg/L.

Asphalt-Paved Road Area

- No contaminants were detected in upper zone groundwater within the asphalt-paved road area.

Loading Rack/Entrance Area

- No lower zone groundwater monitoring wells exist in the loading rack/entrance area of the Main Terminal.

Shoreline Wells

- Groundwater results for the Willamette River shoreline wells indicate that, with the exception of chromium in wells LW-37D, LW-38D, and LW-39D and copper in well LW-37D, no concentrations exceeded the preliminary screening levels during the November 2004 event. Data for the first quarter 2005 (to be provided in its entirety in a separate deliverable) indicate that concentrations for all constituents are less than the preliminary screening levels in the shoreline wells. These data indicate that there is not a

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PCP-impacted soil in the Phase II study area at the ground surface to the depth of the water table (approximately 13 ft BGS) has been removed and incinerated and disposed offsite. Concentrations of contaminants remaining in soil in this area are at levels that were calculated to be protective for migration to groundwater that ultimately discharges to surface water.

Contaminant Fate and Transport: Groundwater

The presence of the same contaminants found in groundwater as in soil throughout the tank farm areas and the former PCP mixing area indicates that contaminants have partitioned from the soil and/or NAPL into the groundwater. Petroleum hydrocarbon plumes and PCP plumes found in the upper zone of the tank farm areas and the former PCP mixing area, respectively, appear to have migrated in the downgradient direction (west or southwest). For PCP, historical and recent concentrations of PCP in groundwater were used to evaluate potential contaminant migration pathways between the historical and recent monitoring periods. Currently, migration pathways for PCP are being controlled through the groundwater interim action (e.g. groundwater recovery) and the ISCO injections in the PCP plume areas. Potential historical contaminant migration to the Willamette River is being addressed during the RI/FS for the Portland Harbor Superfund Project. Historical groundwater quality data are not available for the tank farm areas.

In the Main Terminal Tank Farm area, the presence of contaminants in the lower zone groundwater in the western portion of the tank farm where the confining unit is discontinuous or absent, and the lesser presence of these contaminants in the lower zone groundwater in the eastern portion of the tank farm where the confining unit is present, indicates that contaminants in the upper zone groundwater are migrating westward (downgradient) and mixing with the lower zone groundwater. The downgradient extent of the diesel-range and gasoline-range hydrocarbon plumes originating from the Bell Terminal Tank Farm area suggests that lateral movement of the contaminants is slow, which may be due to the low horizontal hydraulic gradient in this area, partitioning of these constituents from the dissolved phase onto organic matter, or attenuation processes (e.g., biodegradation and/or volatilization).

Vertical migration of contaminants from the upper zone groundwater to the lower zone groundwater seems to occur only in locations where the confining unit is discontinuous and/or absent (e.g., the western portion of the Main Terminal Tank Farm area, within and downgradient of the former PCP mixing area, and the western portion of the former PEO property to the west of the Bell Terminal tank farm area). This suggests that the silt layer over much of the western portion of the Main Terminal Tank Farm area and the Bell Terminal Tank Farm area is acting as an impermeable geologic/hydrogeologic boundary. Because the confining unit boundary on the former PEO property is estimated within the likely source area where the diesel ASTs were located on the eastern portion of the

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2.2.2.7 *In Situ* Chemical Oxidation Interim Action

To further facilitate the remediation of PCP contamination in the groundwater and soil at the Terminal within the upper zone, the *in situ* chemical oxidation (ISCO) technique has been implemented. The primary objectives of the ISCO interim remedial action were to reduce the concentration of PCP present in upper zone groundwater within the PCP source area, to reduce the extent of the PCP plume in the upper zone groundwater, and to reduce the concentration of PCP in the soil located within the zone of groundwater fluctuation (i.e., smear zone). The specific type of chemical oxidation that was implemented for the interim action is based on Fenton's Reagent oxidation technology as applied by In-Situ Oxidation Technologies, Inc. (ISOTEC) of Englewood, Colorado. The Fenton's Reagent chemical oxidation reaction is created by the combination of soluble iron with low concentrations of hydrogen peroxide to produce hydroxyl radicals (•OH). The hydroxyl radical is a short-lived oxidizer that is very powerful, second only to fluorine in oxidative power. The hydroxyl free radicals attack the carbon double bonds of chlorinated hydrocarbons (e.g., PCP). Iron is used to catalyze the reaction.

Bench Scale and Pilot Studies

Use of the ISCO technique was originally assessed during a bench scale laboratory study and a pilot study conducted within and downgradient of the former PCP mixing area in September 2002. The results of the bench scale study and pilot test are provided in 2002 and 2003 ISOTEC reports, respectively (ISOTEC 2002, 2003).

For the pilot test, ISOTEC injected reagents into 10 locations within and downgradient of the former PCP mixing area. The material injected included 17 percent hydrogen peroxide, complexed iron solution, and tap water. The injection points were driven to a depth of 19 to 19.5 ft BGS and spaced 25 ft apart based on a 12.5 ft estimated radius of influence (ROI). The ROI was estimated based on site lithology, contaminant concentrations, and ISOTEC's previous experience. The depths were chosen so that the reagent could be delivered to the saturated zone between the water table at approximately 16 ft BGS and a silt layer at approximately 19 ft BGS.

Following the injection of the hydrogen peroxide solution, groundwater and soil samples were collected to evaluate the effectiveness of the pilot test. Results from the testing indicated that the pilot study was successful in reducing the concentration of PCP in soil and groundwater (ISOTEC 2003).

Full Scale Implementation

Following the documentation of a successful pilot study using ISCO techniques (ISOTEC 2003), Landau Associates prepared a work plan for implementation of a full-scale ISCO interim remedial action

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8.0 CONCEPTUAL SITE MODEL

This section provides the conceptual site model for the Terminal based on the hydrogeologic/geologic system and the RI and previous investigation data presented in this report. The conceptual site model includes a description of the defined source areas; a discussion of the general release mechanisms and fate and transport processes, and site-specific fate and transport processes along the exposure pathways for the Terminal. The conceptual site model demonstrates that the existing data are sufficient to define the nature and extent of contamination from the defined source areas and to conduct the human health and ecological risk assessments.

8.1 SOURCE AREAS

Sources that have affected soil and groundwater quality at the Terminal were related to separate historical operations, including: 1) a wood treatment formulation operation in the former PCP mixing area and former PCP warehouse area; 2) petroleum handling and storage in the Main Terminal and the Bell Terminal Tank Farm areas, and associated loading rack and petroleum handling areas; 3) storage of waste oils in tanks in the former Crosby & Overton area; 4) oiling of roads on the East Property; and 5) unknown sources along the western property boundary of the Bell Terminal Tank Farm area outside the tank farm wall and on the adjacent former PEO property to the west. Contamination to soil on the East Property has been addressed through a soil remedial action and the soil to groundwater pathway has been effectively eliminated. DEQ has issued a conditional NFA for the East Property portion of the Terminal and further discussion of the conceptual site model is focused on the other areas of the Terminal.

8.1.1 FORMER PCP MIXING AREA AND WAREHOUSE

The primary contaminant of concern resulting from the historical blending of specialty wood treating products is PCP. Two source areas for PCP-related contamination (e.g., PCP by-products and dioxins/ furans) were defined in the Phase II RI. These areas are the former PCP mixing area (including the area below the former PCP warehouse) and the northwestern portion of former Crosby & Overton tank area. As discussed in the Phase II RI report, releases of PCP, carriers, additives, and PCP formulations to soil in the PCP mixing area appear to have occurred during the mixing operations. These releases resulted in the primary source of PCP (and related constituents) contamination to soil in this area with historical PCP soil concentrations exceeding 100,000 mg/kg. Based on historical upper and lower zone groundwater data, the former PCP mixing area was also identified as a significant or primary source of PCP contamination to groundwater with historical concentrations in the upper zone exceeding 60,000 µg/L. PCP concentrations detected in the lower zone have been as high as 18,000 µg/L. Based on

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the magnitude of PCP detections in the soil and groundwater in and downgradient of the PCP source area and information about the PCP formulations, there is the possibility that free-phase PCP (dense non-aqueous phase liquid (DNAPL)] with a carrier was used, providing a potential residual source of PCP. However, to date, there has been no direct observation of DNAPL at the Terminal.

Contaminated soil was removed from the former PCP mixing area and below the footprint of the former PCP warehouse during a soil removal action in the fall of 2002. Where possible, soil exceeding PCP concentrations of 5 mg/kg was removed from these source areas for offsite incineration and disposal. However, soil containing PCP concentrations above 5 mg/kg still remain in some areas, mainly at or below the water table, as shown on Figure 2-4. An interim remedial action using the ISCO remediation technique is currently being implemented to address PCP-impacted soil and groundwater both in and downgradient of these source areas.

8.1.2 TANK FARM AREAS

As discussed in Section 7.0, contaminants in soil and groundwater at the Terminal associated with petroleum storage and handling operations include mainly petroleum hydrocarbons, PAHs, VOCs, and metals. The presence of these contaminants is consistent with the historical uses of the Terminal for bulk storage of petroleum products.

Three primary source areas for diesel-range and gasoline-range petroleum hydrocarbon contamination (and related constituents) have been identified on the Terminal property based on concentrations of these contaminants detected in soil and groundwater. These areas include the Main Terminal Tank Farm area, the central portion of the Bell Terminal Tank Farm area, and an area along the western boundary of the Bell Terminal Tank Farm area. Another source area appears to occur downgradient of the Bell Terminal Tank Farm area on the former PEO property where significant historical releases have been documented in the area of the former diesel ASTs. Past releases of petroleum products have been documented in the Main Terminal Tank Farm area. Specifically, a release of diesel occurred in 1975 when Tank 29508 (shown on Figure 2-1) split along a vertical weld. An unleaded gasoline spill in 1994 was also reported in the Main Terminal Tank Farm area. Such releases have provided a source for diesel-range and gasoline-range petroleum hydrocarbons (and related constituents such as PAHs and VOCs) at concentrations exceeding 36,000 mg/kg and 8,000 mg/kg, respectively, in soil and at concentrations exceeding 19 mg/L and 24 mg/L, respectively, in groundwater below the Main Terminal Tank Farm area. Leaks along pipelines conveying petroleum products may have also provided a source for the petroleum hydrocarbon contamination in soil and groundwater in this area. LNAPL has been observed at locations within the Main Terminal Tank Farm area in the area of the 1994 spill and more recently in the central portion of the Main Terminal Tank Farm area, which is likely

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a current source of groundwater contamination to the river at concentrations exceeding screening levels for the following reasons:

- LNAPL has not been observed in nearshore wells.
- As described earlier, groundwater data collected from Willamette River shoreline wells installed in November 2004 and February 2005 indicate that groundwater concentrations downgradient of the Main Terminal Tank Farm area do not consistently exceed preliminary screening levels and therefore, there is not a complete groundwater transport pathway to the river.
- The Bell Terminal Tank Farm area boundary is located more than 600 ft from the river shoreline. Groundwater concentrations from the operational area of the Bell Terminal Tank Farm area do not exceed preliminary screening levels, except for low level metals concentrations. Elevated groundwater concentrations along the downgradient western property boundary and on the former PEO property do not appear to be related to Time Oil operations.
- The east-west trending storm drain could historically have provided a preferential pathway for the transport of PCP- impacted groundwater from the Phase II source areas to the river; however, ongoing operation of the groundwater intercept system provides capture/migration of contaminant migration to the river. Migration of PCP in groundwater is also contained through operation of the groundwater interim action system and performance of the full scale ISCO injections within the PCP plume area. PCP has not been consistently detected at the downgradient wells closest to the river or at the river outfall since operation of the groundwater interim action began.

If impacted groundwater has historically discharged to the river from the Terminal, there is the potential for impact to sediment or surface water quality. Historical impacts to the river are being addressed as part of the RI/FS for the Portland Harbor Superfund Project

8.3.1 PCP Mixing Area

The majority of the contaminated soil from the former PCP mixing area and former soil stockpile area has been excavated and disposed offsite. However, residual amounts still remain at depths typically at or greater than 13 ft BGS (the approximate water table elevation) within and directly adjacent to the mixing area. PCP formulations were likely introduced into the environment through spills of PCP-containing NAPL directly onto the ground surface and subsequent migration based on the fate and transport parameters discussed in the previous section. Historical information indicates that most of the PCP formulations were less dense than water (i.e., specific gravity of less than 1) and, therefore, would migrate through the environment as LNAPL; however, at least one formulation had a density greater than 1 and could move as DNAPL through the subsurface. LNAPL has been observed in wells LW-11S and OX-2S, which are located downgradient from the PCP mixing area. DNAPL has never been observed.

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Citation: **959 f.2d 126**

*959 F.2d 126, *; 1992 U.S. App. LEXIS 3924, **;*
34 ERC (BNA) 1891; 92 Cal. Daily Op. Service 2131

Jones-Hamilton Co., a California Corporation, Plaintiff-Appellant, v. Beazer Materials & Services, Inc.; Kop-Coat, Inc., a Pennsylvania Corporation; Koppers Company, Inc., Defendants-Appellees.

No. 91-15054

UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

959 F.2d 126; 1992 U.S. App. LEXIS 3924; 34 ERC (BNA) 1891; 92 Cal. Daily Op. Service 2131; 92 Daily Journal DAR 3390; 22 ELR 20677

January 16, 1992, Argued and Submitted, San Francisco, California
March 12, 1992, Filed

SUBSEQUENT HISTORY: Amended and Petition for Rehearing Denied and Suggestion for Rehearing En Banc Rejected, August 24, 1992, Reported at 1992 U.S. App. LEXIS 19401.

PRIOR HISTORY: **[**1]** Appeal from the United States District Court for the Northern District of California. D.C. No. CV-90-00169-EFL. Eugene F. Lynch, District Judge, Presiding.

CASE SUMMARY

PROCEDURAL POSTURE: Appellant formulator challenged the decision of the United States District Court for the Northern District of California, which granted summary judgment in favor of appellee chemical supplier and denied appellant's motion for partial summary judgment in appellant's action seeking contribution for environmental cleanup costs incurred pursuant to the Comprehensive Environmental Response, Compensation and Liability Act.

OVERVIEW: Appellant formulator sought contribution from appellee chemical supplier for the cost incurred under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for the illegal disposal of hazardous substances from appellant's facility. The district court granted summary judgment in favor of appellee and denied appellant's motion for partial summary judgment. The court affirmed that the parties' indemnification agreement was not barred by CERCLA and that appellant was liable to indemnify appellee for appellant's acts in violation of CERCLA. As there was a question of fact as to the scope of appellee's involvement in the disposal of the toxic substances, the court reversed summary judgment because appellant was not liable for indemnity for appellee's acts. The court also reversed the denial of partial summary judgment, holding that because appellee retained ownership of all materials and the contract contemplated a percentage of spillage, appellee had "arranged for disposal" of toxic substances and was liable under CERCLA. The award of attorney's fees to appellee was reversed for reconsideration in light of its possible responsibility for the cleanup costs.

OUTCOME: The court affirmed appellant formulator's obligation to indemnify appellee chemical supplier for liability incurred for appellant's illegal acts. Appellant was entitled to partial summary judgment as to appellee's liability for arranging for disposal of hazardous materials. Summary judgment in favor of appellee and appellee's attorney's fees award were reversed for consideration of appellee's participation in the disposal of the toxic substances.

CORE TERMS: summary judgment, disposal, arranged, indemnification, hazardous, chemical, cleanup, toxic substances, pesticide, indemnify, partial, reasonably susceptible, indemnitor, supplied, formulator, ownership, issues of material fact, hazardous waste, indemnitee, granting summary judgment, indemnity clause, public policy, obligated to indemnify, liability arising, illegal acts, water, pentachlorophenol, contamination, environmental, spillage

LexisNexis(R) Headnotes ◆ Hide Headnotes

Civil Procedure > Appeals > Standards of Review > De Novo Review

HN1 A grant of summary judgment is reviewed de novo to determine whether, viewing the evidence in a light most favorable to the nonmoving party, there are any genuine issues of material fact and whether the district court applied the relevant substantive law. More Like This Headnote

Civil Procedure > State & Federal Interrelationships > Application of State Law

HN2 A federal court applies state law as it believes the highest court of the state would apply it. More Like This Headnote

Environmental Law > Hazardous Wastes & Toxic Substances > CERCLA & Superfund Amendments

HN3 See 42 U.S.C.S. § 9607(e)(1).

Environmental Law > Hazardous Wastes & Toxic Substances > CERCLA & Superfund Amendments

HN4 Enforcement of indemnification clauses does not frustrate public policy as expressed in the Comprehensive Environmental Response, Compensation and Liability Act . More Like This Headnote | *Shepardize:* Restrict By Headnote

Contracts Law > Contract Interpretation > Ambiguities & Contra Proferentem

HN5 Under California law, whether a contract is ambiguous is a question of law. When interpreting a contract, even when the document is unambiguous on its face, a judge is required to give at least a preliminary consideration to all credible evidence offered to prove the intention of the parties. However, after considering the evidence, the trial court may then exclude it if it tends to prove a meaning of which the language of the contract is not reasonably susceptible. If the trial court finds that the language of the contract is not reasonably susceptible to the suggested interpretation, and excludes the evidence, the case may then be disposed of by summary judgment. More Like This Headnote

Environmental Law > Hazardous Wastes & Toxic Substances > CERCLA & Superfund Amendments

HN6 42 U.S.C.S. § 9607(a)(3) of the Comprehensive Environmental Response, Compensation and Liability Act imposes liability on any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances owned or possessed by such person, by any other party or entity, at any facility owned or operated by another party or entity and containing such hazardous substances. More Like This Headnote | *Shepardize:* Restrict By Headnote

Environmental Law > Hazardous Wastes & Toxic Substances > CERCLA & Superfund Amendments

HN7 "Disposal" is defined as discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters. 42 U.S.C.S. § 6903(3). More Like This Headnote | *Shepardize:* Restrict By Headnote

Civil Procedure > Costs & Attorney Fees > Attorney Fees

HN8 The indemnitee can recover attorneys' fees for an action against the indemnitor. More Like This Headnote

COUNSEL:

John L. Boos, Pettit & Martin, San Francisco, California, for the plaintiff-appellant.

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James L. Meeder, Beveridge & Diamond, San Francisco, California, for the defendants-appellees.

JUDGES: Before: Alfred T. Goodwin, Betty B. Fletcher and Melvin Brunetti, Circuit Judges.

BZTO104(e)015443

Opinion by Judge Fletcher.

OPINIONBY: FLETCHER

OPINION: [*127] OPINION

FLETCHER, Circuit Judge:

Jones-Hamilton Co. ("J-H") appeals the district court's grant of summary judgment in favor of Beazer Materials & Services, Inc. ("Beazer") and denial of J-H's own motion for partial summary judgment. The district court found that J-H was obligated to indemnify Beazer for any liability Beazer incurred from environmental cleanup orders issued to J-H, and that this obligation barred J-H's action against Beazer for contribution under CERCLA.

We affirm in part and reverse in part.

BACKGROUND

In 1970, J-H, a contract chemical formulator, entered into a formulation agreement (the "Agreement") with Wood Treating Chemicals Co. ("WTCC"). The Agreement was to continue in force until terminated by written notice; **[**2]** it was ultimately terminated in 1984. In 1971, WTCC was sold to Koppers Company; Beazer has assumed the duties and liabilities of Koppers under the Agreement and has been assigned all rights thereunder. Throughout this opinion, **[*128]** WTCC or its successors will be referred to as "Beazer." n1

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n1 For further discussion of the parties to the district court case, see *Jones-Hamilton Co. v. Kop-Coat, Inc.*, 750 F. Supp. 1022, 1023 n. 1 (N.D. Cal. 1990).

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Under the Agreement, J-H would formulate raw materials provided by Beazer into wood preservation compounds. Beazer retained ownership of the materials it provided. The Agreement contained two clauses specifically relevant to this appeal. First, with regard to chemicals used in formulation, it provided: "A tolerance of up to two percent by volume shall be allowed for spillage or shrinkage in any calendar month . . . ." With regard to indemnification, it provided: "J-H agrees to comply with all applicable Federal, State and Local laws, ordinances, codes, rules and **[**3]** regulations and to indemnify WTCC against all losses, damages and costs resulting from any failure of J-H or any of its employees, agents or contractors to do so."

J-H carried out formulation activities under the Agreement at its facility in Newark, California. Dr. Stutz, a consultant employed by Beazer, was on site at the facility and was present during the formulation process, although his role in the process is a matter of dispute.

Among the raw materials Beazer provided to J-H were pentachlorophenol and tetrachlorophenol, substances classified as "hazardous substances" under CERCLA. In 1970, J-H had received a waste discharge permit from the California Regional Water Quality Control Board ("RWQCB"); the permit prohibited J-H from discharging chemicals other than certain listed substances into its waste water containment ponds. However, prohibited substances, apparently including pentachlorophenol, were nonetheless discharged into the ponds.

In 1985, after contamination had been discovered at the Newark site, the RWQCB issued cleanup and abatement orders to J-H. J-H has spent over $ 2,000,000 to comply with the orders.

J-H filed suit against Beazer under CERCLA seeking contribution **[**4]** from Beazer for cleanup costs. *See*

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42 U.S.C. § 9613(f). J-H also sought a declaratory judgment as to Beazer's potential liability under CERCLA. Beazer counterclaimed, seeking indemnity under the Agreement. Both parties filed motions for summary judgment. The district court granted summary judgment in favor of Beazer as to J-H's duty to indemnify Beazer, and held that the indemnification clause barred J-H's claim for contribution. It also denied J-H's motion for partial summary judgment on the issue of whether Beazer had "arranged for the disposal" of toxic substances. In addition, the district court awarded attorneys' fees to Beazer.

JURISDICTION; STANDARD OF REVIEW

The district court had jurisdiction under 42 U.S.C. § 9613(b) and 28U.S.C. § 1331; this court has jurisdiction under 28 U.S.C. § 1291.

A grant of summary judgment is reviewed de novo. *T.W. Elec. Serv., Inc. v. Pacific Elec. Contractors Ass'n,* 809 F.2d 626, 629 (9th Cir. 1987). HN1 "A grant of summary judgment is reviewed de novo to determine whether, viewing the evidence in a light most favorable to the nonmoving party, there are any genuine issues of material fact and whether the district court applied **[**5]** the relevant substantive law." *Tzung v. State Farm Fire and Casualty Co.,* 873 F.2d 1338, 1339-40 (9th Cir. 1989).

HN2 A federal court applies state law as it believes the highest court of the state would apply it. *Insurance Co. of N. Amer. v. Howard,* 679 F.2d 147, 149 (9th Cir. 1982).

DISCUSSION

I. Did the District Court Err in Granting Summary Judgment in Favor of Beazer?

A. Was the Indemnity Clause against Public Policy under CERCLA?

CERCLA's provision regarding indemnity clauses is truly murky:

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[*129] No indemnification, hold harmless, or similar agreement or conveyance shall be effective to transfer from the owner or operator of any vessel or facility or from any person who may be liable for a release or threat of release under this section, to any other person the liability imposed under this section. Nothing in this subsection shall bar any agreement to insure, hold harmless, or indemnify a party to such agreement for any liability under this section.

42 U.S.C. § 9607(e)(1). As the district court noted in its opinion, courts around the country have reached different interpretations of this language. This court has held that HN4 enforcement **[**6]** of indemnification clauses does not frustrate public policy as expressed in CERCLA. *Mardan Corp. v. C.G.C. Music, Ltd.,* 804 F.2d 1454, 1459 (9th Cir. 1986). In *Mardan,* we reasoned that CERCLA policy would not be frustrated because all responsible parties would remain fully liable to the government, although they would be free to enter into private contractual arrangements "essentially tangential to the enforcement of CERCLA's liability provisions." *Id.* Thus enforcement of the indemnification agreement would not violate public policy under *CERCLA.*

B. Scope of the Indemnity Clause

J-H argues that a question of fact remains as to whether it agreed to indemnify Beazer for environmental liability under the Agreement. It asserts that the district court erred in not considering the statements of J-H co-chairman James Black that J-H promised to comply only with "workman's compensation laws, overtime laws, labor laws, and industrial health and safety laws," and agreed to indemnify Beazer only for liability arising out of J-H's failure to comply with such laws.

HN5 Under California law, whether a contract is ambiguous is a question of law. *Brobeck, Phleger & Harrison v. Telex Corp.,* 602 F.2d 866, 871 **[**7]** (9th Cir.) (applying California law), *cert. denied,* 444 U.S. 981, 62 L. Ed. 2d 407, 100 S. Ct. 483 (1979). When interpreting a contract, even when the document is unambiguous on its face, a judge is required to give "at least a preliminary consideration [to] all credible evidence offered to prove the intention of the parties." *Pacific Gas & Elec. Co. v. G.W. Thomas Drayage & Rigging Co.,* 69 Cal. 2d 33, 442 P.2d 641, 645, 69 Cal. Rptr. 561 (Cal. 1968); *see also Brobeck, Phleger &*

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Harrison, 602 F.2d at 871 ("The trial judge must receive relevant extrinsic evidence that can prove a meaning to which the language of the contract is 'reasonably susceptible.' "). However, after considering the evidence, the court may then exclude it if it "tends to prove a meaning of which the language [of the contract] is not reasonably susceptible." *Thomas Drayage,* 442 P.2d at 645 n. 7; *see also Brobeck, Phleger & Harrison,* 602 F.2d at 871. If the court finds that the language of the contract is not "reasonably susceptible" to the suggested interpretation, and excludes the evidence, "the case may then be disposed of by summary judgment." *Brobeck, Phleger & Harrison,* 602 F.2d at 871. **[**8]**

The question here, then, is whether an agreement under which J-H agrees to indemnify Beazer for liability arising from J-H's violation of "all applicable Federal, State and local laws, ordinances, codes, rules and regulations" is "reasonably susceptible" to the meaning that it in truth refers only to all "workman's compensation laws, overtime laws, labor laws, and industrial health and safety laws." J-H contends that, in this context, where J-H was to supply labor and facilities, and Beazer was to supply materials and expertise, this meaning is reasonable. We reject this argument: had the parties chosen to limit the scope of the indemnification clause in the manner J-H suggests, they would surely have made this clear in the Agreement. *Cf. Blumenfeld v. R.H. Macy & Co.,* 92 Cal. App. 3d 38, 154 Cal. Rptr. 652, 656 (Cal. Ct. App. 1979) (refusing to admit extrinsic evidence suggesting one particular cause of action was not assigned, where agreement explicitly assigned "all claims against third parties").

Thus, the district court did not err in refusing to consider the evidence J-H submitted. There was therefore no issue **[*130]** of fact as to the interpretation of the indemnity clause to preclude **[**9]** summary judgment. However, because issues of fact remained as to the scope of Beazer's involvement in the disposal of the toxic substances, we find the district court erred in granting summary judgment in favor of Beazer.

C. Beazer's Involvement in the Disposal of Hazardous Substances

J-H does not contest the district court's finding that it was obligated to indemnify Beazer for any liability Beazer incurred as a result of J-H's illegal acts. However, J-H claims that even if the indemnity provision can be read to apply to the violation of environmental laws, it requires that J-H indemnify Beazer only for damages Beazer incurs as a result of *J-H's* violation of laws, not *Beazer's* violation of laws. J-H therefore claims the district court erred in granting Beazer's motion for summary judgment because the court ignored this language in the agreement.

The language of the agreement and the evidence submitted by the parties suggest that the district court erred on this issue. The Agreement requires J-H to indemnify Beazer for liability Beazer incurs as a result of J-H's own actions. There remains an issue of fact as to the level of Beazer's participation in waste disposal, and **[**10]** thus as to its own liability.

At the outset, the agreement recognized the possibility of spillage of the materials Beazer provided and of which it retained ownership; such materials would apparently include the toxic chemicals at issue. J-H officers testified that J-H relied on Beazer for information and instructions on the handling of Beazer's chemicals. Additionally, evidence suggests that Beazer's consultant, Dr. Stutz, may have been actively involved in the production process at J-H. J-H submitted the deposition testimony of several of its employees, who described Stutz' participation in the production of Beazer's materials. In particular, these employees described Stutz' supervision and awareness of the procedures for rinsing the tote bins returned by customers - production which resulted in the introduction of hazardous chemicals into the evaporation pond from which contamination occurred.

On the basis of evidence before the district court when it ruled on the summary judgment motions, a jury could reasonably find Beazer itself was responsible, at least to some extent, for the contamination for which J-H became subject to CERCLA liability. Thus, because it ignored language in **[**11]** the agreement limiting J-H's duty to indemnify to Beazer's liability arising out of J-H's own illegal acts, and failed to consider evidence indicating the existence of issues of material fact, the district court erred in granting summary judgment in favor of Beazer.

II. Did the District Court Err in Denying J-H's Summary Judgment motion?

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A. Appealability

Denial of a motion for summary judgment is generally not a final order, and is therefore not appealable. *Abend v. MCA, Inc.*, 863 F.2d 1465, 1482 n. 20 (9th Cir. 1988), *aff'd*, 495 U.S. 207, 110 S. Ct. 1750, 109 L. Ed. 2d 184 (1990). However, in this case, "the district court's grant of summary judgment was a final decision giving us jurisdiction to review its denial of plaintiff's motion for summary judgment." *Id.*

B. Was it error to deny the motion?

J-H sought partial summary judgment on the issue of whether Beazer had "arranged for disposal" of toxic substances, and was thus itself liable under CERCLA.

HN6 CERCLA imposes liability on

any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances **[**12]** owned or possessed by such person, by any other party or entity, at any facility owned or operated by another party or entity and **[*131]** containing such hazardous substances . . .

42 U.S.C. § 9607(a)(3)

CERCLA does not define the term "arranged for." HN7 "Disposal" is defined as

discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

42 U.S.C. § 6903(3); *see also* 42 U.S.C. § 9601(29) (adopting definition in 42 U.S.C. § 6903).

We have not yet addressed the issue of when liability for "arranging for disposal" will attach. Several courts of appeal and district courts around the country have, however, considered this question. *See, e.g.*, *Florida Power & Light Co. v. Allis Chalmers Corp.*, 893 F.2d 1313 (11th Cir. 1990) (discussed in footnote 2); *United States v. Aceto Agric. Chems. Corp.*, 872 F.2d 1373 (8th Cir. 1989) (discussed below); *CPC Int'l, Inc. v. Aerojet-Gen. Corp.*, 759 F. Supp. 1269 (W.D. Mich. 1991); **[**13]** *B.F. Goodrich Co. v. Murtha*, 754 F. Supp. 960 (D. Conn. 1991); *United States v. Shaner*, 1990 Westlaw 115085 (E.D. Pa. 1990); *United States v. Velsicol Chems. Corp.*, 701 F. Supp. 140 (W.D. Tenn. 1987).

An Eighth Circuit case on this issue presents facts very similar to those before us here. In *United States v. Aceto Agric. Chem. Corp.*, 872 F.2d 1373 (8th Cir. 1989), that court refused to dismiss the United States' claim against pesticide companies which had hired a formulating company to perform certain processes on pesticides they supplied to the formulator. The pesticide companies retained ownership of the pesticides they supplied. According to the complaint, toxic waste was generated through spills and through the operations of the formulator. The court rejected the pesticide companies' argument that they could be liable only if they "intended" to dispose of waste, noting that such a narrow reading would frustrate CERCLA's goal of making companies that are responsible for the production of hazardous waste pay for cleanup. *Aceto*, 872 F.2d at 1380. The court also noted it would go beyond "defendants' **[**14]** characterizations to determine whether a transaction in fact involves an arrangement for the disposal of a hazardous substance." *Id.* at 1381. Finally, noting that the defendants before it owned the toxic substances at issue, it rejected the argument that they were not liable because they had no authority to control the formulator's operations. *Id.*; *see also United States v. Velsicol Chem. Corp.*, 701 F. Supp. 140 (W.D. Tenn. 1987) (refusing to dismiss a case under this provision against companies which had done business with a chemical blending company whose plant was a contaminated site).

Here, *Aceto* and, indeed, the language of the statute itself, suggest that the district court erred in denying partial summary judgment in favor of J-H. No issues of material fact remain. Under the agreement, Beazer retained ownership of all materials it supplied to J-H. Materials it supplied to J-H included pentachlorophenol and tetrachlorophenol, substances ultimately classified as hazardous by CERCLA. The agreement between Beazer and J-H contemplated 2% spillage of materials. Thus, it is clear that under the

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agreement Beazer "arranged for disposal" **[**15]** of toxic substances within the meaning of section 9607. n2

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n2 The Eleventh Circuit case of *Florida Power & Light* is distinguishable from this case. In *Florida Power & Light,* the Eleventh Circuit refused to impose "arranging for disposal" liability on Allis Chalmers, where Allis Chalmers had sold Florida Power & Light transformers containing PCB's, and Florida Power & Light had used them for the approximately forty years of their normal useful life before disposing of them. The Eleventh Circuit cited *Aceto* (and cases cited within it) with approval. However, refusing to establish a "per se" rule as to liability under this provision of CERCLA, it held that Allis Chalmers had not "arranged for disposal." *Florida Power & Light,* 893 F.2d at 1318.

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Therefore, the district court erred in denying J-H's motion for partial summary judgment.

[*132] III. Attorneys' Fees

The district court awarded attorneys' fees to Beazer; Beazer also requests fees on appeal.

The California Supreme Court has not yet determined **[**16]** whether an indemnitor can recover attorneys' fees for prosecuting its indemnity claim, and California Courts of Appeal are divided on this issue. *Compare Nicholson-Brown, Inc. v. City of San Jose,* 62 Cal. App. 3d 526, 133 Cal. Rptr. 159 (Cal.Ct.App. 1976) (awarding indemnitee attorneys' fees for successful suit against indemnitor); *Schackman v. Universal Pictures,* 255 Cal. App. 2d 857, 63 Cal. Rptr. 607 (Cal.Ct.App. 1967) (same) *with Hillman v. Burns,* 209 Cal. App. 3d 860, 257 Cal. Rptr. 535 (Cal.Ct.App. 1989) (indemnitee not entitled to attorneys' fees for action against indemnitor to establish right to indemnity); *County of San Joaquin v. Stockton Swim Club,* 42 Cal. App. 3d 968, 117 Cal. Rptr. 300 (Cal.Ct.App. 1974) (same); *Doyle v. Pacific Tel. and Tel.,* 202 Cal. App. 2d 708, 21 Cal. Rptr. 326 (1962) (same). In *DeWitt v. Western Pac. R.R. Co.,* 719 F.2d 1448 (9th Cir. 1983), we noted this split in authority, but chose to follow the *Schackman* line of cases and held that under California law, HN8↑the indemnitee can recover attorneys' fees for an action against the indemnitor. n3 However, because the district court must determine on remand the outcome of the case, we vacate **[**17]** the district court's award of attorneys' fees and decline to award fees on appeal at this time. While the district court correctly found that Beazer was entitled to indemnity for any liability it incurred as a result of J-H's unlawful acts, it erred in holding that Beazer itself had incurred no liability as a result of its own actions. When it has determined to what extent each party is responsible for cleanup costs, the district court should reconsider the issue of attorneys' fees both for services before the district court and for this appeal.

- - - - - - - - - - - - - - Footnotes - - - - - - - - - - - - - -

n3 J-H suggests that we "reevaluate" our holding in *DeWitt,* in light of *Hillman,* which was decided after *DeWitt*. *DeWitt's* interpretation of California law is "binding in the absence of any subsequent indication from the California courts that our interpretation was incorrect." *Owen v. United States,* 713 F.2d 1461, 1464 (9th Cir. 1983). In this instance, J-H can only point to an additional intermediate appellate court decision on one side of a clear split. This does not provide the kind of indication that our past interpretation of California law was incorrect that would cause us to revisit our holding in *DeWitt*.

- - - - - - - - - - - - End Footnotes- - - - - - - - - - - - -

[18]**
IV. Conclusion

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We affirm the district court's holding that J-H is obligated to indemnify Beazer for any liability Beazer has incurred as a result of J-H's illegal acts and that to that extent J-H cannot seek contribution. However, we vacate the district court's award of attorneys' fees, without prejudice to Beazer to move at an appropriate time for fees for its services both before the district court and for this appeal. The district court should grant summary judgment in favor of J-H, holding that Beazer "arranged for disposal" of hazardous materials. The issue to be resolved at trial, therefore, is the extent to which Beazer is responsible for contribution to cleanup costs, as a result of its "arranger" liability and its own participation, if any, in waste disposal at J-H's facility.

AFFIRMED IN PART AND REVERSED IN PART.

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NORTHWEST REGION

Phase I - Soil Stockpile Removal Action Plan
Time Oil Northwest Terminal
Portland, Oregon

February 8, 2002

Prepared for

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

Prepared by

LANDAU ASSOCIATES, INC.

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

DEQ 020776

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BZTO104(e)015450

1.0 INTRODUCTION

This Phase I - Soil Stockpile Removal Action Plan (RAP) provides details on the methods to be utilized to complete the removal action for the soil stockpile at the Time Oil Northwest Terminal (terminal) in Portland, Oregon. The removal action, as recommended in a feasibility study (FS; Landau Associates 2001a), includes the loading of soil stockpile materials into dump trucks and transporting the material to a treatment/disposal facility located in Richmond, British Columbia, Canada. The FS was submitted to the Oregon Department of Environmental Quality (DEQ) on September 4, 2001. In a letter dated September 25, 2001 (DEQ 2001), DEQ approved the FS and approved completion of the proposed stockpile disposal as a removal action as defined by Oregon Revised Statutes (ORS) 465.2000 (24). Time Oil has received final approval from Environment Canada (2001) and from the United States Environmental Protection Agency (EPA; 2001) to dispose of the material at the recommended facility. The removal action will be completed under the provisions of a voluntary cleanup program (VCP) agreement between DEQ and Time Oil Co.(Time Oil) (DEQ No. WMCVC-NWR-96-07). The removal action will commence following the review and approval of the Phase I RAP by DEQ.

The remainder of this introductory section of the RAP provides information on the project background, a description of the material to be addressed by removal action, and a summary of the analytical results of soil samples collected from the soil stockpile in May 2001.

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 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). 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, pentachlorophenol (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

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the chemicals in the former PCP warehouse and in product tanks located within the former PCP mixing area; 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.

Time Oil has implemented closure procedures for the Northwest Terminal. The terminal ceased operations on October 31, 2001.

1.2 SOIL STOCKPILE BACKGROUND AND DESCRIPTION

Releases of PCP, carriers, additives, and PCP formulations to soil in the former PCP mixing area 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 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. The excavated soil was stockpiled onsite in a bermed and lined area. The stockpile was then covered to minimize dust generation and contact with precipitation. The excavated area was backfilled to the present 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, the management of the stockpile was upgraded by Time Oil 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 the Phase II remedial investigation (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.

The stockpile is currently lined, covered, and surrounded by a concrete wall or earth berm (Figure 4). Based on volume calculations conducted for the soil characterization and biotreatability assessment in May 2001 (Landau Associates 2001a), the soil stockpile has been volumetrically reduced (from about

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2.0 DESCRIPTION OF PLANNED REMOVAL ACTION

As indicated in the FS (Landau Associates 2001a), the planned removal action for the soil stockpile will include the removal of the stockpile material (soil, liner, cover, tires, etc.) from the site for offsite treatment and/or disposal. Oversight of remedial activities to be completed for removal of the soil stockpile will be provided by authorized employees of Time Oil or Landau Associates. The soil removed from the soil stockpile will be transported to the Richmond Biotreatment Facility (RBF) located in Richmond, British Columbia, Canada for treatment, followed by disposal at the Richmond Landfill. The RBF is operated by HAZCO Environmental Services, LLC (HAZCO) and the Richmond Landfill is operated by Ecowaste Industries Ltd. (Ecowaste). Miscellaneous materials associated with the stockpile (stockpile covers, liner, water tubes, traffic bollards, etc.) will be disposed at the Richmond Landfill; however, any of the stockpile liner material that cannot be segregated from the soil will be deposited at the RBF with the soil. Tires used to hold the stockpile cover in place will be disposed at a local tire recycling facility. The stormwater and leachate collection systems associated with the soil stockpile will be permanently disabled and abandoned.

As stated in the FS, the remedial action objectives (RAOs) for the soil stockpile are as follows:

- To prevent exposure of COPCs/CPECs within the stockpile to human and ecological receptors at concentrations that are not protective during future terminal use
- To prevent migration of COPCs/CPECs currently contained within the stockpile
- To eliminate the need for long-term management of the stockpile.

It is anticipated that the RAOs identified will be achieved with the physical removal of the soil stockpile material from the site for treatment at the RBF and disposal at the Richmond Landfill. In the absence of a site-specific risk analysis at this time, EPA Region 9 Preliminary Remediation Goals (PRGs) established for industrial site soil (EPA 2001) were used as screening levels for COPCs and CPECs present in the soil underlying the stockpile following removal. The industrial soil PRGs for the primary COPCs/CPECs are as follows:

Chemical Constituent	EPA Region 9 PRG Industrial Soil (mg/kg)
Arsenic (a)	440
Cadmium	810
Lead	750
Selenium	10,000
Silver	10,000
Dioxin (TEQ for 2,3,7,8-TCDD)	0.000027
Pentachlorophenol	11
Benzo(a)pyrene	0.29

(a) Noncancer endpoint

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EXTOXNET

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Pesticide Information Profiles

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

EXTOXNET primary files maintained and archived at Oregon State University

Revised June 1996

Pentachlorophenol (PCP)

Trade and Other Names: Trade names for pentachlorophenol include Dowicide, PCP, Penchlorol, Penta, Penta Plus, Pentachloral, Pentacon, Penwar, Priltox, Santobrite, Santophen, Sinituho, and Weedone.

Regulatory Status: Pentachlorophenol is a moderately toxic compound in EPA toxicity class II. It is a Restricted Use Pesticide (RUP) in its formulations as a wood preservative, but a General Use Pesticide (GUP) for other purposes; labels for products containing it must bear the Signal Word DANGER.

Chemical Class: chlorinated hydrocarbon

Introduction: Pentachlorophenol (PCP) is a chlorinated hydrocarbon insecticide and fungicide. It is primarily used to protect timber from fungal rot and wood-boring insects, but may also be used as a preharvest defoliant in cotton, a general pre-emergence herbicide, and as a biocide in industrial water systems. It is available in blocks, flakes, granules, liquid concentrates, wettable powders, or ready-to-use petroleum solutions.

Data presented in this profile are for technical grade pentachlorophenol, unless otherwise stated. Technical grade PCP has historically contained dioxins (e.g. tetra-, hexa- and octochlorodibenzo-p-dioxin) and hexachlorobenzene as manufacturing by-products. Technical grade PCP is typically about 86% pure. The discovery of these compounds in technical grade PCP may be one reason for its being phased out of use. Pentachlorophenol is also a major product of the metabolism of hexachlorobenzene in mammals.

Formulation: It is available in blocks, flakes, granules, liquid concentrates, wettable powders, or ready-to-use petroleum solutions.

Toxicological Effects:

- **Acute toxicity:** Pentachlorophenol is moderately toxic via the oral route, with reported oral LD50 values for various formulations ranging from 27 to 211 mg/kg in rats [69,70]. In mice the oral LD50 is 74 to 130 mg/kg, and in rabbits 70 to 300 mg/kg [69,70[. It is moderately toxic via inhalation as well, with a reported inhalation LC50 of 0.2 to 2.1 mg/L in rats [17]. The time frame for this LC50 (e.g., 4-hour, 1-hour, etc.) was not given.

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Inhalation LD50 values (i.e., the median lethal doses, not concentrations, via the inhalation route) of 225 mg/kg in rats and 355 mg/kg in mice are reported, also without a time frame [70]. Another calculated LD50 in rats via the inhalation route is 11.7 mg/kg for 28 to 44 minutes of exposure, assuming a breathing rate of 80 mL/minute [69]. Pentachlorophenol causes irritation to the mucous membranes, skin, and eyes of test animals [9]. Via the dermal route, it is moderately toxic, with reported dermal LD50 values ranging from 96-330 mg/kg in the rat, and 40 to greater than 1000 mg/kg in the rabbit (depending on formulation) [69]. Skin penetration may be the most dangerous route of exposure, being responsible for about 50 known cases of PCP poisoning, 30 of which have resulted in death. Immersion of a human hand in a 0.4 percent PCP solution for 10 minutes caused pain and inflammation. Technical PCP resulted in chloracne on the ears of rabbits, and edema in chicks, but pure PCP did not [70]. High acute exposure to PCP can cause elevated temperature, profuse sweating, dehydration, loss of appetite, decreased body weight, nausea, and neurological effects such as tremors, uncoordinated movement, leg pain, muscle twitching, and coma [69,70]. Some of the symptoms may be due to the impurities in the formulation, rather than the pentachlorophenol itself [69].

- **Chronic toxicity:** Much research on PCP has been performed with poorly characterized technical material, and the chronic toxicity observed may depend in large measure on the proportion of chlorodibenzo-p-dioxins present in the mixture [69]. In a 90-day feeding trial in rats, 30 mg/kg/day produced depressed red blood cell and hemoglobin levels as well as liver degeneration, and even lower doses resulted in irregular blood chemistry and enzyme levels, along with increased liver and kidney weights [69,71]. Pure PCP, and also technical PCP without dioxin contamination, produced only slight enlargement of livers and kidneys [69]. Purified PCP also did not produce toxic effects such as liver damage and immune system alterations, which had previously been reported for the technical product [69,71]. In humans, the most common exposure to PCP is inhalation in the workplace. Abdominal pain, nausea, fever, and respiratory irritation, as well as eye, skin, and throat irritation, may result from such exposure [70], while very high levels may cause obstruction of the circulatory system in the lungs and cause heart failure [70]. Survivors of toxic exposures may suffer permanent visual and central nervous system damage [70]. Persons regularly exposed to PCP tend to tolerate higher levels of PCP vapors than persons having little contact with these vapors [70,71].
- **Reproductive effects:** Rats fed PCP at doses of 30 mg/kg/day for 62 days before mating and during lactation showed weight loss, but no decreases in fecundity and fertility [69]. Sperm of male mice given technical or purified PCP for 5 days at 50 mg/kg/day showed no abnormalities within 35 days of treatment [69]. The evidence indicates that PCP does not cause reproductive effects.
- **Teratogenic effects:** Offspring of rats fed PCP at doses of 30 mg/kg/day for 62 days before mating and during lactation showed lowered survival and growth rates [69]; 3 mg/kg/day did not have any effects [69]. Maternal doses of 5 mg/kg/day of technical PCP in rats produced toxicity to the fetus or embryo, and 50 mg/kg/day on days 6 to 15, 8 to 11 or 12 to 15 of gestation produced increases resorptions, swelling, dilated ureters, and skeletal anomalies [69]. It is unlikely that PCP has teratogenic effects in humans at normal exposure levels.
- **Mutagenic effects:** PCP is not mutagenic in bacteria or houseflies, but is weakly mutagenic in mice and may be mutagenic in yeast [71]. One study of chromosomal aberrations in occupationally exposed workers showed no increased incidence of sister-chromatid exchanges, while another did find increases [71]. Weak mutagenic effects were seen in human lymphocyte cultures exposed to PCP [71]. The evidence suggests that PCP is nonmutagenic or weakly mutagenic.
- **Carcinogenic effects:** Studies of two formulated PCP products (Dowcide and Penta) showed increases in cancers of the spleen, liver, and adrenal gland in test mice or rats at doses of about 17 to 18 mg/kg/day [71]. These findings were not replicated for Dowcide in mice in a second study [71]. There have been reports of a possible association between occupational exposures to technical PCP and Hodgkin's disease, acute leukemia, and soft-tissue sarcoma, but confounding factors such as concurrent exposure to other substances makes interpretation of these data problematic [71]. No convincing evidence of PCP's caricinogenic effects in humans is available [71]. Current evidence is not sufficient to assess the potential of PCP to cause carcinogenic effects in humans.
- **Organ toxicity:** Data from animal studies indicate that the major target organs for PCP are the liver, kidneys, and central nervous system.

- **Fate in humans and animals:** PCP is rapidly absorbed through the gastrointestinal tract following ingestion [71]. Accumulation is not common, but if it does occur, the major sites are the liver, kidneys, plasma protein,

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brain, spleen, and fat [69,71]. Unless kidney and liver functions are impaired, PCP is rapidly eliminated from blood and tissues, and is excreted, mainly unchanged or in conjugated form, via the urine [71]. Single doses of PCP have half-lives in blood of 15 hours in rats, 78 hours in monkeys, and 30 to 50 hours in humans [69].

Ecological Effects:

- **Effects on birds:** The compound is slightly toxic to practically nontoxic to bird species. The reported 5-day dietary LC50 value in Japanese quail is greater than 5139 ppm [54]. Reported acute oral LD50 values for PCP are 380 mg/kg in mallard duck and 504 mg/kg in pheasant [55].
- **Effects on aquatic organisms:** PCP may be highly to very highly toxic to many species of fish; reported 96-hour LC50 values are 68 ug/L in chinook salmon, 52 ug/L in rainbow trout, 205 ug/L in fathead minnow, 68 ug/L in channel catfish, and 32 ug/L in bluegill sunfish [55]. Several species of fish, invertebrates, and algae have had levels of PCP that were significantly higher (up to 10,000 times) than the concentration in the surrounding waters [71]. Once absorbed by fish, pure PCP is rapidly excreted as is its metabolite, with a biological half-life of only 10 hours [71]. Biomagnification, that is the progressively higher concentration of a compound as it passes up the food chain, is not thought to be significant because of PCP's rapid break down in living organisms [70].
- **Effects on other organisms:** Cattle and other farm animals have ingested PCP by chewing and licking outdoor wood structures, or from being housed in wooden pens that were treated with PCP solutions. This has caused sickness and death in some of these animals [17].

Environmental Fate:

- **Breakdown in soil and groundwater:** PCP is moderately persistent in the soil environment, with a reported field half-life of 45 days [15]. PCP degrades most rapidly in flooded or anaerobic (airless) soils, at higher temperatures and in the presence of organic matter in the soil [12,15]. Breakdown is mainly by anaerobic biodegradation; breakdown by sunlight and hydrolysis do not appear to be significant processes [15]. It is poorly sorbed at neutral and alkaline conditions, and may be mobile in many soils [12,15]. Sorption will be slightly greater (and mobility slightly lesser) in soils with higher proportions of soil organic matter [12]. The compound has been found in groundwater in California, Oregon, and Minnesota at very low concentrations ranging from 0.06 ppt to 0.64 ppb [15].
- **Breakdown in water:** In the water environment, PCP is mainly bound to sediments and suspended particles in water [12]. PCP will dissociate by releasing a hydrogen ion and may then be more readily degraded by sunlight or microorganisms [12]. In water, biodegradation occurs, mainly at the surface, with a half-life ranging from hours to days [12]. It does not evaporate to a significant degree. PCP has been detected at very low levels in rivers and streams (0.01 to 16 ug/L), surface water systems (1.3 to 12 ug/L), and seawater (0.02 to 11 ug/L) [12].
- **Breakdown in vegetation:** PCP may be taken up by plants; lettuce grown on soil containing PCP contained low levels of PCP residues [12]. Uptake and accumulation varies according to plant species. PCP is strongly toxic to plants [9].

Physical Properties:

- **Appearance:** At room temperature, pentachlorophenol is a colorless crystalline solid with a phenolic odor [9]. Color may vary from white to dark grayish brown, depending on the purity of the compound [9].
- **Chemical Name:** pentachlorophenol [9]
- **CAS Number:** 87-86-5
- **Molecular Weight:** 266.34
- **Water Solubility:** 80 mg/L @ 20 C [9]
- **Solubility in Other Solvents:** v.s. in acetone, alcohols, ether, and benzene; s. in petroleum ether, carbon tetrachloride, and paraffins [9]
- **Melting Point:** 191 C [9]
- **Vapor Pressure:** 16,000 mPa @ 20 C [9]
- **Partition Coefficient:** 5.12 [17]

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- **Adsorption Coefficient:** 30 (at pH 7) (estimated) [15]

Exposure Guidelines:

- **ADI:** Not Available
- **MCL:** 0.001 mg/L [67]
- **RfD:** 0.03 mg/kg/day [8]
- **PEL:** 0.5 mg/m3 (8-hour) [28]
- **HA:** Not Available
- **TLV:** Not Available

Basic Manufacturer:

ISK Biosciences
5966 Heisley Road
P.O. Box 8000
Mentor, OH 44061-8000

- **Phone:** 216-357-4100
- **Emergency:** 216-357-7070

References:

References for the information in this PIP can be found in Reference List Number 6

DISCLAIMER: The information in this profile does not in any way replace or supersede the information on the pesticide product labeling or other regulatory requirements. Please refer to the pesticide product labeling.

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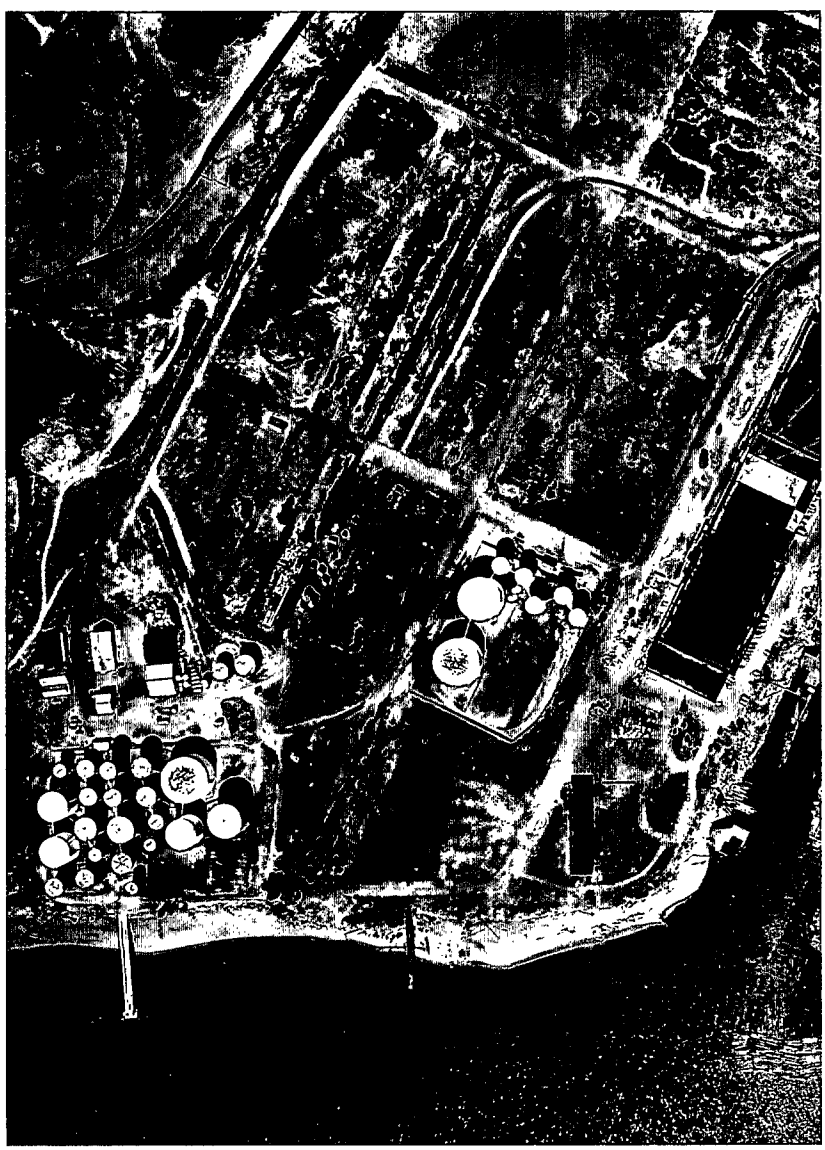

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DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

October 3, 1995

Kevin Murphy
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Re: DEQ File Summary
Time Oil Company Northwest Terminal

Dear Mr. Murphy:

Enclosed for your use is a copy of the file summary prepared by the Department of Environmental Quality (DEQ) Voluntary Cleanup Program (VCP) for the Time Oil Company Northwest Terminal in Portland, Oregon. The file summary identifies data gaps and provides recommendations and a project strategy for continued work.

After you and your consultants have had a chance to review the file summary, we would be happy to meet with you to discuss the next steps in the environmental investigation and cleanup. We will also be preparing a Voluntary Cleanup Agreement in order to continue DEQ VCP oversight through the next phases of the site investigation and cleanup.

If you have any questions or would like to schedule a meeting, please call me at (503) 229-6729. We look forward to working with you to achieve the cleanup of the Time Oil Northwest Terminal site.

Sincerely,

Karla Urbanowicz
Project Manager
Northwest Region
Voluntary Cleanup Section

KLU/klu

Enclosure: File Summary

John A. Kitzhaber
Governor

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DEQ-1

STUDIES BY LOC/Portland

DEQ 020846

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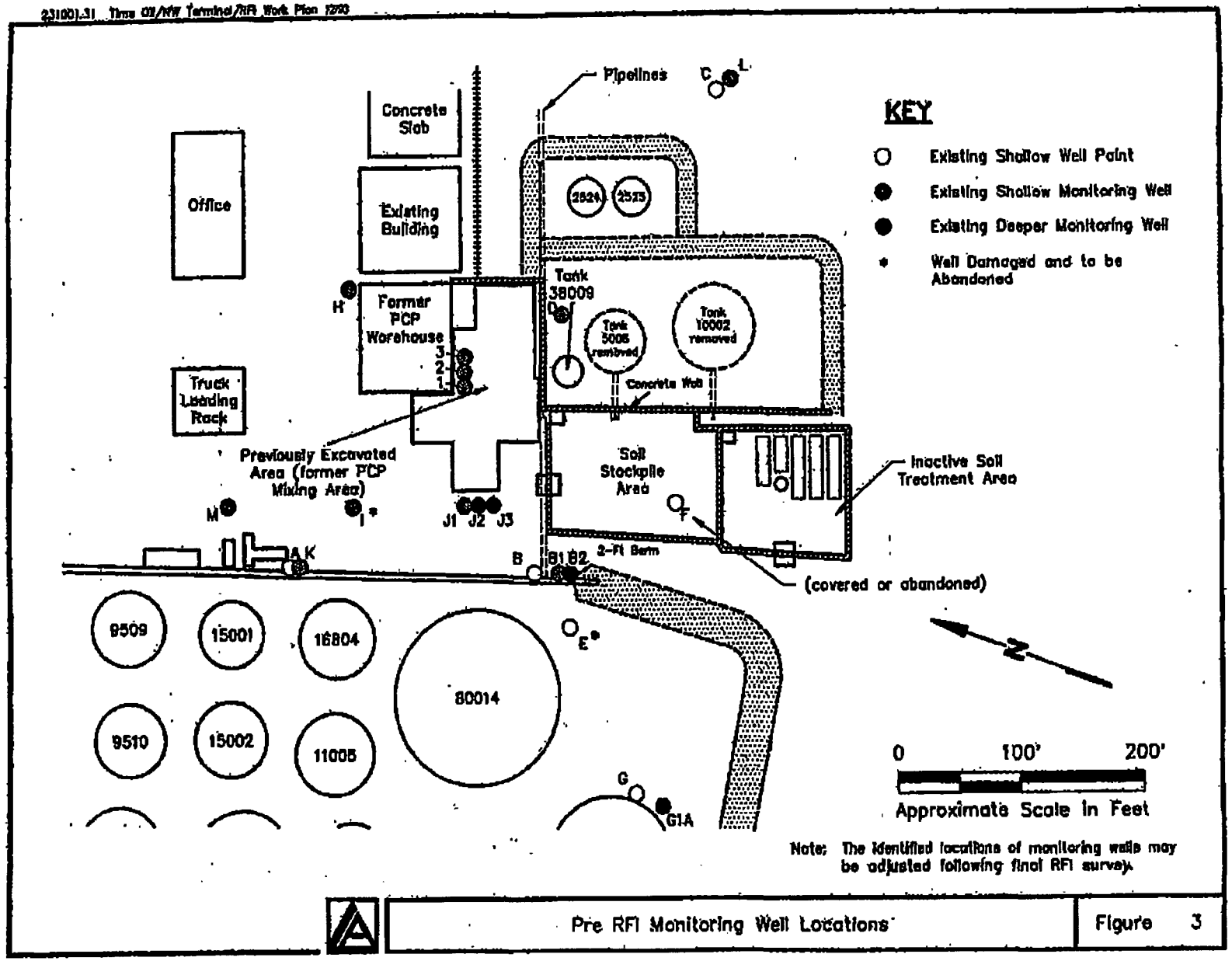
II. BACKGROUND

Time Oil Company owns and operates a petroleum product storage and handling terminal on approximately 51 acres located at 12005 North Burgard Street, Portland, Oregon, 97203 (see Figure 1). The facility is in north Portland, Multnomah County, at latitude 45 degrees 37 minutes North, longitude 122 degrees 47 minutes west. The property consists of four parcels in Section 35 of Township 2N Range 1W. Three of the parcels comprise the Northwest Terminal; one parcel is known as the Bell Terminal. The focus of this file summary is the Northwest Terminal. The area surrounding the property is the Rivergate Industrial area occupied by Port of Portland facilities and other industries. The facility has operated since 1953.

The Northwest Terminal facility includes a tank farm with approximately 21 tanks ranging from 5,000 to 80,000 gallons in size (see Figure 2). Marine vessels dock in the Willamette River adjacent to the site to load and unload product via pipelines to the tanks. A truck loading area is present northeast of the tank farm. Piping to the truck loading area is currently subsurface, although Time Oil plans to replace the system with above ground piping. Five warehouses and one office building are present. Adjacent to the southern warehouses is an area that was formerly used for pentachlorophenol (PCP) product formulation (Figure 3 - PCP Mixing Area). Adjacent to the PCP mixing area are two former tank locations (5006 and 10002). These tanks were leased by Time Oil to Crosby and Overton, formerly Pac-Mar, in the 1980s for storage of waste oil.

In the PCP mixing area, several former tanks (20001, 20002, 20003 (20,000 gallon tanks) and several smaller horizontal tanks) were leased by Time Oil to Koppers Co. for blending and storage of wood treating products. Blending and storage operations occurred from 1967 to 1982. PCP granules were heated and mixed with paraffin wax, mineral spirits, ketones and other solvents. Dry PCP granules were stored in the southwestern warehouse and product formulation and storage occurred in the large tanks south of the PCP warehouse in the PCP mixing area. At least one of the products had a specific gravity of greater than 1 ("Timbertox 20", specific gravity=1.12). The mixing area was surrounded by a concrete bulkhead about three feet high. Trucks were loaded with product on the west side of the mixing area. The tanks, piping and related equipment were removed in 1984 from the mixing area, and the bulkhead was decontaminated and removed in 1985.

About 290 cubic yards of soil contaminated with pentachlorophenol was excavated in 1985 and disposed at the Chem-Security Systems, Inc. facility in Arlington. RCRA land ban restrictions came into effect in late 1985 and further off-site disposal of PCP-contaminated soil was prohibited. Time Oil contracted with ECOVA to develop a slurry bioreactor treatment system on-site in 1988. The treatment system was installed in late 1988, and additional soil was excavated in 1989. About 3,000 cubic yards of soil was stockpiled adjacent to the excavation area, and treatment process area (see Figure 3). The treatment operation was terminated in 1989 when ECOVA was unable to achieve the target treatment goal of 0.5 ppm PCP. The soil



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LANDAU ASSOCIATES, INC.

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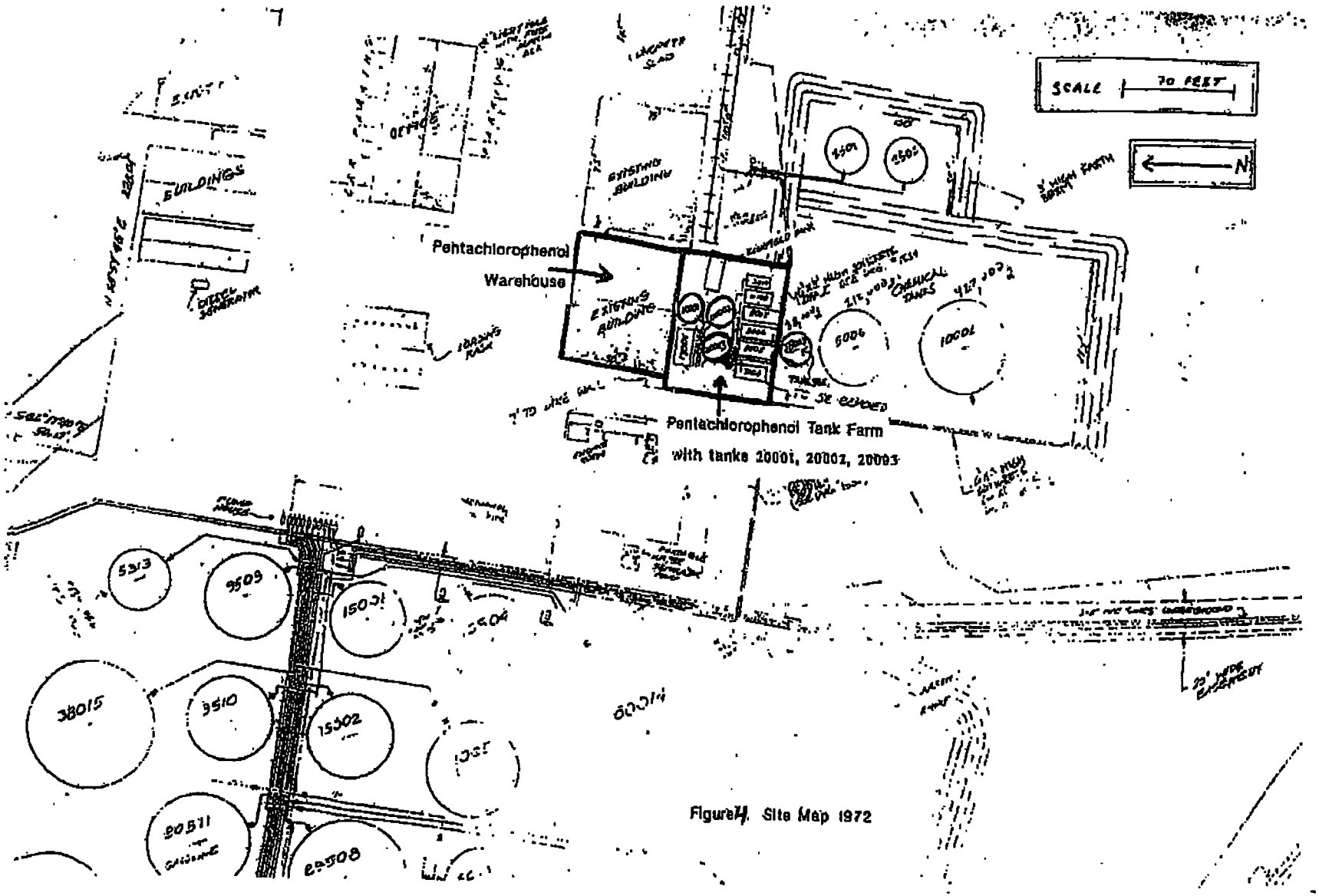

Figure 4. Site Map 1972

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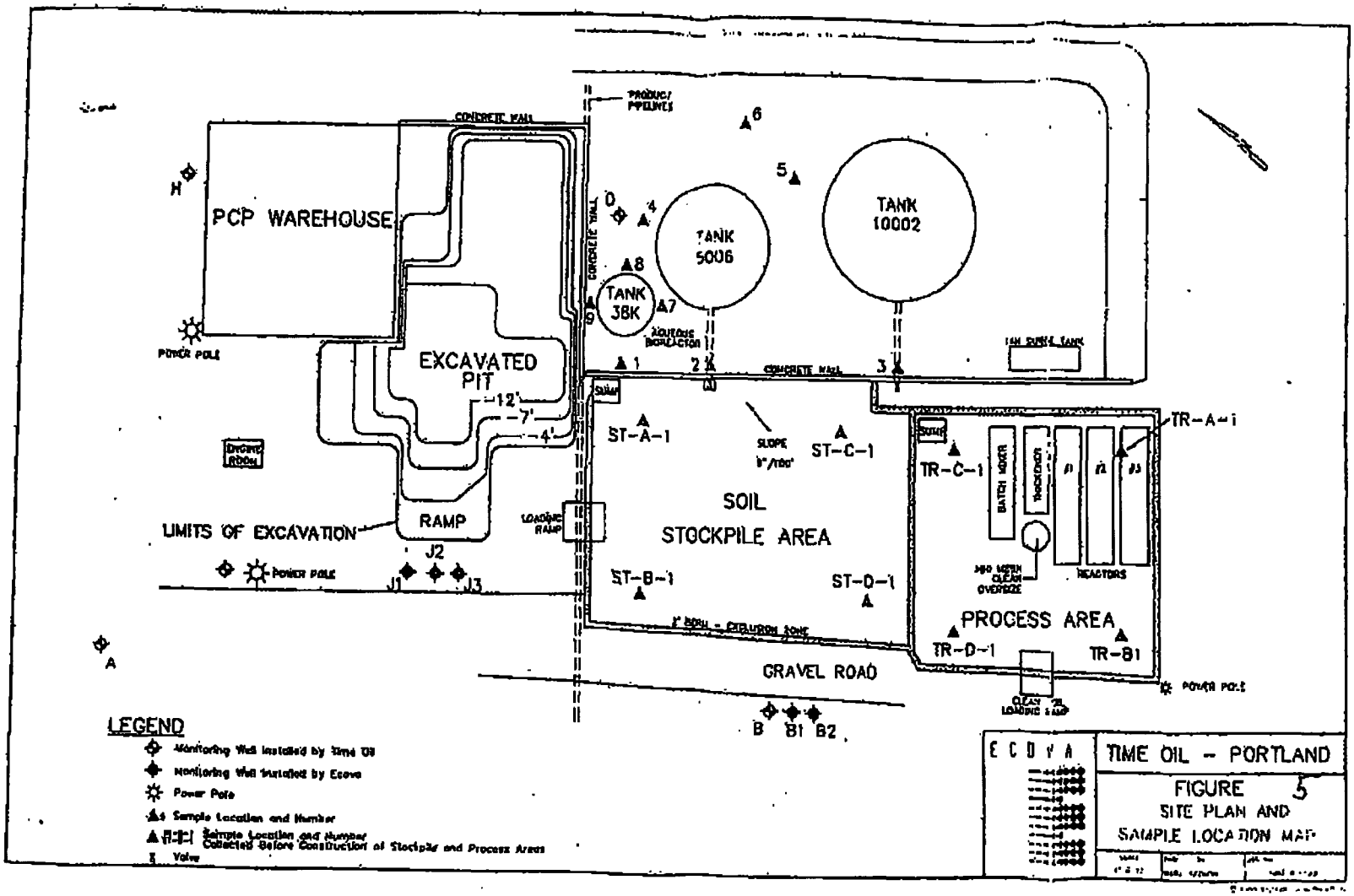

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Oregon DEQ

Environmental Cleanup Site Information (ECSI) Database
Site Summary Report - Details for Site ID 170

This report shows data entered as of May 2, 2005 at 8:42:45 AM

This report contains site details, organized into the following sections: 1) Site Photos (appears only if the site has photos); 2) General Site Information; 3) Site Characteristics; 4) Substance Contamination Information; 5) Investigative, Remedial and Administrative Actions; and 6) Site Environmental Controls (i.e., institutional or engineering controls; appears only if DEQ has applied one or more such controls to the site). A key to certain acronyms and terms used in the report appears at the bottom of the page.

Go to DEQ's Facility Profiler to see a site map as well is information on what other DEQ programs may be active at this site.

General Site Information

Site ID: 170	Site Name: Time Oil Co.- Northwest Terminal		CERCLIS No: 009597543
Address:	10350 N Time Oil Rd Portland 97203		
	County: Multnomah		Region: Northwest
Other location information:	Address changed in 1995. Former address 12005 N Burgard St, Portland 97203.		
	Investigation Status: Listed on CRL or Inventory	NPL Site: No	Orphan Site: No / Study Area: No
Property:	Twnshp/Range/Sect: 2N , 1W , 35		Tax Lots: 18, 31, 63, 38
	Latitude: 45.6161 deg.	Longitude: -122.7832 deg.	Site Size: 52 acres
Other Site Names:	Portland Harbor Sediment Study		

Site Characteristics

General Site Description:	
Site History:	
Contamination Information:	Time Oil Company owns a petroleum products storage terminal on approximately 52 acres located in the Rivergate area of North Portland. Terminal operations began in the 1940s. Koppers Co. leased tanks from Time Oil for PCP product formulation and storage from 1967 to 1982. Crosby and Overton leased tanks from Time Oil in the 1980s for waste oil storage. Soil and groundwater contamination resulted from petroleum storage and handling and pentachlorophenol blending operations. Discarded drums and PCP materials were found in an area in the undeveloped eastern portion of the site in 1996.
Manner and Time of Release:	Past handling practices or spills in the former PCP mixing area and waste oil tank area; past practices in the tank farm, and spills in 1985, 1986, 1990, and 1994.
Hazardous Substances/Waste Types:	Pentachlorophenol (PCP), PCBs, petroleum products, carcinogenic PAHs including benzo(a)pyrene and chrysene.
Pathways:	(10/4/95 KLU/VCS) The 52-acre site is located in the Rivergate Industrial Area along the east bank of the Willamette River. The surface soils are sandy. The site is generally flat up to the embankment along the river. The site is within the 100-year floodplain for the Willamette River. The water table is less than 20 feet below the ground surface. Groundwater generally flows toward the river.
Environmental/Health Threats:	Soil and groundwater contamination. Potential for surface water impacts.
Status of Investigative or Remedial Action:	(5/92 MHK/VCS) Time Oil signed a Voluntary Cleanup Agreement with DEQ 7/91. A site visit and detailed report were completed 4/92. It was determined that stockpiled

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BZTO104(e)015464

contaminated soil on-site was a listed hazardous waste, and not stored in compliance with RCRA regulations. Proper storage was expected to include site investigation and cleanup requirements. The project was referred to the RCRA program for resolution of those issues. (7/30/92 MHK) Recommended for listing on the CRL, medium priority. Additional information was needed about groundwater use in the area to complete compilation of PA equivalent data. Further action was defered pending completion of RCRA review. (3/31/93 Monica Rolluda/EPA) Based on a review of files and other pertinent information, EPA did not anticipate further investigation under the Federal Superfund Program. (7/10/95 KLU/VCS) Time Oil project reactivated in DEQ Voluntary Cleanup Program. (10/4/95 KLU) VCP file summary completed - identified issues and areas of concern for a Remedial Investigation/Feasibility Study, including the soil stockpile, former PCP mixing area, former waste oil tank area, the tank farm area and groundwater. (4/24/97 KLU/VCP) Discarded drums and soil stockpile containing PCP materials were found in the eastern undeveloped portion of the property in the spring of 1996. A removal of the drums and consolidation of the soil into the larger stockpile were conducted in the fall of 1996. The Remedial Investigation was implemented beginning in fall 1996. Phase I included soil stockpile characterization. Phase II included soil and groundwater characterizations. A management plan for the large soil stockpiles was developed and implemented in 1996. (7/24/98 KLU/VCP) Phase II of the removal action was conducted from September 15 - October 1, 1997. About 285 cubic yards of soil containing PCP were removed from the northeastern area of the site and consolidated into the large stockpile. About 25 cubic yards of debris were segregated and decontaminated for off-site disposal. PCP-levels in soil remaining after the removal were less than 0.140 ppm. Soil in a large mound in the northeastern area was sampled, and PCP levels were generally non-detect. Quarterly groundwater sampling was conduted for monitoring wells installed in the Phase II RI area. PCP at up to 16.5 mg/L in deeper groundwater has been detected west of the former mixing area. (4/19/00 TER/VCP) Phase II RI submitted. Interim action for groundwater contamination containment was installed. (2/19/02 TER/VCP) A 5,000-gallon diesel UST at the former Bell Terminal was decommissioned in September 2001. 43 cubic yards of petroleum-contaminated soil were disposed of off-site and a No Further Action (NFA) determination was issued for the UST on January 17, 2002. (11/26/02 TER/VCP) 1,732 tons of petroleum-contaminated soil were removed from the East Property portion of the facility. The cleanup to address PAH contamination in soil was approved through the Numerical Soil Cleanup rules and a Easement and Equitable Servitude recorded to ensure the East Property remains industrial use. DEQ issued a conditional no further action determination for the East Property on November 24, 2003. The Phase I Stockpile of PCP-contaminated soil and additional contaminated soil excavated from the Phase II Mixing Area was transported offsite for incineration at a facility in Alberta, Canada. Phase III Remedial Investigation continues on the remainder of the facility including the Main Tank Farm and Bell Terminal.

Data Sources: 1) NWR files 2) CERCLIS file 3) VCS project files; Inspection reports; Correspondence FROM owner and/or operator; Lab results; 12/91 Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co., by ECOVA Corp.; 6/89 Remedial Activities Report Time Oil Project by Crosby and Overton Inc.; January 1998 Technical Memorandum Interim Removal Action; Phase I Remedial Investigation, April 1997; Phase II Remedial Investigation, February 2001; Phase I Feasibility Study Soil Stockpile, September 2001; Report of UST Removal Site Assessment, October 2001.

Substance Contamination Information

Substance	Media Contaminated	Concentration Level	Date Recorded
BENZO(a)PYRENE	Soil	9.4 mg/kg	3/1/1989
CHRYSENE	Soil	16 mg/kg	3/1/1989
LEAD	Soil	200 mg/kg	3/1/1989
LEAD	Soil	< 0.05 mg/L	4/20/1989
NAPHTHALENE	Soil	100 mg/kg	5/2/1984
PCB 1221	Soil	22 mg/kg	4/20/1989
PENTACHLOROPHENOL	Groundwater	60 mg/L	11/29/1988
PENTACHLOROPHENOL	Soil	116,000 mg/kg	11/1/1985
PETROLEUM HYDROCARBONS	Soil	16,430 mg/kg	5/1/1994

Investigative, Remedial and Administrative Actions

LWG00317

Action	Start Date	Compl. Date	Resp. Staff	Lead Pgm
Site added to CERCLIS	01/01/1983	01/01/1983		
EPA PA1/SI1	02/20/1985	07/31/1985		
No Further Remedial Action Planned under Federal program	07/31/1985	07/31/1985		
Site added to database	03/21/1988	03/21/1988	Michael Zollitsch	SAS
Responsible party notified re 11/88 Inventory listing	11/30/1988	11/30/1988		SAS
Letter Agreement	07/10/1991	07/10/1991	Karla Urbanowicz	VCS
NEGOTIATIONS	07/19/1991	05/27/1992	Michael Kortenhof	VCS
SITE EVALUATION	07/29/1992	07/29/1992	Michael Kortenhof	VCS
Listing Review completed	07/30/1992	07/30/1992	Michael Kortenhof	VCS
Proposal for Confirmed Release List recommended	07/30/1992	07/30/1992	Michael Kortenhof	VCS
EPA Site Inspection Prioritization	03/19/1993	03/19/1993		
No Further Remedial Action Planned under Federal program	03/31/1993	03/31/1993		
PRELIMINARY ASSESSMENT EQUIVALENT	08/30/1993	08/30/1993	Karla Urbanowicz	VCS
VCS Waiting List	08/19/1994	05/22/1995	Eric Blischke	VCS
REMEDIAL INVESTIGATION (Primary Action)	05/23/1995		Thomas Roick	VCS
Proposal for Inventory recommended	10/05/1995	10/05/1995	Karla Urbanowicz	VCS
Facility proposed for Confirmed Release List	10/20/1995	10/20/1995	Karla Urbanowicz	VCS
Facility proposed for Inventory	10/20/1995	10/20/1995	Karla Urbanowicz	VCS
Facility placed on Confirmed Release List	04/17/1996	04/17/1996	Kim Van Patten	VCS
Facility placed on Inventory	04/17/1996	04/17/1996	Kim Van Patten	VCS
REMOVAL	09/16/1996	10/23/1996	Karla Urbanowicz	VCS
REMOVAL	09/16/1997	10/01/1997	Karla Urbanowicz	VCS
REMOVAL	03/10/2000		Thomas Roick	VCS
No Further Action (Conditional)	08/31/2001	11/24/2003	Thomas Roick	VCS
FEASIBILITY STUDY	09/04/2001	10/26/2001	Thomas Roick	VCS
Partial No Further Action	01/17/2002	01/17/2002	Thomas Roick	VCS

Site Environmental Controls

Control Description	Begin Date	End Date	Last Reviewed By	Last Review Date
Easement Equitable Servitude	10/24/2003		Tom Roick	

Comments: PAH contamination on the East Property is above residential but below industrial DEQ Numerical Soil Cleanup Levels. The easement restricts property use to industrial.

Key to certain acronyms and terms in this report:
CERCLIS No.: The U.S. EPA's Hazardous Waste Site identification number, shown only if EPA has been involved at the site.
Region: DEQ divides the state into three regions, Eastern, Northwest, and Western; the regional office shown is responsible for site investigation/cleanup.
NPL Site: Is this site on EPA's National Priority List (i.e., a federal Superfund site)? (Y/N).
Orphan Site: Has DEQ's Orphan Program been active at this site? (Y/N). The Orphan Program uses state funds to clean up high-priority sites where owners and operators responsible for the contamination are absent, or are unable or unwilling to use their own resources for cleanup.
Study Area: Is this site a Study Area? (Y/N). Study Areas are groupings of individual ECSI sites that may be contributing to a larger, area-wide problem. ECSI assigns unique Site ID numbers to both individual sites and to Study Areas.

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Pathways: A description of human or environmental resources that site contamination could affect.
Lead Pgm: This column refers to the Cleanup Program affiliation of the DEQ employee responsible for the action shown. SAS or SAP = Site Assessment; VCS or VCP = Voluntary Cleanup; ICP = Independent Cleanup; SRS or SRP = Site Response (enforcement cleanup); ORP = Orphan Program.

You may be able to obtain more information about this site by contacting Thomas Roick at (503) 229-5502 or via email at roick.tom@deq.state.or.us. If this does not work, you may contact Gil Wistar at (503) 229-5512, or via email at wistar.gil@deq.state.or.us or contact the Northwest regional office.

DEQ Online is the official web site for the Oregon Department of Environmental Quality.

LWG00319

See file for additional info

WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO

TIME OIL CO.

PHONE (206) 285-2400
FAX (206) 283-9036

2737 WEST COMMODORE WAY
P.O. BOX 24447

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

March 31, 1999

Mr. Steve Fortuna
Oregon Department of Environmental Quality
Northwest Region
2020 Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: Submittal of Responses to Site Assessment Information Request
Time Oil Co. Northwest Terminal
Portland, Oregon 97203

Dear Mr. Fortuna,

Per your letter dated March 5, 1999, and our correspondence dated March 12, 1999, please find enclosed herewith Time Oil Co.'s responses to the site assessment information request for the above referenced property. For ease of reference our responses are organized in an identical manner as the information request

We trust that this information satisfies your needs. Please contact us at (206) 286-5443 if you have any questions or require any additional information.

Sincerely,
Time Oil Co.

Kevin M. Murphy
Sr. Environmental Specialist – Northwest Terminal

Encl: Site Assessment Information Request Response – Northwest Terminal
Site Maps – Northwest Terminal

LWG00320

MAR-31-1999 12:33 ENVIRO SERVICES

DEQ 027942

BZTO104(e)015468

Response to Site Assessment Information Request
Time Oil Co. Northwest Terminal
10350 North Time Oil Road, Portland, Oregon

1. **Background Information:**

a. *Facility name and address:*
Time Oil Co. Northwest Terminal
10350 North Time Oil Road
Portland, Oregon 97203

b. *Facility owner and operator:*
Time Oil Co. H. R. Holliday, President
2737 W. Commodore Way
Seattle, WA 98199-1233
(206) 285-2400.

c. *Property owner:*
Northwest Terminal Co. and Bell Oil Co., wholly owned subsidiaries of Time Oil Co,

d. *Current use of the site:*
Bulk petroleum storage and marine terminal. Operations began in Approximately 1943.

e. *Past use of site:*
Site was owned by US Government and based on aerial photos was used as a storage yard during the construction of Liberty Ships during WWII.

f. *Size of site:*
The site is approximately 52 acres in size. The tax lot numbers are:
97135-0180, 97135-0310, 97135-0380, 97135-0380, 97135-0630,

g. *Site security:*
The site is completely surrounded by a chain-link fence. The entry is gated.

h. *Surrounding land uses.*
The site is surrounded by industrial properties: a former edible oils refinery to the south, warehouses and scrap metal storage to the south east and east, a railroad right-of-way and road to the north, a trucking company and BPA power lines to the northwest, and the Willamette river to the west.

2. **SITE MAP: General site maps are provided as Enclosure 1.**

Major site features are labeled. A complete listing of monitoring wells can be found in the reports referenced at the end of this document.

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DEQ 027943

BZTO104(e)015469

3. **CHEMICAL/WASTE HANDLING INFORMATION:**

a. Fuel products stored in the site's bulk storage tanks include:
** = Currently being stored

1979	**Gasoline	
	Diesel	
	Stove Oil	
12/80	Crude Fatty Acid	(1 month)
	Methanol	
	Lignon Liquor	
3/82	Alcohol	6/82
	Solution 32	6/82
5/86	**Ethanol	
1/89	Vanillin Black Liquor	
4/92	Vacuum Gas Oil	3/93
5/93	Naphtha	
2/94	Reformate	6/94
	(blended with butane to make unleaded regular)	
12/94	Additive	
12/95	Jet	(1 month)
6/96	Crude Fatty Acid	
10/96	**AvGas	
6/98	Transmix	

1967 to 84 stored on site. Several pentachlorophenol containing mixtures were manufactured and See Site Characteristics Report dated 8/93.

b. *Waste products generated and stored at the site* include:
Gasoline and diesel-contaminated wastewater, absorbent materials and tank sludge; spent sandblasting sand; pentachlorophenol-contaminated soil and debris, and; ethyl and methyl alcohol-contaminated wastewater.

c. *The approximate volumes of chemicals used annually* include:
100 pounds of soda ash; 15 gallons of hydrochloric acid, and; 10 gallons of silicone antifoam (for our wastewater treatment system). The approximate volumes of chemicals stored annually, include: 500 pounds of soda ash; 30 gallons of hydrochloric acid; 40 gallons of silicone antifoam; 110 gallons of sulfuric acid; 110 gallons of sodium hydroxide, and; 110 gallons of hydrogen peroxide.

The volumes of waste generated annually are a function of product changeovers, tank(s) repairs, (which determine tank cleanings) and rainfall volume. These fluctuating demands can cause the hazardous waste generating status to range from Conditionally Exempt Small Quantity Generator (<220 pounds/month) to Large Quantity Generator (> 2,200 pounds/month), annually.

d. *On site waste treatment:*
The wastewater treatment system at the Northwest terminal consists of a collection and conveyance system (trenches and three underground surge tanks) which discharges to a waste

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MAR-31-1999 12:34 ENVIRO SERVICES 206 285 7833 P.04/06

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averaging tank (settling and separation). The averaging tank discharges to a biotreatment feed tank which discharges to a Sequencing Batch Reactor activated sludge system which discharges to the Portland sanitary sewer system.

Stormwater drainage from two non-industrial areas of the terminal are discharged through the NPDES outfall. The stormwater treatment system at the Northwest terminal consists of a collection and conveyance system (catch basins w/sediment filtration and pipelines) which discharges to the Willamette River.

e. *Chemical and waste storage areas:*
The chemical storage areas at the Northwest terminal are containment pallets and tanks in the wastewater treatment building and a portion of the warehouse which contains the hazardous waste storage area.

The waste storage areas at the Northwest terminal are a dedicated portion of a warehouse (10 drum storage w/containment); a 126,000 gallon waste averaging tank and a 210,000 gallon biotreatment feed tank, in the tank farm. These areas are in addition to the pentachlorophenol-contaminated soil storage.

The chemical and/or "waste disposal" areas are the historical contaminated areas as documented in the referenced reports.

f. *Waste Disposal*
Since 1994, the Northwest terminal has disposed of approximately:

- 385 gallons of liquid w/benzene (gasoline) via incineration by Eltex Chemical of Houston, TX;
- 1,835 of flammable tank sludge via incineration by Eltex;
- 460 pounds of flammable tank sludge incineration by Heritage Environmental of Lemont, IL;
- 51,030 pounds of pentachlorophenol contaminated soil via incineration by Laidlaw Environmental of Coffeyville, KS;
- 300 of flammable Lab Pack liquids via recycling by Philip Environmental of Renton, WA;
- 120 of caustic soda via neutralization by Philip, and;
- 600 pounds of oily flammable waste by Philip.
- PCP contaminated soils disposal are documented in the referenced Site Characteristics Report.

g. *Spills or Releases:*
1967 - 1982 Releases from the pentachlorophenol mixing process are documented in the referenced reports. Source removal completed in 1985, Contaminated soil take to Arlington Landfill for disposal. In 1989, additional soil was excavated and is now contained on site pending remediation. RI/FS is in progress.
1975 Release of diesel fuel from tank 29005 during a vessel transfer operation. Immediate response recovered significant product volume. Soil removal and disposal is documented in a report provided to DEQ.
May 1990 Release of approximately 1,000 gallons of ethanol from a pipeline. Source removal, soil and groundwater remediation completed 1992.

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MAR-31-1999 12:34 ENVIRO SERVICES 206 285 7833 P.05/06

May 1994 Release of approximately 1,200 gallons of premium unleaded gasoline from a pipeline. Investigation performed, product removal implemented and monitoring continues.

h Prior chemical use

Time Oil Co. has no information regarding the use or release of chemical substances prior to Time Oil Co.'s operations.

4. PERMIT INFORMATION:

a. Permit Information

The Northwest terminal has three (3) wastewater discharge permits as follows:

- Industrial Wastewater Discharge Permit No. 400-121 with the City of Portland (POTW) for discharge to the sanitary sewer;
- NPDES Storm Water Discharge Permit, File No. 109186, ORR80-2182, and;
- General Permit, NPDES Storm Water Discharge Permit No 1200C, File No. 109737, ORR10-3162, for proposed construction activities.

5. SAMPLING/CLEANUP/INVESTIGATIVE INFORMATION:

a & b Sampling, Cleanup and Investigation Information

Environmental investigation, remediation, and groundwater monitoring events, reports and cleanup activities are extensively documented in the DEQ NW Region VCP files. Our project manager at the Northwest Region is Ms. Karla Urbanowicz. Please contact Kevin Murphy at (206) 286-6443 if you have questions about any of the reports or documents for this site.

LWG00324

Oregon DEQ

Environmental Cleanup Site Information Database
Site Summary Report - Details for Site ID 170

This report shows data entered as of January 25, 2003 at 4:45:15 PM

See the bottom of this page for a key to certain acronyms and terms used in the report below

For more information on what is occuring at this site see DEQ's Facility Profiler.

Site Information

Site ID: 170	Site Name: Time Oil Co.- Northwest Terminal		CERCLIS No: 009597543
	Address: 10350 N Time Oil Rd Portland 97203		
	County: Multnomah		Region: Northwest
	Investigation Status: Listed on CRL or Inventory	NPL Site: No	Orphan Site: No / Study Area: No
Property:	Twnshp/Range/Sect: 2N , 1W , 35		Tax Lots: 18, 31, 63, 38
	Latitude: 45 deg. 36 ' 56"	Longitude: - 122 deg. 47 ' 0"	Site Size: 52 acres
Other Site Names:			

Operations:

Name: Time Oil Co.- Northwest Terminal

Comments: Petroleum product bulk storage and handling terminal;tank farm

Years of Operation:

SIC Code: 5171 — Operating Status: Active

Contamination Information

Hazardous Substances/Waste Types:	Pentachlorophenol (PCP), PCBs, petroleum products, carcinogenic PAHs including benzo(a)pyrene and chrysene.
Manner and Time of Release:	Past handling practices or spills in the former PCP mixing area and waste oil tank area; past practices in the tank farm, and spills in 1985, 1986, 1990, and 1994.
Contamination Information:	Time Oil Company owns and operates a petroleum products storage terminal on approximately 52 acres located in the Rivergate area of North Portland. Terminal operations began in the 1940s. Koppers Co. leased tanks from Time Oil for PCP product formulation and storage from 1967 to 1982. Crosby and Overton leased tanks from Time Oil in the 1980s for waste oil storage. A federal PA was performed in 1985. Soil contamination resulted from waste oil handling and pentachlorophenol blending operations. The site was referred to the State for further action. (10/4/95 KLU/VCS) About 290 cubic yards of PCP contaminated soil were removed from the site in 1985 for off-site disposal. RCRA land-ban restrictions for F027 waste prohibited further off-site disposal after 1985. Time Oil constructed an on-site slurry bioreactor in 1988 to treat contaminated soil. 3,000 cubic yards of PCP-contaminated soil were

DEQ 020882

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excavated and stockpiled on-site in 1989. The system was not able to reach the target treatment level of 0.5 ppm PCP, and treatment operations were terminated in 1989. The soil stockpile remains on-site. (4/24/97 KLU/VCP) Discarded drums and a small stockpile of PCP materials were found in an area in the undeveloped eastern portion of the site in 1996. A removal of drums and consolidation of soil into the larger soil stockpile were conducted in fall 1996. Phase I and II of a Remedial Investigation (RI) were conducted in fall and winter of 1996-97.

Pathways: (10/4/95 KLU/VCS) The 52-acre site is located in the Rivergate Industrial Area along the east bank of the Willamette River. The surface soils are sandy. The site is generally flat up to the embankment along the river. The site is within the 100-year floodplain for the Willamette River. The water table is less than 20 feet below the ground surface. Groundwater generally flows toward the river.

Environmental/Health Threats: Soil and groundwater contamination. Potential for surface water impacts.

Status of Investigative or Remedial Action: (5/92 MHK/VCS) Time Oil signed a Voluntary Cleanup Agreement with DEQ 7/91. A site visit and detailed report were completed 4/92. It was determined that stockpiled contaminated soil on-site was a listed hazardous waste, and not stored in compliance with RCRA regulations. Proper storage is expected to include site investigation and cleanup requirements. The project was referred to the RCRA program for resolution of those issues. (7/30/92 MHK) Recommended for listing on the CRL, medium priority. Additional information needed about groundwater use in the area, to complete compilation of PA equivalent data. Defer further action pending completion of RCRA review. (3/31/93 Monica Rolluda/EPA) Based on a review of files and other pertinent information, EPA does not anticipate further investigation under the Federal Superfund Program. Time Oil is encouraged to continue working with DEQ. (7/10/95 KLU/VCS) Time Oil project reactivated in Voluntary Cleanup Program. (10/4/95 KLU) VCP file summary completed - identifies issues and areas of concern for a Remedial Investigation/Feasibility Study, including the soil stockpile, former PCP mixing area, former waste oil tank area, the tank farm area, and groundwater. (1/3/96 KLU/VCS) Time Oil & DEQ met to discuss treatability studies being conducted and focus of additional site investigation work on 12/14/95. (4/24/97 KLU/VCP) Discarded drums and soil stockpile containing PCP materials were found in the eastern undeveloped portion of the property in the spring of 1996. A removal of the drums and consolidation of the soil into the larger stockpile were conducted in the fall of 1996. A report on the removal was submitted to DEQ. The Remedial Investigation (RI) was implemented beginning in fall 1996. Phase I included soil stockpile characterization. Phase II included soil and groundwater characterizations. A management plan for the large soil stockpiles was developed and implemented in 1996. (7/24/98 KLU/VCP) Phase II of the removal action was conducted from September 15 - October 1, 1997. About 285 cubic yards of soil containing PCP were removed from the northeastern area of the site and consolidated into the large stockpile. About 25 cubic yards of debris were segregated and decontaminated for off-site disposal. PCP levels in soil remaining after the removal were less than 0.140 ppm. Soil in a large mound in the northeastern area was sampled, and PCP levels were generally non-detect. Quarterly groundwater sampling of monitoring wells installed in the Phase II RI is occurring. PCP at up to 16.5 mg/L in deeper groundwater has been detected west of the former mixing area. (4/19/00 TER/VCP) Phase II RI submitted. Interim action for groundwater contamination containment is being installed. (2/19/02 TER/VCP) A 5,000-gallon diesel UST at the former Bell Terminal was decommissioned in September 2001. 43 cubic

LWG00326

DEQ 020883

yards of petroleum-contaminated soil were disposed of off-site and a No Further Action (NFA) determination was issued for the UST on January 17, 2002.

Data Sources: 1) NWR files 2) CERCLIS file 3) VCS project files; Inspection reports; Correspondence FROM owner and/or operator; Lab results; 12/91 Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co., by ECOVA Corp.; 6/89 Remedial Activities Report Time Oil Project by Crosby and Overton Inc.; January 1998 Technical Memorandum Interim Removal Action; Phase I Remedial Investigation, April 1997; Phase II Remedial Investigation, February 2001; Phase I Feasibility Study Soil Stockpile, September 2001; Report of UST Removal Site Assessment, October 2001.

Substance Contamination Information

Substance	Media Contaminated	Concentration Level	Date Recorded	Lab Data	Agency Observation	Owner Operator Admission
BENZO(a)PYRENE	Soil	9.4 mg/kg	3/1/1989	Yes	No	No
CHRYSENE	Soil	16 mg/kg	3/1/1989	Yes	No	No
LEAD	Soil	200 mg/kg	3/1/1989	Yes	No	No
LEAD	Soil	< 0.05 mg/L	4/20/1989	Yes	No	No
NAPHTHALENE	Soil	100 mg/kg	5/2/1984	Yes	No	No
PCB 1221	Soil	22 mg/kg	4/20/1989	Yes	No	No
PENTACHLOROPHENOL	Groundwater	60 mg/L	11/29/1988	Yes	No	No
PENTACHLOROPHENOL	Soil	116,000 mg/kg	11/1/1985	Yes	No	No
PETROLEUM HYDROCARBONS	Soil	16,430 mg/kg	5/1/1994	Yes	No	No

Investigative, Remedial and Administrative Actions

Action	Start Date	Compl Date	Resp. Staff	Agency Code	Region	Lead Pgm
Site added to CERCLIS	1/1/1983	1/1/1983		EPA		
EPA PA1/SI1	2/20/1985	7/31/1985		EPA		
No Further Remedial Action Planned under Federal program	7/31/1985	7/31/1985		EPA		
Site added to database	3/21/1988	3/21/1988	Michael Zollitsch	DEQ		SAS
Responsible party notified re 11/88 inventory listing	11/30/1988	11/30/1988		DEQ		SAS
Letter Agreement	7/10/1991	7/10/1991	Karla Urbanowicz	DEQ	NWR	VCS
NEGOTIATIONS	7/19/1991	5/27/1992	Michael Kortenhof	DEQ		VCS
SITE EVALUATION	7/29/1992	7/29/1992	Michael Kortenhof	DEQ		VCS
Listing Review completed	7/30/1992	7/30/1992	Michael Kortenhof	DEQ		VCS
Proposal for Confirmed Release List recommended	7/30/1992	7/30/1992	Michael Kortenhof	DEQ		VCS
EPA Site Inspection Prioritization	3/19/1993	3/19/1993		EPA		
No Further Remedial Action Planned under Federal program	3/31/1993	3/31/1993		EPA		

LWG00327

DEQ 020884

PRELIMINARY ASSESSMENT EQUIVALENT	8/30/1993	8/30/1993	Karla Urbanowicz	DEQ	NWR	VCS
VCS Waiting List	8/19/1994	5/22/1995	Eric Blischke	DEQ	NWR	VCS
REMEDIAL INVESTIGATION	5/23/1995		Thomas Rolck	DEQ	NWR	VCS
Proposal for Inventory recommended	10/5/1995	10/5/1995	Karla Urbanowicz	DEQ	NWR	VCS
Facility proposed for Confirmed Release List	10/20/1995	10/20/1995	Karla Urbanowicz	DEQ	NWR	VCS
Facility proposed for Inventory	10/20/1995	10/20/1995	Karla Urbanowicz	DEQ	NWR	VCS
Facility placed on Confirmed Release List	4/17/1996	4/17/1996	Kim Van Patten	DEQ	NWR	VCS
Facility placed on Inventory	4/17/1996	4/17/1996	Kim Van Patten	DEQ	NWR	VCS
REMEDIAL INVESTIGATION	6/1/1996		Thomas Rolck	DEQ	NWR	VCS
REMOVAL	9/16/1996	10/23/1996	Karla Urbanowicz	DEQ	NWR	VCS
REMOVAL	9/16/1997	10/1/1997	Karla Urbanowicz	DEQ	NWR	VCS
REMOVAL	3/10/2000		Thomas Rolck	DEQ	NWR	VCS
REMEDIAL INVESTIGATION	6/18/2001		Thomas Rolck	DEQ	NWR	VCS
FEASIBILITY STUDY	9/4/2001	10/26/2001	Thomas Rolck	DEQ	NWR	VCS
Partial No Further Action	1/17/2002	1/17/2002	Thomas Rolck	DEQ	NWR	VCS
REMEDIAL INVESTIGATION	6/18/2002		Thomas Rolck	DEQ	NWR	VCS

Key to certain acronyms and terms in this report:
CERCLIS No.: The U.S. EPA's Hazardous Waste Site identification number, shown only if EPA has been involved at the site.
Region: DEQ divides the state into three regions (E, NW, and W); the regional office shown is responsible for site investigation/cleanup.
NPL Site: Is the site on EPA's Superfund List? (Y/N).
Orphan Site: Has DEQ's Orphan Program been active at this site? (Y/N). The Orphan Program cleans up high-priority sites where owners and operators responsible for the contamination are absent, or are unwilling or unable to use their own resources for cleanup.
Study Area: Is this site a Study Area? (Y/N). ECSI assigns unique Site ID numbers to both individual sites and to Study Areas, which are groupings of individual ECSI sites that may be contributing to a larger, area-wide problem.
SIC Code: The Standard Industrial Classification code assigned to the operation described in this part of the report.
Pathways: A description of human or environmental resources that site contamination could affect.
Lead Pgm: This column refers to the Cleanup Program affiliation of the DEQ employee responsible for the action shown. SAS = Site Assessment; VCS = Voluntary Cleanup; SRS = Site Response (enforcement cleanup).

For more information about this page please contact Gil Wistar at (503) 229-6512 or via email at

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DEQ 020886

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

July 2, 2002

Prepared for

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DEQ 020790

LWG00330

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). Detected 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 ($\mu g/kg$). 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 amendment letter (Time Oil Co. 2002).

Time Oil Co. (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 amendment 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 3). The terminal covers approximately 52 acres

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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 2); 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 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 (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 (Landau

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Associates 2001a), are shown on Figure 2. 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 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 2001a). A summary of a reduced set of the analytical soil PCP data from the historical events, containing data representing soil concentrations remaining within the former PCP mixing area after excavation, is included in Appendix A, Table A-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 Table A-2.

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 A-3 presents the PCP soil results for the Phase II supplemental locations and Table A-4 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 detected 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 17 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

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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. Time Oil is planning a conservative removal action to avoid the need for future soil removal in the former PCP mixing area.

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Removal Actions Completion Report
Phases I/II RI Areas
Time Oil Northwest Terminal
Portland, Oregon

November 10, 2003

Prepared for

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LWG00335

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

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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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Second Quarter 2001 Groundwater Report
Time Oil Northwest Terminal
Portland, Oregon

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Prepared for

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DEQ 020610

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1.0 INTRODUCTION

This report provides the results of the second quarter 2001 groundwater sampling event, conducted as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal in June 2001. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report. The second quarter 2001 event was conducted during implementation of a groundwater interim action in the lower water-bearing zone at recovery well RW-2. The status and performance summary of the interim action during this period is summarized in the *Groundwater Interim Action Status Report, Second Quarter 2001* (Landau Associates 2001a).

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. (Time Oil). The facility is located in the industrialized Rivergate area of north Portland, Oregon (Figure 1). Quarterly groundwater sampling has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of the groundwater monitoring locations at the terminal are shown on Figure 2.

Modifications to the groundwater quality sampling and analysis requirements (Landau Associates 1998a, 1999a, 2000a,b, 2001b,c) were approved by the Oregon Department of Environmental Quality (DEQ) in letters dated May 15, 1998, May 18, 2000, February 21, 2001 (DEQ 1998, 2000a, 2001a), by verbal authorization to Rebekah Brooks of Landau Associates on February 12, 1999 (Landau Associates 1999b), and by e-mail on August 15, 2000 and May 30, 2001 (DEQ 2000b, 2001b). Beginning with this event, modifications to the sampling program included the reduction of the frequency of total petroleum hydrocarbons (TPH) analyses 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 analyses were eliminated in the following wells: upper zone wells D, L, LW-5S, LW-101S through -104S, and lower zone well LW-3D. Previous modifications were documented in the first quarter 2001 groundwater report (Landau Associates 2001d), and will be reiterated in the first quarter report each year hereafter.

Groundwater level measurements conducted at the terminal for the second quarter 2001 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-1. Analyses conducted during this sampling event for each sampling location are summarized in Table A-2. Groundwater quality data for the second quarter 2001 event are provided in Tables A-3 and A-4 for the shallow and deep wells, respectively. The data validation reports for these data are provided in Appendix B. Laboratory data packages are provided in Appendix C.

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2.0 SECOND QUARTER 2001 GROUNDWATER SAMPLING EVENT

The second quarter 2001 groundwater sampling event was conducted from June 4 through June 6, 2001. 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, as well as the monitoring wells that are sampled as part of the groundwater interim action (LW-13S, LW-14D, LW-17D and LW-18D). 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.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the second quarter 2001 event on June 4, 2001. The presence of product was also checked in each well; no product was observed. 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 A-1. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided the Phase II RI Report (Landau Associates 2000b).

For evaluation purposes, the groundwater level measurements were converted from depth-to-water readings to groundwater elevations using the survey information for each location. The groundwater elevations for the upper zone were then contoured using SURFER for Windows. Groundwater elevation contours interpreted using SURFER kriging techniques are considered approximate, and were modified by hand where the contours did not appear to represent hydrogeologic conditions based on the current conceptual model at the terminal. Groundwater elevations for the lower zone were contoured manually in conjunction with the evaluations conducted for determination of the capture zone for the groundwater interim action. Groundwater elevation contour maps for the upper and lower water-bearing zones are shown on Figures 3 and 4, respectively.

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.

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2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the second quarter 2001 event on June 4 through 6, 2001. During this sampling event, fourteen upper zone wells, seventeen lower zone wells, and one deep sand unit well were sampled. Monitoring wells LW-9S and LW-10S were dry and not sampled as part of this event. Except as shown in Table A-2, all groundwater samples were analyzed for the following constituents: semivolatile organic compounds [U.S. Environmental Protection Agency (EPA) method 8270]; pentachlorophenol (PCP) (EPA method 8270 SIM); volatile organic compounds (EPA method 8260); 6 priority pollutant metals (EPA methods 6010/7000 series); chloride (EPA method 325.2); total dissolved solids (EPA method 160.1); and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, TPH diesel range (NWTPH-D) was analyzed at twelve site monitoring wells. In addition to the TPH-D, TPH for gasoline and motor oil ranges (NWTPH-G and NWTPH-D extended) were analyzed in samples from wells B1, LW-8S, LW-11S, RW-1, and RW-2. Laboratory analyses were conducted by Analytical Resources, Inc. (Seattle, Washington). A summary of analyses conducted for each sampling location is provided in Table A-2.

Analytical results for the second quarter 2001 event are provided in Table A-3 for the upper zone wells and Table A-4 for the deep zone wells and deep sand unit well and 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. Data qualifier definitions are included in Table A-5.

2.2.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2) that were purged and sampled with a Grundfos® pump. The sample from RW-2 was collected using the in-line sampling port from the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three 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, specific conductance, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing during sampling for VOCs, a pumping rate was maintained below about 100 ml/min. All sampling was conducted in accordance with the Phase I/II RI/FS work plan and appropriate provisions of the quality assurance project plan and project health and safety plan (Landau

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- tert-Butylbenzene (6.0 µg/L at LW-8S and 1.3 M µg/L at LW-11S)
- sec-Butylbenzene (detected at four wells at concentrations ranging from 7.3 to 30 µg/L)
- 4-Isopropyltoluene (detected at four wells at concentrations ranging from 4.1 µg/L to 25 µg/L)
- n-Butylbenzene (LW-2S at 21 µg/L).

- TPH diesel-range concentrations were detected at all of the eight upper zone wells where analyzed. Concentrations ranged from 1.7 to 47 mg/L.
- TPH motor oil-range was reported at nondetect concentrations at the locations where analyzed (wells B1, LW-8S, LW-11S, and RW-1).
- TPH gasoline-range was detected at each well where analyzed (B1, LW-8S, LW-11S, and RW-1) at concentrations ranging from 2.9 to 25 mg/L.
- At least one priority pollutant metal was detected in each upper zone well as follows:
  - Arsenic (detected at all wells where analyzed, except well K), at concentrations ranging from 0.007 to 0.024 mg/L)
  - Copper (detected at well LW-4S at 0.002 mg/L)
  - Lead (detected at well B1 at 0.002 mg/L and well LW-7S at 0.001 mg/L)
  - Nickel (detected at well B1 at 0.12 mg/L and well K at 0.02 mg/L)
  - Zinc (detected at four wells at concentrations ranging from 0.006 to 0.054 mg/L).

The analytical results from the upper zone wells indicate that the highest PCP concentration in the upper zone during the second quarter 2001 event were observed in well RW-1 (2,000 µg/L by method 8270). Other semivolatile compounds were detected at low concentrations, with most detections at less than 25 µg/L and none exceeding 130 µg/L (methylphenol at well B1). The most elevated concentrations of volatile compounds (acetone, benzene, toluene, ethylbenzene, and m-, p-, and o-xylene) were generally observed at wells B1, LW-4S, and RW-1. No TPH fraction concentration exceeded 25 mg/L. The most elevated concentrations of metal constituents were generally detected in wells B1 (zinc) and LW-8S (arsenic).

2.2.3 Lower Water-Bearing Zone

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for low level metal concentrations, analytical results at wells B2, J2, LW-1D, and LW-10D were nondetect. LW-3D analytical results were nondetect except for low level arsenic and acetone concentrations.
- PCP was detected at one lower zone well, RW-2, at a concentration of 0.68 µg/L using EPA method 8270 SIM.

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- Zinc (detected in nine lower zone wells at concentrations ranging from 0.008 to 0.189 mg/L).

The analytical results from the lower zone wells indicate that PCP was detected only in well RW-2 (0.68 µg/L by EPA method 8270 SIM) during the second quarter 2001 event. Only three other semivolatile compounds [2-methylnaphthalene, fluorene, and bis(2-ethylhexyl)phthalate] were detected in lower zone wells with maximum concentrations not exceeding 3.6 µg/L. Elevated concentrations of most volatile compounds were observed in wells GIA and LW-4D, with none exceeding 150 µg/L. No TPH fraction concentration exceeded 3.5 mg/L. The most elevated concentrations of metals were detected in wells GIA, LW-12D1, and RW-2.

2.2.4 Deep Sand Unit

Well LW-12D2 is the only well currently installed in the deep sand unit underlying the lower water-bearing zone. Only two detections were noted in well LW-12D2: PCP at 1.7 µg/L and arsenic at 0.022 mg/L.

2.2.5 Water Level and Contaminant Trends

Water levels and concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the period of time covered by the Phase II RI quarterly events (March 1997 through the current quarterly event). Plots of PCP concentrations (maximum concentration of EPA methods 8270 and 8040) versus time for selected upper zone wells (LW-2S, -4S, -11S, and RW-1), selected lower zone wells (LW-4D, -11D, and RW-2), and nested wells (LW-4S and -4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-2S, LW-4S, and LW-11S are shown on Figures 8 through 10. A plot of groundwater elevations and PCP concentrations at lower zone well LW-4D with Willamette River stage is shown on Figure 11.

As shown on Figure 5, PCP concentrations in the selected upper zone wells show variable concentration patterns. At well LW-2S, located within the former PCP mixing area, concentrations were elevated between April 1997 through February 1999, ranging from 3000 to 8500 µg/L, but have stabilized to about 560 to 2100 µg/L since that time. Results from the last three sampling events varied little between 1200 to 1500 µg/L. PCP concentrations in well LW-11S have decreased over time from 24,000 to 460 µg/L since the well's installation in May 1999, but, during the last two sampling events, the results have remained approximately the same (460 and 560 µg/L, respectively). However, product was observed in this well during November and December 2000 at thicknesses of up to 0.7 ft; about 8.5L of

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correlation is apparent between the two in the upper zone at well LW-4S. In the lower water-bearing zone, groundwater levels trend similarly with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at LW-4D with river stage on Figure 11; however, there appears to be no correlation between PCP concentrations and groundwater elevations at this location. As discussed previously, product was observed in well LW-11S in November-December 2000.

Contaminant and groundwater level trends will continue to be evaluated and updated for future quarterly events.

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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 A-1.

Water level measurements for the fourth quarter 2001 event were obtained beginning at about 2.5 hours after a predicted mean river stage over about a 2-hr period, 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 1998b), aquifer test report (Landau Associates 1999c), and previous quarterly measurements.

2.1.2 Product Measurements and Product Recovery

During the fourth quarter 2001 event, a trace amount of product was noted in wells N and LW-11S. Measurable product was observed at wells Q and LW-8S at a thickness of 0.42 ft and 0.04 ft, respectively. There was inadequate volume of product in wells N and LW-11S for recovery. Approximately 0.3 L of product was removed from well Q during the fourth quarter sampling event. The product was retycled by Philip Services (Portland, OR) in March 2002. On November 30, 2001, we attempted to collect a product sample from LW-8S; however, the product observed during measurement of water levels on November 28 was no longer present. Instead, a sample of groundwater at the top of the water column was collected for hydrocarbon fingerprinting analysis. The results from this test are discussed in section 2.2.5.

2.1.3 Upper Water-Bearing Zone

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper water-bearing zone (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, with a localized shift to the south in an area south of the former PCP mixing area. A change in the groundwater

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concentration for a particular constituent where field duplicate results are available. Data qualifier definitions are included in Table A-5.

2.2.1 Groundwater Sampling Procedures

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2). Well LW-12D2 was purged and sampled with a Grundfos® pump. The sample from RW-2 was collected using the in-line sampling port from the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three 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 during sampling for VOCs, a 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 2001e). A more detailed description of groundwater sampling procedures is provided in the Phase II RI report (Landau Associates 2000d).

2.2.2 Upper Water-Bearing Zone

The groundwater quality results from the upper water-bearing zone indicate the following:

- Except for low level arsenic concentrations, analytical results for well LW-1S were nondetect.
- PCP was detected at wells LW-2S and RW-1 using EPA Method 8270 with concentrations of 8,000 µg/L and 17 µg/L, respectively. Using EPA Method 8270 SIM (for those wells containing nondetect concentrations using Method 8270 only), PCP was also detected at B1, D, J1, and LW-7S at concentrations ranging from 0.25 µg/L (the detection limit) to 0.65 µg/L.
- Naphthalene, a noncarcinogenic polycyclic aromatic hydrocarbon (PAH), was detected in samples from three wells (LW-2S, LW-7S, and RW-1) at concentrations ranging from 1.3 to 14 µg/L, using Method 8270. Naphthalene was detected in three wells (B1, LW-2S, RW-1) at concentrations ranging from 24 to 54 µg/L using Method 8260.
- All other semivolatile results were reported as nondetect with the following exceptions: phenol [detected at wells B1 (6.2 µg/L), LW-2S (2.8 µg/L) and RW-1 (2.1 µg/L)]; 2-methylphenol [detected in well B1 (12 µg/L)]; 4-methylphenol [detected at wells B1 (44 µg/L) and LW-2S (3.0 µg/L)]; 2-methylnaphthalene [detected in RW-1 (3.7 µg/L)]; bis(2-

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ethylhexyl)phthalate [detected in three wells (D, LW-2S, and LW-7S) at concentrations ranging from 1.5 µg/L to 12 µg/L].

- Several volatile compounds were detected in the upper zone wells including:
  - Acetone (detected at wells LW-2S and RW-1 at concentrations of 39 µg/L and 8.4 µg/L, respectively)
  - 2-Butanone (detected at wells B1 and RW-1 with concentrations of 13 µg/L and 30 µg/L, respectively)
  - Benzene [detected at B1 (120 µg/L) and RW-1 (24 µg/L)]
  - Toluene (detected at wells B1 and RW-1 at concentrations of 800 and 5.7 µg/L, respectively)
  - Ethylbenzene (detected at five wells at concentrations ranging from 1.6 to 86 µg/L)
  - m-, p-, and o-Xylene (detected at five wells at total xylene concentrations ranging from 1.6 to 530 µg/L)
  - 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected at six wells at individual concentrations ranging from 1.4 to 420 µg/L)
  - Isopropylbenzene and n-propylbenzene (detected at seven wells at individual concentrations ranging from 1.1 to 32 µg/L)
  - tert-Butylbenzene (68 µg/L at LW-2S)
  - sec-Butylbenzene (2.3 µg/L at LW-7S)
  - 4-Isopropyltoluene (detected at LW-2S (22 µg/L) and RW-1 (5.5 µg/L))
  - n-Butylbenzene (detected at wells LW-2S and RW-1 at concentrations of 18 and 4.7M, respectively; see Table A-5 for definitions of qualifiers.
- TPH gasoline-range concentrations were detected at each well where analyzed (B1 and RW-1) at 6.8 to 5.3 mg/L, respectively.
- TPH diesel-range concentrations were detected at four of the five upper zone wells that were analyzed. Concentrations ranged from 0.42 to 10 mg/L.
- TPH motor oil-range concentrations were nondetect at the locations where analyzed (wells B1 and RW-1).
- At least one priority pollutant metal was detected in each upper zone well as follows:
  - Arsenic (detected at eight wells, at concentrations ranging from 0.002 to 0.021 mg/L)
  - Chromium (estimated detection in well RW-1 at .014J mg/L)
  - Copper (detected at three wells, at concentrations ranging from 0.003 to 0.016J mg/L)
  - Lead (detected at five wells with concentrations ranging from 0.001 to 0.008 mg/L)
  - Nickel (detected at wells K and RW-1 with concentrations of 0.05 and 0.01 mg/L, respectively)
  - Zinc (detected at four wells at concentrations ranging from 0.012 to 0.038J mg/L).

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In summary, the analytical results from the upper zone wells indicate that six wells (B1, D, J1, LW-2S, LW-7S, and RW-1) contained concentrations of PCP during the fourth quarter 2001 event. The highest concentration was observed in well LW-2S (8,000 µg/L by Method 8270) located within the former PCP mixing area. Historically, this is the first PCP detection at wells D and LW-7S. Additionally, PCP has not been detected in well B-1 since August 2000. At well LW-13S, the PCP concentration for the fourth quarter 2001 event was nondetect for the first time since monitoring began at this location in May 2000. For the fourth quarter 2001, product was observed in well LW-11S for the second time since November 2000 and a significant increase in the PCP concentration was observed at LW-2S after being relatively stable over the last 2 years. Other semivolatile compounds were detected at low concentrations, with most detections at less than 17 µg/L and none exceeding 44 µg/L (4-methylphenol at well B1). The most elevated concentrations of volatile compounds (acetone; benzene; toluene; ethylbenzene; m-, p-, and o-xylene; and 1,2,4-trimethylbenzene) were generally observed at wells B1, LW-2S, and RW-1. No TPH fraction exceeded 10 mg/L. The most elevated concentrations of metal constituents were generally detected in wells B1 and RW-1; note that a majority of these detections are considered estimates by the laboratory.

2.2.3 Lower Water-Bearing Zone

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for low level metal concentrations and acetone concentrations, B2 and LW-10D analytical results were nondetect.
- PCP was detected at six lower zone wells (J2, LW-1D, LW-3D, LW-11D, LW-18D, and RW-2) at concentrations of 0.26 to 3.0 µg/L using EPA Method 8270 SIM.
- Naphthalene, a noncarcinogenic PAH, was detected in well RW-2 at 1.8 µg/L with EPA Method 8270.
- Other semivolatile results were reported as nondetect for lower zone wells with the following exceptions:
  - 4-Methylphenol (detected at well LW-11D at 1.6 µg/L)
  - 2-Methylnaphthalene (detected at well LW-4D at 1.4 µg/L and well RW-2 at 7.0J µg/L)
  - bis(2-ethylhexyl)phthalate (detected at three wells with concentrations ranging from 1.0 to 3.1 µg/L).
- Several volatile compounds were detected at low concentrations, including:
  - Acetone (detected at eight wells with concentrations ranging from 5.0 µg/L to 130 µg/L)
  - 2-Butanone [detected at wells G1A (6.4 µg/L) and LW-12D1 (5.6 µg/L)]

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- Benzene (detected at well O at 1.0 µg/L)
- Toluene (detected at wells O and R at 2.4 and 1.5 µg/L, respectively)
- Ethylbenzene (detected at well RW-2 at 1.5 µg/L)
- m-, p-, and o-Xylene (detected at three wells, at total concentrations ranging from 1.6 to 3.0 µg/L)
- 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (both compounds were detected at four wells at individual concentrations ranging from 1.1 to 21 µg/L)
- Isopropylbenzene and n-propylbenzene (at least one of the compounds was detected at seven wells at individual concentrations ranging from 1.6 to 200 µg/L)
- tert-Butylbenzene (detected at three wells at concentrations ranging from 1.1 to 4.9 µg/L)
- sec-Butylbenzene (detected at eight wells at concentrations ranging from 1.2 to 23 µg/L)
- 4-Isopropyltoluene (detected at well G1A at 7.9 µg/L and well LW-12D1 at 2.2 µg/L)
- n-Butylbenzene (detected at three wells at concentrations ranging from 2.8 to 14M µg/L).

- TPH diesel-range concentrations were detected at seven lower zone wells at concentrations ranging from 0.35 to 4.5 mg/L.
- TPH gasoline-range and motor-oil range analyses were requested only for well RW-2; however, the laboratory also performed these analyses at well LW-9D. Only a TPH gasoline-range concentration of 1.2 mg/L was detected at well RW-2.
- At least one priority pollutant metal was detected in each lower zone well tested, as follows:
  - Arsenic (detected at all lower zone wells tested, ranging at concentrations from 0.006 to 0.042 mg/L)
  - Chromium (detected at three wells at concentrations from 0.005 to 0.010 mg/L)
  - Copper (detected at four lower zone wells with concentrations ranging from 0.003 to 0.012 mg/L)
  - Lead (detected at nine wells at concentrations ranging from 0.001 to 0.005 mg/L)
  - Zinc (detected at nine lower zone wells at concentrations ranging from 0.010 to 0.022 mg/L).

In summary, the analytical results from the lower zone wells indicate that PCP was detected at six monitoring locations with the highest detection noted at LW-3D (3.0 µg/L) during the fourth quarter 2001 event. Historically, this is the first PCP detection at this well and at wells LW-1D. Also, PCP has not been detected at well J2 since December 1999. Naphthalene was detected in well RW-2 at a concentration of 1.8 µg/L with EPA Method 8270. Concentrations of all other detected semivolatile compounds did not exceed 7.0J µg/L (2-Methylnaphthalene at RW-2). Elevated concentrations of most detected volatile compounds were observed in wells G1A, O, R, and RW-2, with none exceeding 200

How does this detection fit into the conceptual model

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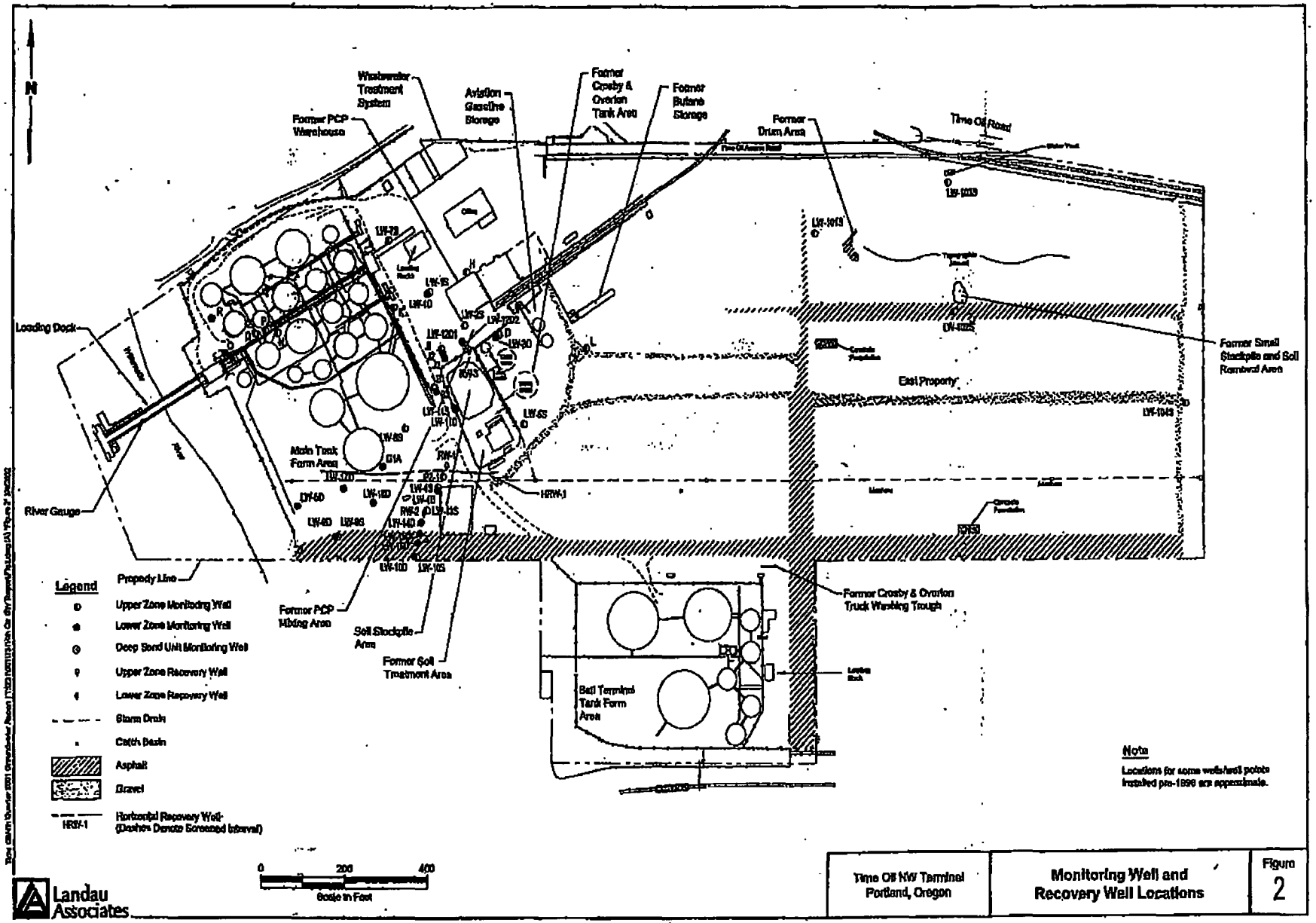

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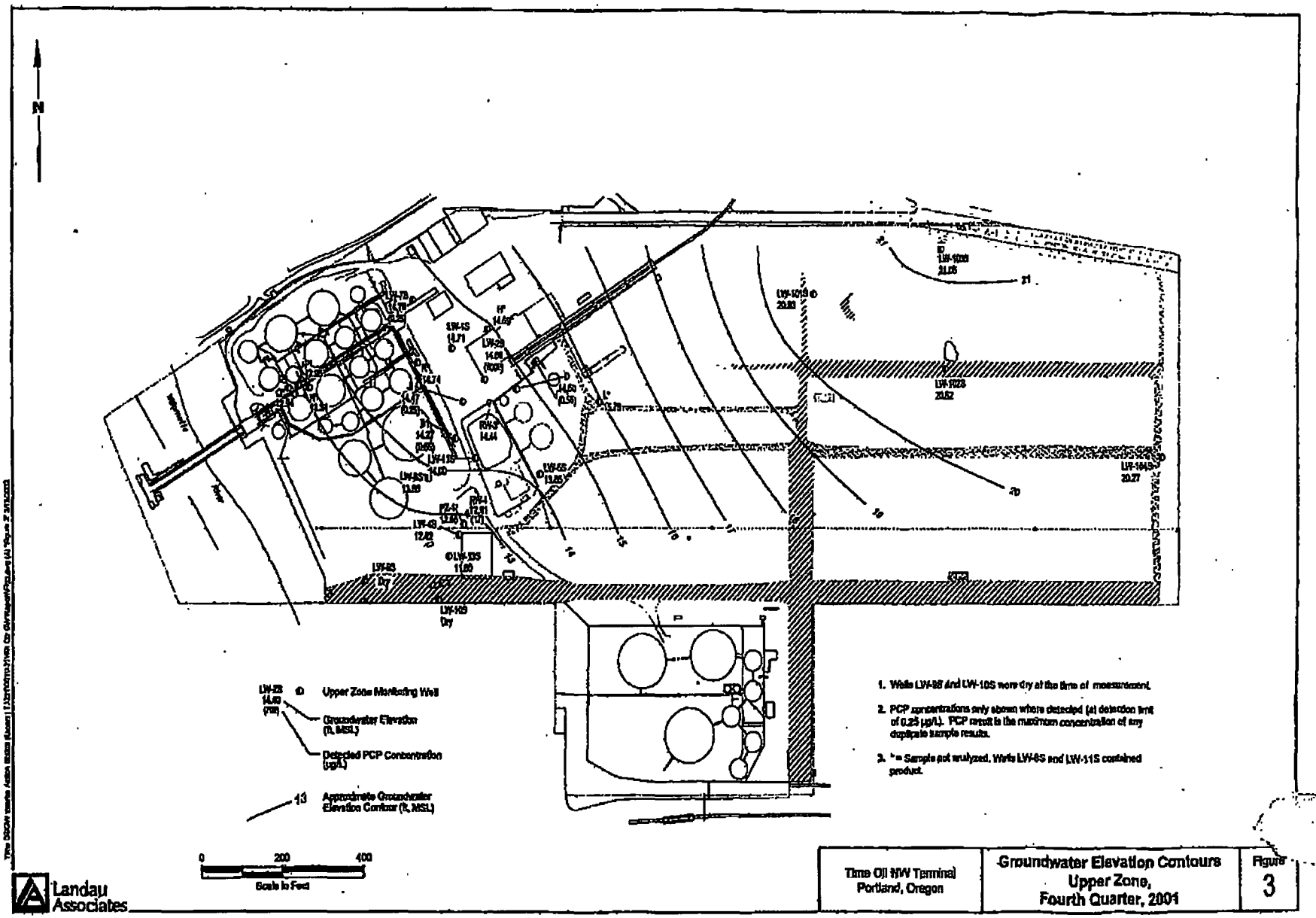

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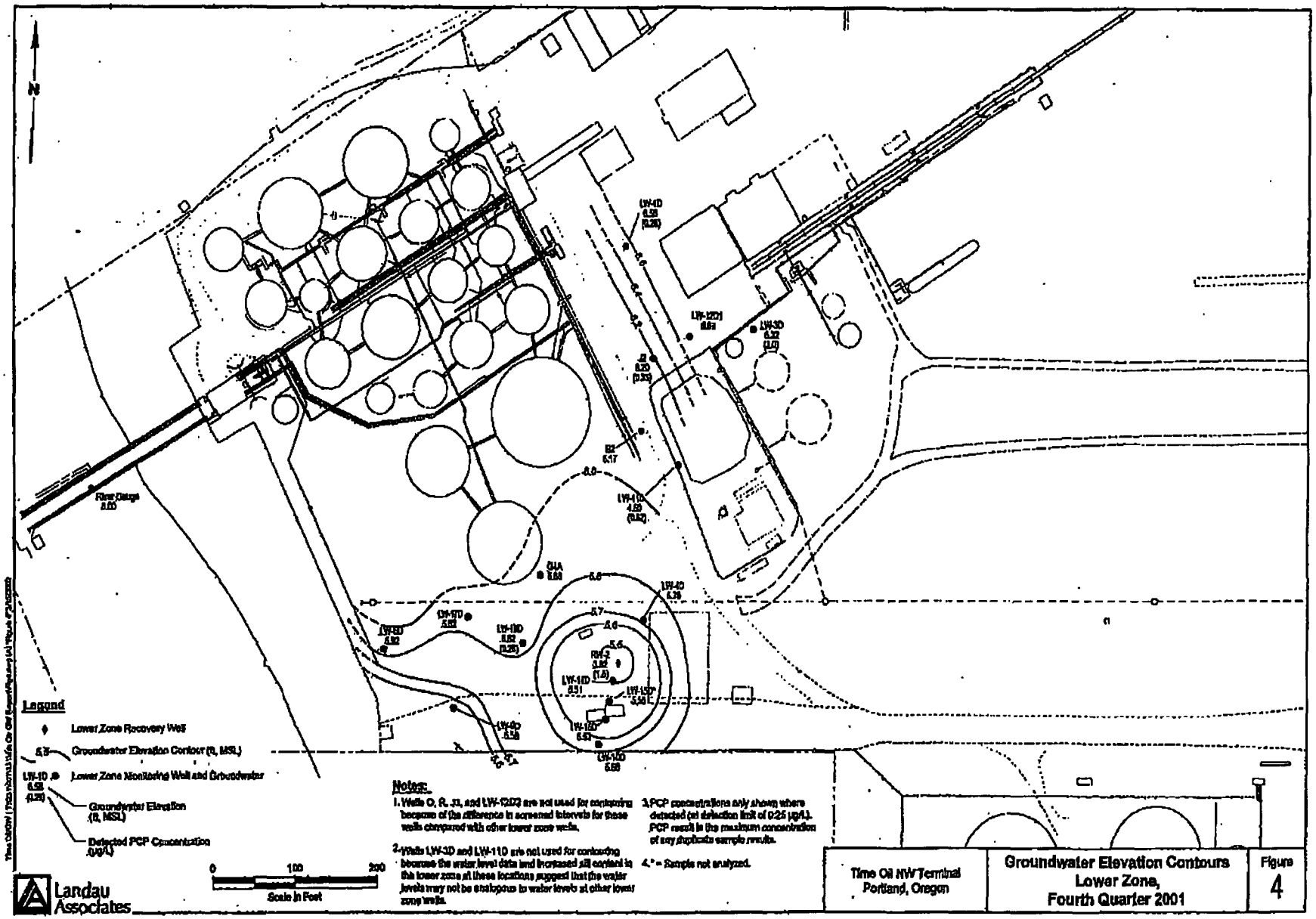

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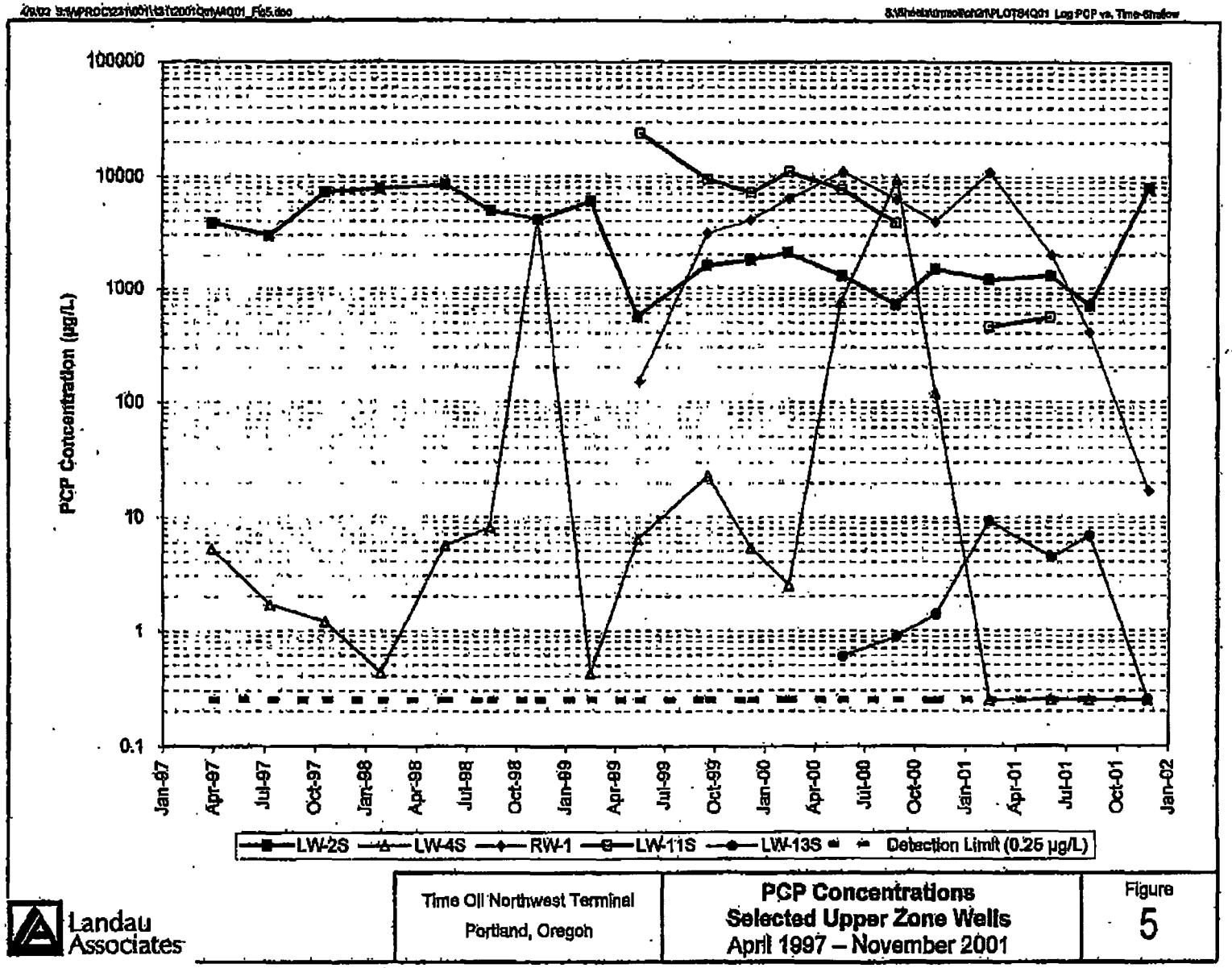

Landau Associates

Time Oil Northwest Terminal Portland, Oregon	**PCP Concentrations Selected Upper Zone Wells April 1997 – November 2001**	Figure 5

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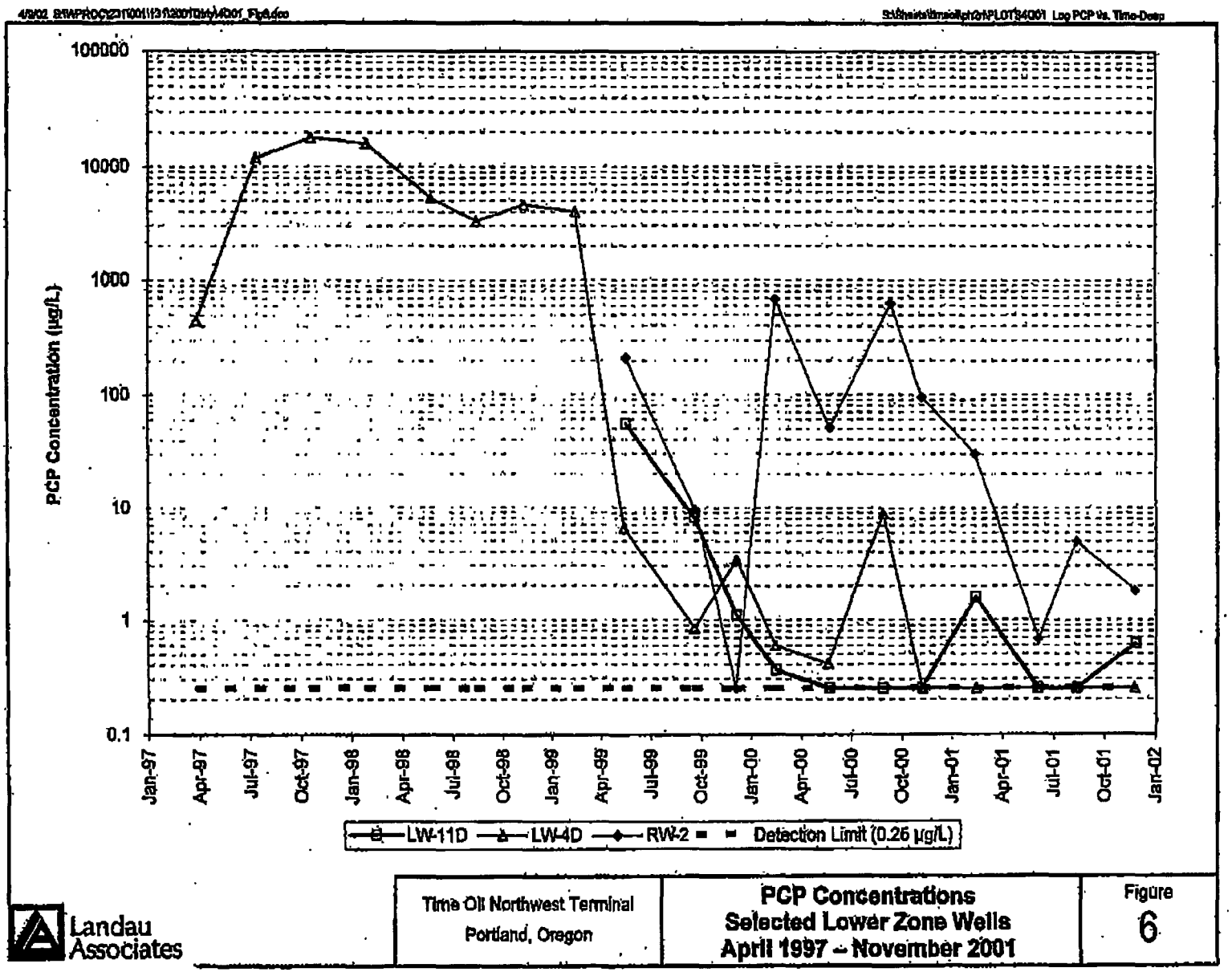

Landau Associates

Time Oil Northwest Terminal
Portland, Oregon

PCP Concentrations
Selected Lower Zone Wells
April 1997 – November 2001

Figure
6

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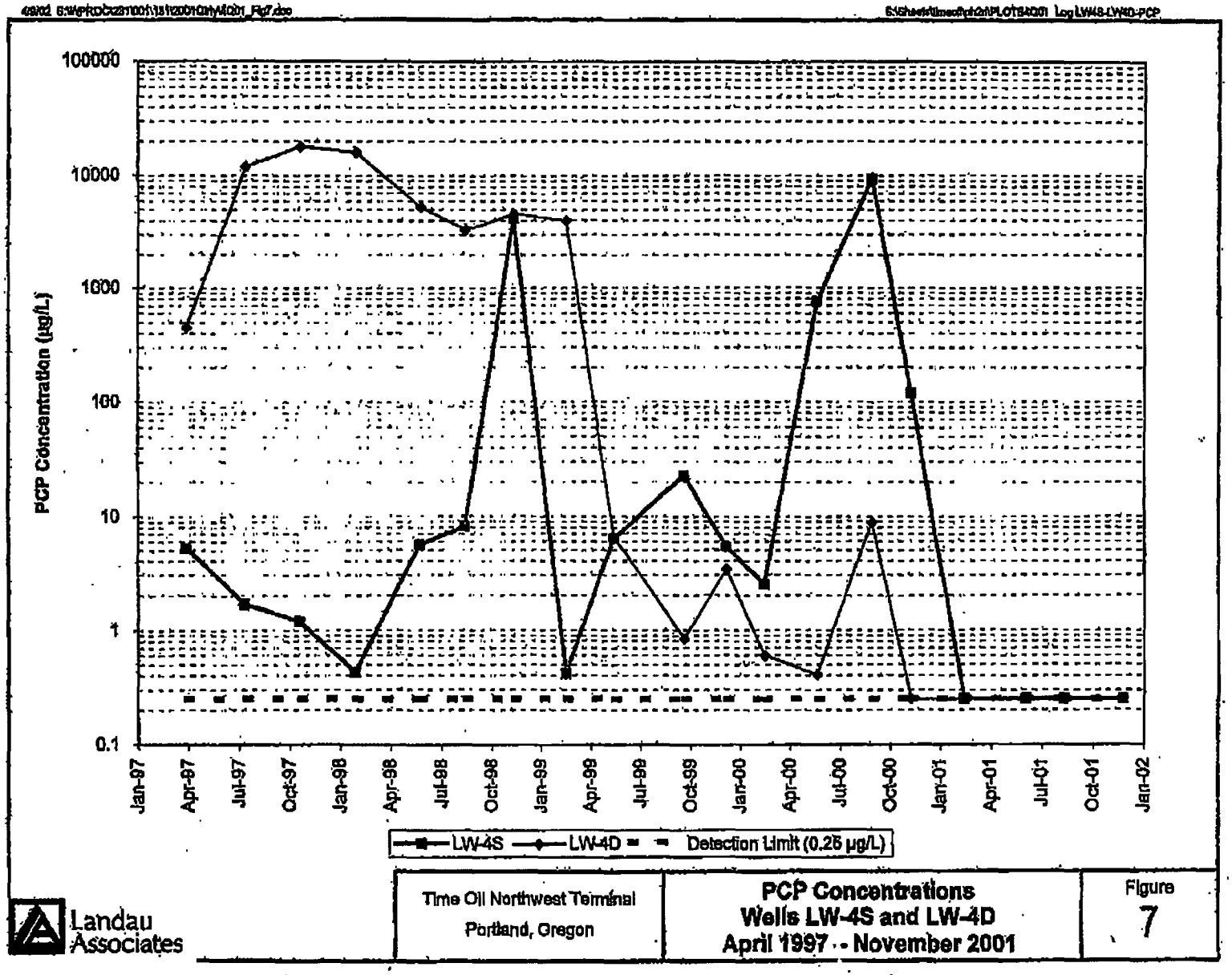

Landau Associates

Time Oil Northwest Terminal Portland, Oregon	**PCP Concentrations Wells LW-4S and LW-4D April 1997 - November 2001**	Figure **7**

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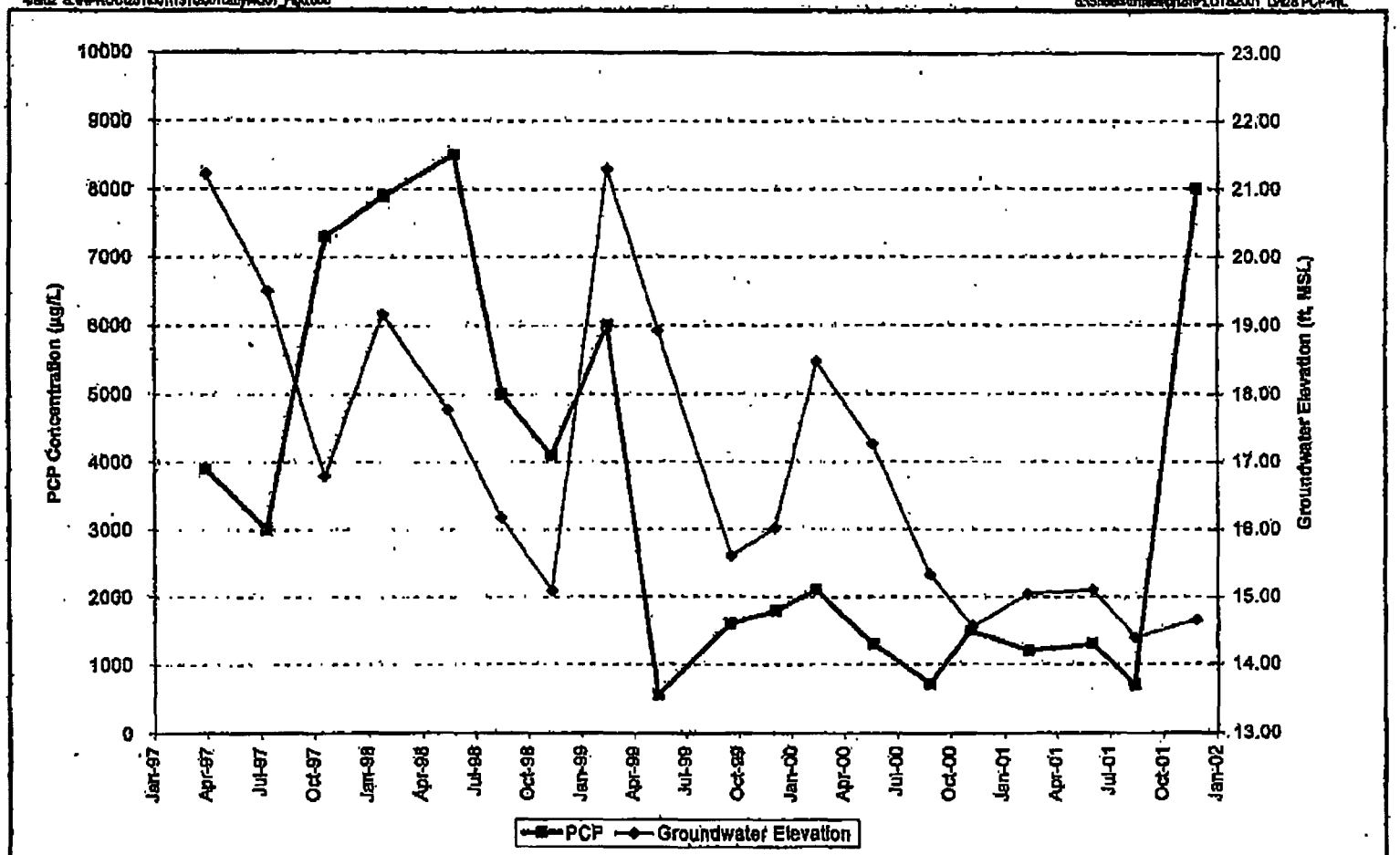

Landau Associates

Time Oil Northwest Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-2S April 1997 – November 2001**	Figure 8

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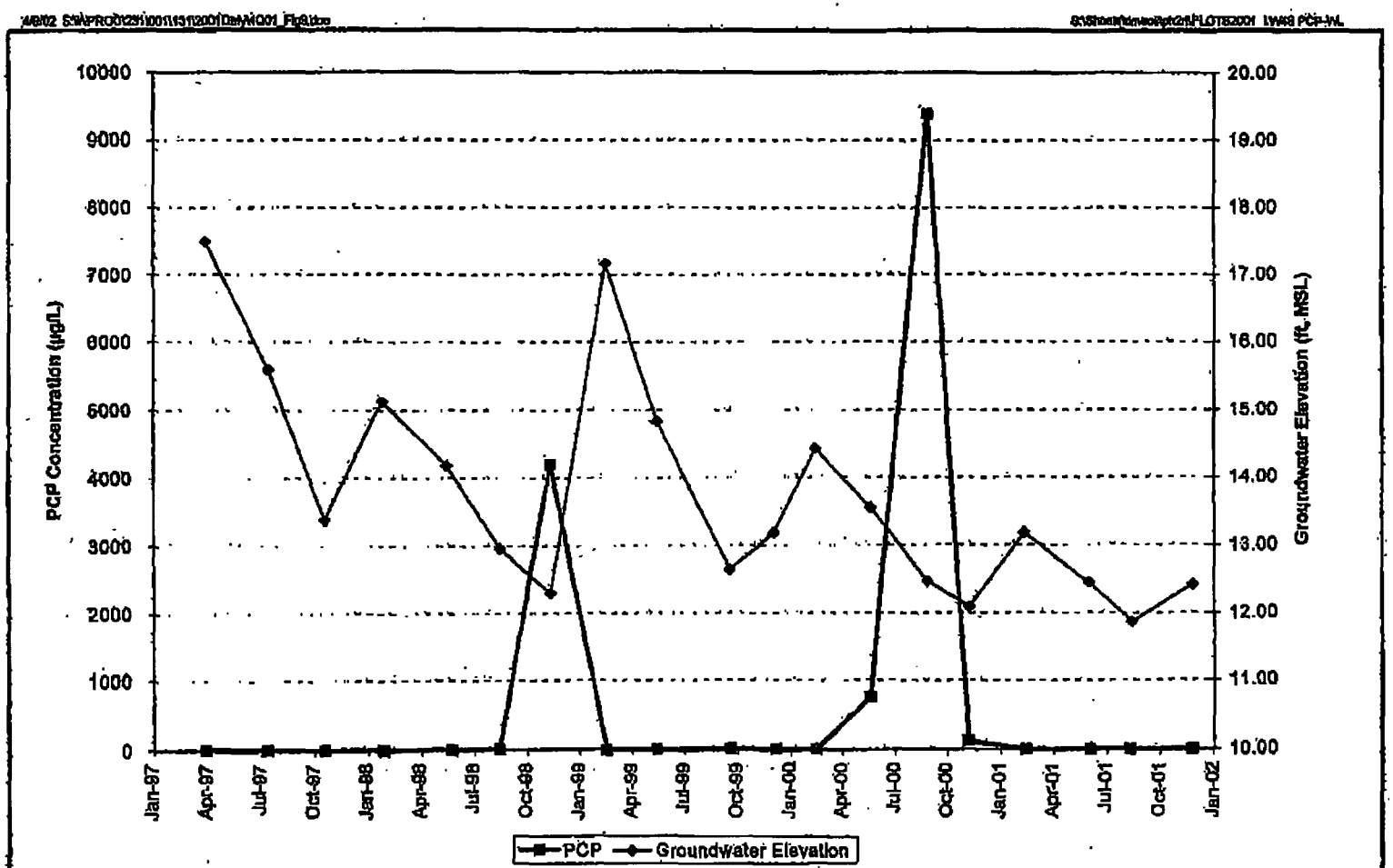

Landau Associates

Time Oil Northwest Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-4S April 1997 – November 2001**	Figure 9

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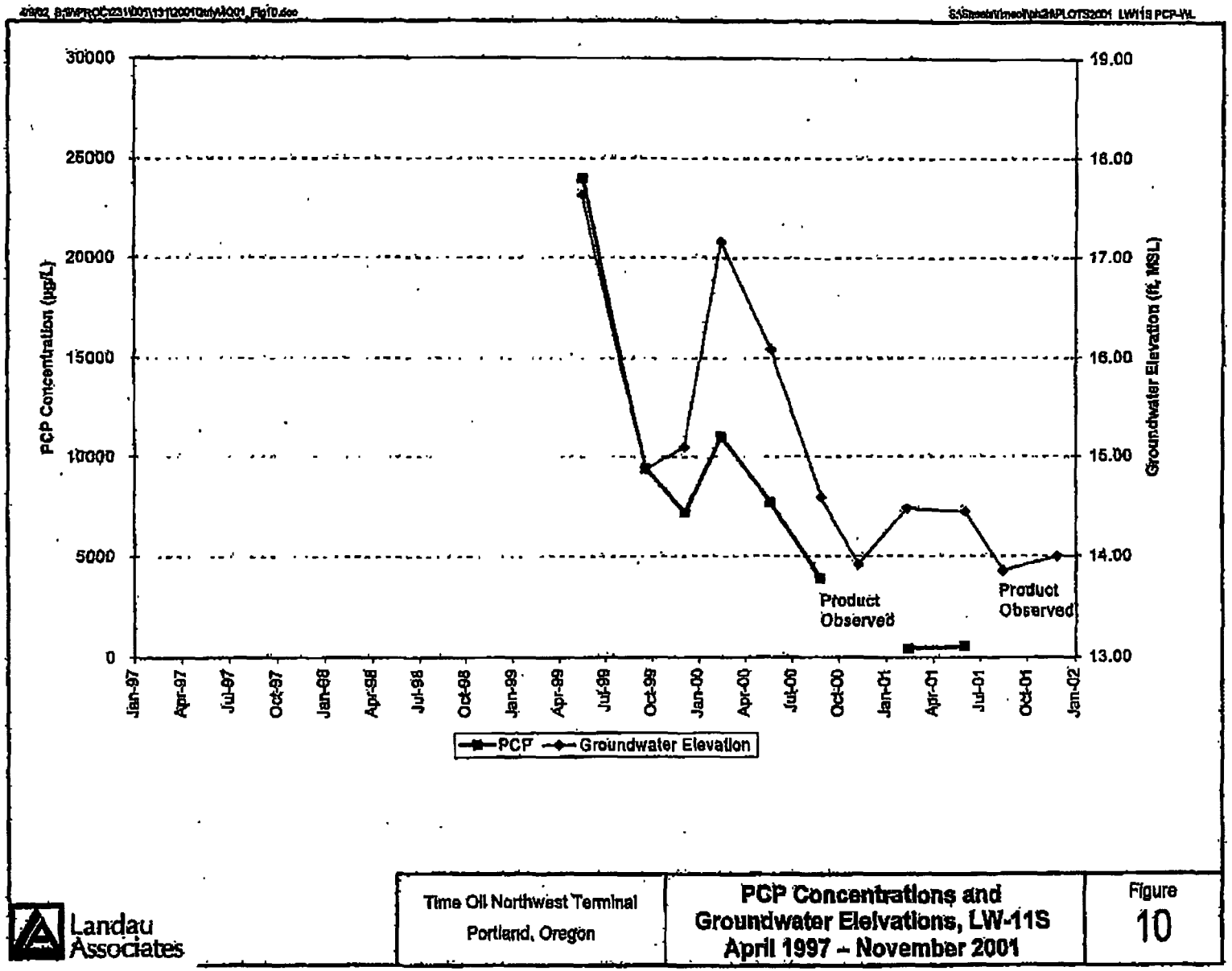

Landau Associates

Time Oil Northwest Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elelvations, LW-11S April 1997 – November 2001**	Figure 10

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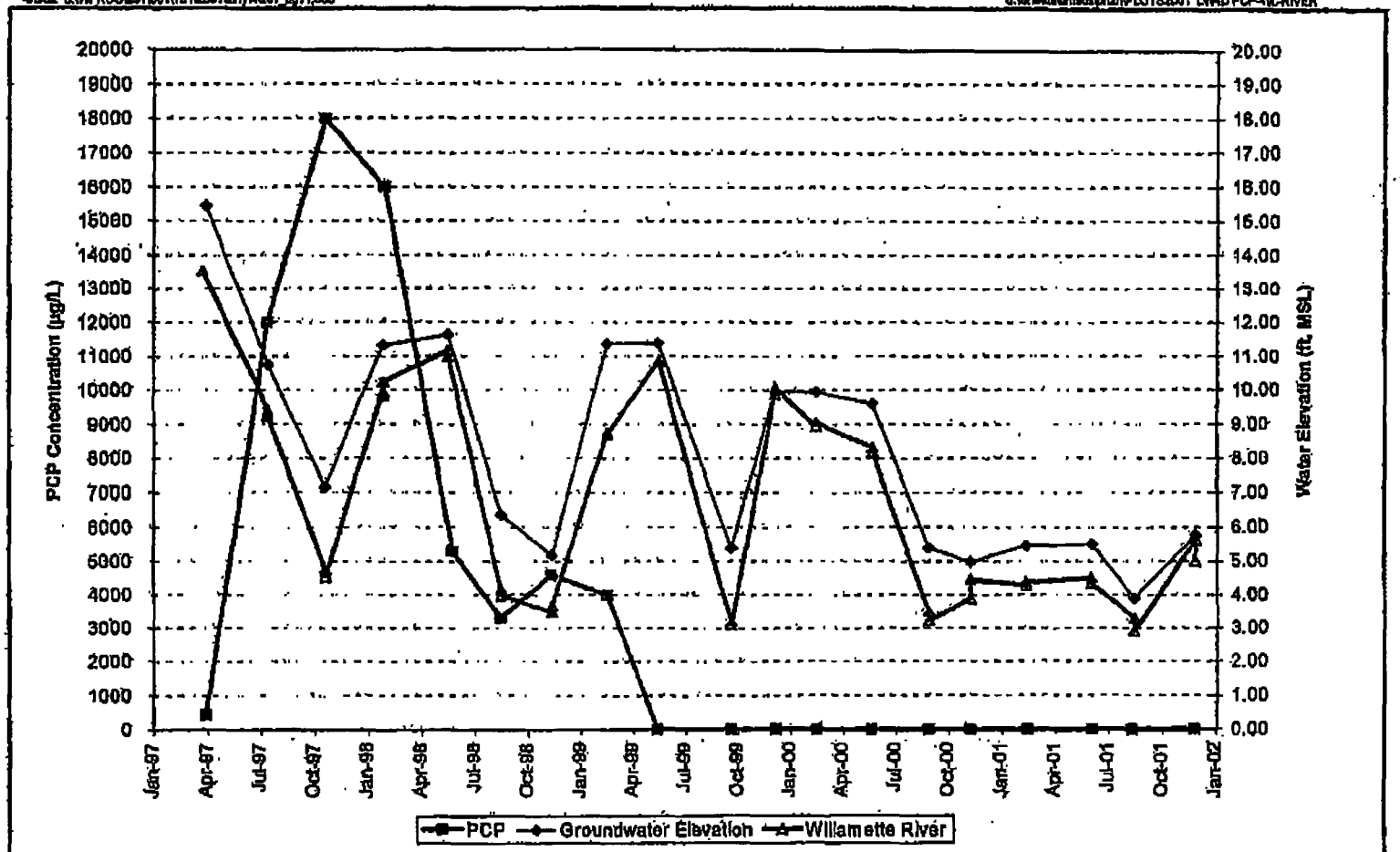

Landau Associates

Time Oil Northwest Terminal
Portland, Oregon

River Stage, PCP Concentrations, and Groundwater Elevations, LW-4D April 1997 – November 2001

Figure 11

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Preliminary Round 2a Surface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
G061	0	29	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	7.537		pg/g
G062	0	20	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	37.058		pg/g
G061	0	29	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	246.964		pg/g
G062	0	20	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	247.172		pg/g
G061	0	29	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Y	0.227	J	pg/g
G062	0	20	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Y	2.425		pg/g
G061	0	29	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	0.813	J	pg/g
G062	0	20	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	2.434		pg/g
G061	0	29	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	0.294	J	pg/g
G062	0	20	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	1.816		pg/g
G061	**0**	**29**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**8.947**		**pg/g**
G062	**0**	**20**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**9.913**		**pg/g**
G061	0	29	1,2,3,7,8,9-Hexachlorodibenzofuran	Y	0.162	J	pg/g
G062	0	20	1,2,3,7,8,9-Hexachlorodibenzofuran	Y	0.426	J	pg/g
G061	**0**	**29**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**11.458**		**pg/g**
G062	**0**	**20**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**6.051**		**pg/g**
G061	0	29	1,2,3,7,8-Pentachlorodibenzofuran	Y	0.44	J	pg/g
G062	0	20	1,2,3,7,8-Pentachlorodibenzofuran	Y	0.559	J	pg/g
G061	0	29	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Y	0.428	J	pg/g
G062	0	20	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Y	1.069		pg/g
G061	0	29	2,3,4,6,7,8-Hexachlorodibenzofuran	Y	0.301	J	pg/g
G062	0	20	2,3,4,6,7,8-Hexachlorodibenzofuran	Y	2.628		pg/g
G061	0	29	2,3,4,7,8-Pentachlorodibenzofuran	Y	0.563	J	pg/g
G062	0	20	2,3,4,7,8-Pentachlorodibenzofuran	Y	0.565	J	pg/g
G061	0	29	2,3,7,8-Tetrachlorodibenzofuran	Y	0.694		pg/g
G062	0	20	2,3,7,8-Tetrachlorodibenzofuran	Y	0.339		pg/g
G062	**0**	**20**	**2,3,7,8-Tetrachlorodibenzo-p-dioxin**	**Y**	**0.168**	**J**	**pg/g**
G059	0	22	2,4'-DDD	Y	0.113	NJ	ug/kg
G062	0	20	2,4'-DDD	Y	0.319	NJ	ug/kg
G062	0	20	2,4'-DDE	Y	1.4	NJ	ug/kg
G062	0	20	2,4'-DDT	Y	0.279	J	ug/kg
G059	0	22	2-Methylnaphthalene	Y	0.77	J	ug/kg
G061	0	29	2-Methylnaphthalene	Y	7		ug/kg
G062	0	20	2-Methylnaphthalene	Y	4		ug/kg
G059	0	22	4,4'-DDD	Y	0.385	J	ug/kg
G062	0	20	4,4'-DDD	Y	1.03	NJ	ug/kg
G059	0	22	4,4'-DDE	Y	0.19	J	ug/kg
G062	0	20	4,4'-DDE	Y	0.671	NJ	ug/kg
G059	0	22	4,4'-DDT	Y	0.511	J	ug/kg
G062	0	20	4,4'-DDT	Y	1.07	NJ	ug/kg
G061	0	29	4-Methylphenol	Y	11		ug/kg
G059	0	22	Acenaphthene	Y	3.5		ug/kg
G061	0	29	Acenaphthene	Y	25		ug/kg
G062	0	20	Acenaphthene	Y	3.2		ug/kg
G059	0	22	Acenaphthylene	Y	2.6		ug/kg
G061	0	29	Acenaphthylene	Y	8.2		ug/kg
G062	0	20	Acenaphthylene	Y	7.7		ug/kg

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Preliminary Round 2a Surface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
G062	0	20	Aldrin	Y	0.798	NJ	ug/kg
G059	0	22	alpha-Hexachlorocyclohexane	Y	0.116	NJ	ug/kg
G062	0	20	alpha-Hexachlorocyclohexane	Y	0.137	NJ	ug/kg
G059	0	22	Aluminum	Y	7940		mg/kg
G061	0	29	Aluminum	Y	21200		mg/kg
G062	0	20	Aluminum	Y	11600		mg/kg
G061	0	29	Ammonia	Y	83.9		mg/kg
G062	0	20	Ammonia	Y	36.5		mg/kg
G059	0	22	Anthracene	Y	2.9		ug/kg
G061	0	29	Anthracene	Y	20		ug/kg
G062	0	20	Anthracene	Y	13		ug/kg
G059	0	22	Antimony	Y	0.07	J	mg/kg
G061	0	29	Antimony	Y	0.11	J	mg/kg
G062	0	20	Antimony	Y	0.07	J	mg/kg
G061	0	29	Aroclor 1248	Y	5.4		ug/kg
G059	0	22	Aroclor 1260	Y	4.8		ug/kg
G061	0	29	Aroclor 1260	Y	8		ug/kg
G062	0	20	Aroclor 1260	Y	9.2		ug/kg
G059	**0**	**22**	**Arsenic**	**Y**	**3.04**		**mg/kg**
G061	**0**	**29**	**Arsenic**	**Y**	**3.57**		**mg/kg**
G062	**0**	**20**	**Arsenic**	**Y**	**9.72**		**mg/kg**
G059	0	22	Benz(a)anthracene	Y	9		ug/kg
G061	0	29	Benz(a)anthracene	Y	84		ug/kg
G062	0	20	Benz(a)anthracene	Y	58		ug/kg
G059	0	22	Benzo(a)pyrene	Y	13		ug/kg
G061	0	29	Benzo(a)pyrene	Y	94		ug/kg
G062	0	20	Benzo(a)pyrene	Y	85		ug/kg
G059	0	22	Benzo(b)fluoranthene	Y	15		ug/kg
G061	0	29	Benzo(b)fluoranthene	Y	130		ug/kg
G062	0	20	Benzo(b)fluoranthene	Y	100		ug/kg
G059	0	22	Benzo(g,h,i)perylene	Y	15		ug/kg
G061	0	29	Benzo(g,h,i)perylene	Y	68		ug/kg
G062	0	20	Benzo(g,h,i)perylene	Y	86		ug/kg
G059	0	22	Benzo(k)fluoranthene	Y	4.4		ug/kg
G061	0	29	Benzo(k)fluoranthene	Y	46		ug/kg
G062	0	20	Benzo(k)fluoranthene	Y	32		ug/kg
G061	0	29	Benzyl alcohol	Y	7.1	J	ug/kg
G059	0	22	beta-Hexachlorocyclohexane	Y	2.91	NJ	ug/kg
G062	0	20	beta-Hexachlorocyclohexane	Y	4.06	NJ	ug/kg
G061	**0**	**29**	**Bis(2-ethylhexyl) phthalate**	**Y**	**51**		**ug/kg**
G062	**0**	**20**	**Bis(2-ethylhexyl) phthalate**	**Y**	**45**		**ug/kg**
G059	0	22	Cadmium	Y	0.09		mg/kg
G061	0	29	Cadmium	Y	0.298		mg/kg
G062	0	20	Cadmium	Y	0.14		mg/kg
G061	0	29	Carbazole	Y	6.3	J	ug/kg
G062	0	20	Carbazole	Y	5.6	J	ug/kg
G062	0	20	Chloroform	Y	0.091	J	ug/kg

LWG00362

Preliminary Round 2a Surface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
G059	**0**	**22**	**Chromium**	**Y**	**10.1**		**mg/kg**
G061	**0**	**29**	**Chromium**	**Y**	**26.3**		**mg/kg**
G062	**0**	**20**	**Chromium**	**Y**	**14.6**		**mg/kg**
G059	0	22	Chrysene	Y	13		ug/kg
G061	0	29	Chrysene	Y	150		ug/kg
G062	0	20	Chrysene	Y	85		ug/kg
G062	0	20	cis-Chlordane	Y	0.195	NJ	ug/kg
G059	**0**	**22**	**Copper**	**Y**	**11.9**		**mg/kg**
G061	**0**	**29**	**Copper**	**Y**	**34.4**		**mg/kg**
G062	**0**	**20**	**Copper**	**Y**	**15.8**		**mg/kg**
G062	0	20	delta-Hexachlorocyclohexane	Y	0.644	NJ	ug/kg
G059	0	22	Dibenz(a,h)anthracene	Y	1.6	J	ug/kg
G061	0	29	Dibenz(a,h)anthracene	Y	16		ug/kg
G062	0	20	Dibenz(a,h)anthracene	Y	13		ug/kg
G059	0	22	Dibenzofuran	Y	0.92	J	ug/kg
G061	0	29	Dibenzofuran	Y	7.6		ug/kg
G062	0	20	Dibenzofuran	Y	2.2	J	ug/kg
G061	0	29	Dibutyl phthalate	Y	5.3	J	ug/kg
G062	0	20	Dibutyl phthalate	Y	12		ug/kg
G061	0	29	Diesel Range Hydrocarbons	Y	92	J	mg/kg
G062	0	20	Diesel Range Hydrocarbons	Y	35	J	mg/kg
G062	0	20	Endrin	Y	0.055	NJ	ug/kg
G059	0	22	Endrin ketone	Y	0.097	NJ	ug/kg
G062	0	20	Endrin ketone	Y	1.07	NJ	ug/kg
G059	0	22	Fluoranthene	Y	28		ug/kg
G061	0	29	Fluoranthene	Y	220		ug/kg
G062	0	20	Fluoranthene	Y	150		ug/kg
G059	0	22	Fluorene	Y	1.3	J	ug/kg
G061	0	29	Fluorene	Y	17		ug/kg
G062	0	20	Fluorene	Y	4.3		ug/kg
G061	0	29	Heptachlorodibenzofuran homologs	Y	19.189		pg/g
G062	0	20	Heptachlorodibenzofuran homologs	Y	134.296		pg/g
G061	0	29	Heptachlorodibenzo-p-dioxin homologs	Y	1025.117		pg/g
G062	0	20	Heptachlorodibenzo-p-dioxin homologs	Y	472.64		pg/g
G059	**0**	**22**	**Hexachlorobenzene**	**Y**	**1.72**	**NJ**	**ug/kg**
G061	0	29	Hexachlorodibenzofuran homologs	Y	11.343		pg/g
G062	0	20	Hexachlorodibenzofuran homologs	Y	62.858		pg/g
G061	**0**	**29**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**157.584**		**pg/g**
G062	**0**	**20**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**60.984**		**pg/g**
G059	0	22	Hexachloroethane	Y	0.9	J	ug/kg
G059	0	22	Indeno(1,2,3-cd)pyrene	Y	11		ug/kg
G061	0	29	Indeno(1,2,3-cd)pyrene	Y	71		ug/kg
G062	0	20	Indeno(1,2,3-cd)pyrene	Y	82		ug/kg
G059	**0**	**22**	**Lead**	**Y**	**11.6**		**mg/kg**
G061	**0**	**29**	**Lead**	**Y**	**15.1**		**mg/kg**
G062	**0**	**20**	**Lead**	**Y**	**16**		**mg/kg**
G059	0	22	Mercury	Y	0.012	J	mg/kg

LWG00363

BZTO104(e)015511

Preliminary Round 2a Surface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
G061	0	29	Mercury	Y	0.252		mg/kg
G062	0	20	Mercury	Y	0.032		mg/kg
G059	0	22	Methoxychlor	Y	0.29	NJ	ug/kg
G062	0	20	Methoxychlor	Y	2.45	J	ug/kg
G061	0	29	Methyl tert-butyl ether	Y	0.84	J	ug/kg
G061	**0**	**29**	**Naphthalene**	**Y**	**14**		**ug/kg**
G062	**0**	**20**	**Naphthalene**	**Y**	**8.7**		**ug/kg**
G059	0	22	Nickel	Y	12.4	J	mg/kg
G061	0	29	Nickel	Y	23.8	J	mg/kg
G062	0	20	Nickel	Y	16.9	J	mg/kg
G061	0	29	Octachlorodibenzofuran	Y	11.476		pg/g
G062	0	20	Octachlorodibenzofuran	Y	110.931		pg/g
G061	**0**	**29**	**Octachlorodibenzo-p-dioxin**	**Y**	**1230.736**	**J**	**pg/g**
G062	**0**	**20**	**Octachlorodibenzo-p-dioxin**	**Y**	**2250.706**	**J**	**pg/g**
G061	0	29	Pentachlorodibenzofuran homologs	Y	4.932		pg/g
G062	0	20	Pentachlorodibenzofuran homologs	Y	20.955		pg/g
G061	0	29	Pentachlorodibenzo-p-dioxin homologs	Y	8.048		pg/g
G062	0	20	Pentachlorodibenzo-p-dioxin homologs	Y	7.639		pg/g
G062	**0**	**20**	**Pentachlorophenol**	**Y**	**4.6**	**J**	**ug/kg**
G059	0	22	Phenanthrene	Y	13		ug/kg
G061	0	29	Phenanthrene	Y	96		ug/kg
G062	0	20	Phenanthrene	Y	44		ug/kg
G059	0	22	Pyrene	Y	32		ug/kg
G061	0	29	Pyrene	Y	160		ug/kg
G062	0	20	Pyrene	Y	140		ug/kg
G061	0	29	Residual Range Hydrocarbons	Y	370	J	mg/kg
G062	0	20	Residual Range Hydrocarbons	Y	240	J	mg/kg
G059	0	22	Silver	Y	0.032		mg/kg
G061	0	29	Silver	Y	0.183		mg/kg
G062	0	20	Silver	Y	0.049		mg/kg
G061	0	29	Sulfide (S)	Y	16.3		mg/kg
G061	0	29	Tetrachlorodibenzofuran homologs	Y	1.743		pg/g
G062	0	20	Tetrachlorodibenzofuran homologs	Y	3.268		pg/g
G061	**0**	**29**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**0.165**		**pg/g**
G062	**0**	**20**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**1.253**		**pg/g**
G059	0	22	trans-Chlordane	Y	0.059	J	ug/kg
G062	0	20	trans-Chlordane	Y	0.159		ug/kg
G059	0	22	trans-Nonachlor	Y	0.038	NJ	ug/kg
G059	**0**	**22**	**Zinc**	**Y**	**56.2**		**mg/kg**
G061	**0**	**29**	**Zinc**	**Y**	**111**		**mg/kg**
G062	**0**	**20**	**Zinc**	**Y**	**65.6**		**mg/kg**

Notes

Bold indicates an analyte/contaminant detected in/on facility soils and/or groundwater and adjacent/receiving river sediments.

LWG00364

BZTO104(e)015512

Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C061	30	77	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	8.198		pg/g
C061	77	151	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	9.114		pg/g
C062	30	145	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	2.96	T	pg/g
C062	261	340	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Y	0.012	J	pg/g
C061	30	77	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	58.8		pg/g
C061	77	151	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	28.699		pg/g
C062	30	145	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	2.63	T	pg/g
C062	145	261	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Y	0.053	J	pg/g
C061	30	77	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Y	0.548	J	pg/g
C062	30	145	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Y	0.0715	JT	pg/g
C061	30	77	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	0.999		pg/g
C061	77	151	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	2.395		pg/g
C062	30	145	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	0.275	JT	pg/g
C062	145	261	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	0.015	J	pg/g
C062	261	340	1,2,3,4,7,8-Hexachlorodibenzofuran	Y	0.014	J	pg/g
C061	**30**	**77**	**1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**0.599**	**J**	**pg/g**
C061	**77**	**151**	**1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**0.205**	**J**	**pg/g**
C062	**30**	**145**	**1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**0.041**	**JT**	**pg/g**
C061	30	77	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	0.576	J	pg/g
C061	77	151	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	1.071		pg/g
C061	276	312	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	0.039	J	pg/g
C062	30	145	1,2,3,6,7,8-Hexachlorodibenzofuran	Y	0.241	JT	pg/g
C061	**30**	**77**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**3.128**		**pg/g**
C061	**77**	**151**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**1.161**		**pg/g**
C061	**276**	**312**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**0.084**	**J**	**pg/g**
C062	**30**	**145**	**1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin**	**Y**	**0.233**	**JT**	**pg/g**
C062	30	145	1,2,3,7,8,9-Hexachlorodibenzofuran	Y	0.011	JT	pg/g
C061	**30**	**77**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**1.762**		**pg/g**
C061	**77**	**151**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**0.597**	**J**	**pg/g**
C061	**276**	**312**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**0.05**	**J**	**pg/g**
C062	**30**	**145**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**0.16**	**JT**	**pg/g**
C062	**261**	**340**	**1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin**	**Y**	**0.017**	**J**	**pg/g**
C061	30	77	1,2,3,7,8-Pentachlorodibenzofuran	Y	0.41	J	pg/g
C061	77	151	1,2,3,7,8-Pentachlorodibenzofuran	Y	1.157		pg/g
C061	276	312	1,2,3,7,8-Pentachlorodibenzofuran	Y	0.016	J	pg/g
C062	30	145	1,2,3,7,8-Pentachlorodibenzofuran	Y	0.072	JT	pg/g
C061	30	77	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Y	0.332	J	pg/g
C061	77	151	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Y	0.138	J	pg/g
C062	30	145	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Y	0.058	JT	pg/g
C061	30	77	2,3,4,6,7,8-Hexachlorodibenzofuran	Y	0.593	J	pg/g
C061	77	151	2,3,4,6,7,8-Hexachlorodibenzofuran	Y	0.298	J	pg/g
C062	30	145	2,3,4,6,7,8-Hexachlorodibenzofuran	Y	0.129	JT	pg/g
C061	30	77	2,3,4,7,8-Pentachlorodibenzofuran	Y	0.244	J	pg/g
C061	77	151	2,3,4,7,8-Pentachlorodibenzofuran	Y	0.515	J	pg/g
C062	30	145	2,3,4,7,8-Pentachlorodibenzofuran	Y	0.0825	JT	pg/g
C061	30	77	2,3,7,8-Tetrachlorodibenzofuran	Y	0.366		pg/g
C061	77	151	2,3,7,8-Tetrachlorodibenzofuran	Y	0.624		pg/g
C061	**77**	**151**	**2,3,7,8-Tetrachlorodibenzo-p-dioxin**	**Y**	**0.1**	**J**	**pg/g**
C062	261	340	2,4'-DDE	Y	0.177	J	ug/kg
C061	30	77	2-Methylnaphthalene	Y	6.9		ug/kg

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Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C061	77	151	2-Methylnaphthalene	Y	130		ug/kg
C061	276	312	2-Methylnaphthalene	Y	5		ug/kg
C062	30	145	2-Methylnaphthalene	Y	9.2		ug/kg
C062	145	261	2-Methylnaphthalene	Y	3.9		ug/kg
C062	261	340	2-Methylnaphthalene	Y	0.73	J	ug/kg
C061	77	151	4-Methylphenol	Y	25	J	ug/kg
C062	145	261	4-Methylphenol	Y	5.1	J	ug/kg
C061	30	77	Acenaphthene	Y	31		ug/kg
C061	77	151	Acenaphthene	Y	210		ug/kg
C061	276	312	Acenaphthene	Y	4.1		ug/kg
C062	30	145	Acenaphthene	Y	1.7	J	ug/kg
C062	145	261	Acenaphthene	Y	1.7	J	ug/kg
C061	30	77	Acenaphthylene	Y	8.4		ug/kg
C061	77	151	Acenaphthylene	Y	61		ug/kg
C061	276	312	Acenaphthylene	Y	3.1		ug/kg
C062	30	145	Acenaphthylene	Y	3.6		ug/kg
C062	145	261	Acenaphthylene	Y	5.1		ug/kg
C061	**30**	**77**	**Acetone**	**Y**	**17**		**ug/kg**
C061	**77**	**151**	**Acetone**	**Y**	**12**		**ug/kg**
C061	**276**	**312**	**Acetone**	**Y**	**31**		**ug/kg**
C062	**145**	**261**	**Acetone**	**Y**	**110**		**ug/kg**
C062	145	261	Acrolein	Y	1.4	J	ug/kg
C062	30	145	alpha-Hexachlorocyclohexane	Y	0.552	NJ	ug/kg
C062	145	261	alpha-Hexachlorocyclohexane	Y	0.972	NJ	ug/kg
C061	30	77	Aluminum	Y	13300		mg/kg
C061	77	151	Aluminum	Y	23900		mg/kg
C061	276	312	Aluminum	Y	16700		mg/kg
C062	30	145	Aluminum	Y	9810	T	mg/kg
C062	145	261	Aluminum	Y	15800		mg/kg
C062	261	340	Aluminum	Y	11000		mg/kg
C061	30	77	Anthracene	Y	18		ug/kg
C061	77	151	Anthracene	Y	110		ug/kg
C061	276	312	Anthracene	Y	4.2		ug/kg
C062	30	145	Anthracene	Y	6.9		ug/kg
C062	145	261	Anthracene	Y	4.9		ug/kg
C061	30	77	Antimony	Y	0.31	J	mg/kg
C061	77	151	Antimony	Y	0.45	J	mg/kg
C061	276	312	Antimony	Y	0.13	J	mg/kg
C061	**30**	**77**	**Arsenic**	**Y**	**2.61**		**mg/kg**
C061	**77**	**151**	**Arsenic**	**Y**	**4.99**		**mg/kg**
C061	**276**	**312**	**Arsenic**	**Y**	**2.08**		**mg/kg**
C062	**30**	**145**	**Arsenic**	**Y**	**2.79**	**T**	**mg/kg**
C062	**145**	**261**	**Arsenic**	**Y**	**3.35**		**mg/kg**
C062	**261**	**340**	**Arsenic**	**Y**	**1.86**		**mg/kg**
C061	30	77	Benz(a)anthracene	Y	63		ug/kg
C061	77	151	Benz(a)anthracene	Y	330		ug/kg
C061	276	312	Benz(a)anthracene	Y	5.1		ug/kg
C062	30	145	Benz(a)anthracene	Y	22		ug/kg
C062	145	261	Benz(a)anthracene	Y	11		ug/kg
C061	**30**	**77**	**Benzene**	**Y**	**0.12**	**J**	**ug/kg**

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BZTO104(e)015514

Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C061	**276**	**312**	**Benzene**	**Y**	**0.14**	**J**	**ug/kg**
C062	**30**	**145**	**Benzene**	**Y**	**0.37**	**J**	**ug/kg**
C062	**145**	**261**	**Benzene**	**Y**	**1.4**		**ug/kg**
C062	**261**	**340**	**Benzene**	**Y**	**0.55**	**J**	**ug/kg**
C061	30	77	Benzo(a)pyrene	Y	70		ug/kg
C061	77	151	Benzo(a)pyrene	Y	410		ug/kg
C061	276	312	Benzo(a)pyrene	Y	7		ug/kg
C062	30	145	Benzo(a)pyrene	Y	24		ug/kg
C062	145	261	Benzo(a)pyrene	Y	15		ug/kg
C061	30	77	Benzo(b)fluoranthene	Y	67		ug/kg
C061	77	151	Benzo(b)fluoranthene	Y	270		ug/kg
C061	276	312	Benzo(b)fluoranthene	Y	4.4		ug/kg
C062	30	145	Benzo(b)fluoranthene	Y	23		ug/kg
C062	145	261	Benzo(b)fluoranthene	Y	14		ug/kg
C061	30	77	Benzo(g,h,i)perylene	Y	60		ug/kg
C061	77	151	Benzo(g,h,i)perylene	Y	330		ug/kg
C061	276	312	Benzo(g,h,i)perylene	Y	7.1		ug/kg
C062	30	145	Benzo(g,h,i)perylene	Y	23		ug/kg
C062	145	261	Benzo(g,h,i)perylene	Y	19		ug/kg
C061	30	77	Benzo(k)fluoranthene	Y	58		ug/kg
C061	77	151	Benzo(k)fluoranthene	Y	240		ug/kg
C061	276	312	Benzo(k)fluoranthene	Y	4		ug/kg
C062	30	145	Benzo(k)fluoranthene	Y	6.7		ug/kg
C062	145	261	Benzo(k)fluoranthene	Y	4.6		ug/kg
C062	30	145	beta-Endosulfan	Y	0.307	NJ	ug/kg
C062	145	261	beta-Endosulfan	Y	0.277	NJ	ug/kg
C062	30	145	beta-Hexachlorocyclohexane	Y	4.11	NJ	ug/kg
C062	145	261	beta-Hexachlorocyclohexane	Y	4.49	J	ug/kg
C062	261	340	beta-Hexachlorocyclohexane	Y	0.743	NJ	ug/kg
C061	**30**	**77**	**Bis(2-ethylhexyl) phthalate**	**Y**	**33**		**ug/kg**
C061	**77**	**151**	**Bis(2-ethylhexyl) phthalate**	**Y**	**25**	**J**	**ug/kg**
C061	**276**	**312**	**Bis(2-ethylhexyl) phthalate**	**Y**	**6.8**	**J**	**ug/kg**
C062	**145**	**261**	**Bis(2-ethylhexyl) phthalate**	**Y**	**63**		**ug/kg**
C061	30	77	Cadmium	Y	0.15		mg/kg
C061	77	151	Cadmium	Y	0.68		mg/kg
C061	276	312	Cadmium	Y	0.09		mg/kg
C062	30	145	Cadmium	Y	0.0915	T	mg/kg
C062	145	261	Cadmium	Y	0.121		mg/kg
C062	261	340	Cadmium	Y	0.08		mg/kg
C061	30	77	Carbazole	Y	4.8	J	ug/kg
C061	77	151	Carbazole	Y	17	J	ug/kg
C062	145	261	Chloroform	Y	0.093	J	ug/kg
C061	**30**	**77**	**Chromium**	**Y**	**18.9**		**mg/kg**
C061	**77**	**151**	**Chromium**	**Y**	**32.3**		**mg/kg**
C061	**276**	**312**	**Chromium**	**Y**	**23.9**		**mg/kg**
C062	**30**	**145**	**Chromium**	**Y**	**13.6**	**T**	**mg/kg**
C062	**145**	**261**	**Chromium**	**Y**	**19.5**		**mg/kg**
C062	**261**	**340**	**Chromium**	**Y**	**14.2**		**mg/kg**
C061	30	77	Chrysene	Y	94		ug/kg
C061	77	151	Chrysene	Y	440		ug/kg

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Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C061	276	312	Chrysene	Y	7.8		ug/kg
C062	30	145	Chrysene	Y	36		ug/kg
C062	145	261	Chrysene	Y	14		ug/kg
C061	**30**	**77**	**Copper**	**Y**	**18**		**mg/kg**
C061	**77**	**151**	**Copper**	**Y**	**33.5**		**mg/kg**
C061	**276**	**312**	**Copper**	**Y**	**35.4**		**mg/kg**
C062	**30**	**145**	**Copper**	**Y**	**11.6**	**T**	**mg/kg**
C062	**145**	**261**	**Copper**	**Y**	**17.3**		**mg/kg**
C062	**261**	**340**	**Copper**	**Y**	**12.4**		**mg/kg**
C061	30	77	Dibenz(a,h)anthracene	Y	8.6		ug/kg
C061	77	151	Dibenz(a,h)anthracene	Y	43		ug/kg
C061	276	312	Dibenz(a,h)anthracene	Y	0.57	J	ug/kg
C062	30	145	Dibenz(a,h)anthracene	Y	4		ug/kg
C062	145	261	Dibenz(a,h)anthracene	Y	1.7	J	ug/kg
C061	30	77	Dibenzofuran	Y	4.8		ug/kg
C061	77	151	Dibenzofuran	Y	46		ug/kg
C061	276	312	Dibenzofuran	Y	2.5	J	ug/kg
C062	30	145	Dibenzofuran	Y	1	J	ug/kg
C062	145	261	Dibenzofuran	Y	1.2	J	ug/kg
C061	30	77	Dibutyl phthalate	Y	4.1	J	ug/kg
C062	30	145	Dibutyl phthalate	Y	7.4	J	ug/kg
C062	261	340	Dibutyl phthalate	Y	3.8	J	ug/kg
C061	30	77	Diesel Range Hydrocarbons	Y	39	JT	mg/kg
C061	77	151	Diesel Range Hydrocarbons	Y	260	J	mg/kg
C062	30	145	Diesel Range Hydrocarbons	Y	64	JT	mg/kg
C062	145	261	Diesel Range Hydrocarbons	Y	24	J	mg/kg
C062	**145**	**261**	**Ethylbenzene**	**Y**	**0.29**	**J**	**ug/kg**
C061	30	77	Fluoranthene	Y	140		ug/kg
C061	77	151	Fluoranthene	Y	640		ug/kg
C061	276	312	Fluoranthene	Y	17		ug/kg
C062	30	145	Fluoranthene	Y	20		ug/kg
C062	145	261	Fluoranthene	Y	20		ug/kg
C061	30	77	Fluorene	Y	8.4		ug/kg
C061	77	151	Fluorene	Y	76		ug/kg
C061	276	312	Fluorene	Y	3.8		ug/kg
C062	30	145	Fluorene	Y	3.1		ug/kg
C062	145	261	Fluorene	Y	2.7		ug/kg
C062	30	145	gamma-Hexachlorocyclohexane	Y	3.78	NJ	ug/kg
C062	145	261	gamma-Hexachlorocyclohexane	Y	4.6	NJ	ug/kg
C062	261	340	gamma-Hexachlorocyclohexane	Y	1.36	NJ	ug/kg
C061	30	77	Heptachlorodibenzofuran homologs	Y	24.548		pg/g
C061	77	151	Heptachlorodibenzofuran homologs	Y	30		pg/g
C061	276	312	Heptachlorodibenzofuran homologs	Y	1.031		pg/g
C062	30	145	Heptachlorodibenzofuran homologs	Y	5.3	T	pg/g
C062	261	340	Heptachlorodibenzofuran homologs	Y	0.012		pg/g
C061	30	77	Heptachlorodibenzo-p-dioxin homologs	Y	112.186		pg/g
C061	77	151	Heptachlorodibenzo-p-dioxin homologs	Y	70.296		pg/g
C061	276	312	Heptachlorodibenzo-p-dioxin homologs	Y	4.342		pg/g
C062	30	145	Heptachlorodibenzo-p-dioxin homologs	Y	5.91	T	pg/g
C062	145	261	Heptachlorodibenzo-p-dioxin homologs	Y	0.12		pg/g

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Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C062	261	340	Heptachlorodibenzo-p-dioxin homologs	Y	0.224		pg/g
C062	**145**	**261**	**Hexachlorobenzene**	**Y**	**5.04**	**J**	**ug/kg**
C061	30	77	Hexachlorodibenzofuran homologs	Y	14.866		pg/g
C061	77	151	Hexachlorodibenzofuran homologs	Y	16.811		pg/g
C061	276	312	Hexachlorodibenzofuran homologs	Y	0.59		pg/g
C062	30	145	Hexachlorodibenzofuran homologs	Y	4.32	T	pg/g
C062	145	261	Hexachlorodibenzofuran homologs	Y	0.015		pg/g
C062	261	340	Hexachlorodibenzofuran homologs	Y	0.014		pg/g
C061	**30**	**77**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**19.555**		**pg/g**
C061	**77**	**151**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**9.984**		**pg/g**
C061	**276**	**312**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**0.882**		**pg/g**
C062	**30**	**145**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**2.31**	**T**	**pg/g**
C062	**145**	**261**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**0.023**		**pg/g**
C062	**261**	**340**	**Hexachlorodibenzo-p-dioxin homologs**	**Y**	**0.109**		**pg/g**
C062	145	261	Hexachloroethane	Y	6.37	J	ug/kg
C061	30	77	Indeno(1,2,3-cd)pyrene	Y	54		ug/kg
C061	77	151	Indeno(1,2,3-cd)pyrene	Y	300		ug/kg
C061	276	312	Indeno(1,2,3-cd)pyrene	Y	5		ug/kg
C062	30	145	Indeno(1,2,3-cd)pyrene	Y	18		ug/kg
C062	145	261	Indeno(1,2,3-cd)pyrene	Y	13		ug/kg
C061	**30**	**77**	**Lead**	**Y**	**11.4**		**mg/kg**
C061	**77**	**151**	**Lead**	**Y**	**26.8**		**mg/kg**
C061	**276**	**312**	**Lead**	**Y**	**3.47**		**mg/kg**
C062	**30**	**145**	**Lead**	**Y**	**9.19**	**T**	**mg/kg**
C062	**145**	**261**	**Lead**	**Y**	**5.64**		**mg/kg**
C062	**261**	**340**	**Lead**	**Y**	**2.87**		**mg/kg**
C061	30	77	Mercury	Y	0.035		mg/kg
C061	77	151	Mercury	Y	1.08		mg/kg
C061	276	312	Mercury	Y	0.07		mg/kg
C062	30	145	Mercury	Y	0.034	T	mg/kg
C062	145	261	Mercury	Y	0.032		mg/kg
C062	261	340	Mercury	Y	0.011	J	mg/kg
C061	30	77	Methyl tert-butyl ether	Y	1.2		ug/kg
C061	77	151	Methyl tert-butyl ether	Y	0.4	J	ug/kg
C061	276	312	Methyl tert-butyl ether	Y	0.43	J	ug/kg
C062	30	145	Methyl tert-butyl ether	Y	0.31	J	ug/kg
C062	145	261	Methyl tert-butyl ether	Y	0.72	J	ug/kg
C062	261	340	Methyl tert-butyl ether	Y	0.6	J	ug/kg
C062	145	261	Methylethyl ketone	Y	22	J	ug/kg
C062	261	340	Methylethyl ketone	Y	2.2	J	ug/kg
C061	**30**	**77**	**Naphthalene**	**Y**	**13**		**ug/kg**
C061	**77**	**151**	**Naphthalene**	**Y**	**270**		**ug/kg**
C061	**276**	**312**	**Naphthalene**	**Y**	**21**		**ug/kg**
C062	**145**	**261**	**Naphthalene**	**Y**	**0.66**	**J**	**ug/kg**
C061	30	77	Nickel	Y	19.4		mg/kg
C061	77	151	Nickel	Y	26.3		mg/kg
C061	276	312	Nickel	Y	24		mg/kg
C062	30	145	Nickel	Y	15.6	T	mg/kg
C062	145	261	Nickel	Y	19.7		mg/kg
C062	261	340	Nickel	Y	16.9		mg/kg

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Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C061	77	151	N-Nitrosodiphenylamine	Y	37	J	ug/kg
C061	77	151	Octachlorodibenzofuran	Y	18.761		pg/g
C062	30	145	Octachlorodibenzofuran	Y	1.9	JT	pg/g
C062	145	261	Octachlorodibenzofuran	Y	0.033	J	pg/g
C061	**30**	**77**	**Octachlorodibenzo-p-dioxin**	**Y**	**356.101**		**pg/g**
C061	**77**	**151**	**Octachlorodibenzo-p-dioxin**	**Y**	**329.006**		**pg/g**
C062	**30**	**145**	**Octachlorodibenzo-p-dioxin**	**Y**	**24.6**	**T**	**pg/g**
C062	**145**	**261**	**Octachlorodibenzo-p-dioxin**	**Y**	**0.499**	**J**	**pg/g**
C061	30	77	Pentachlorodibenzofuran homologs	Y	6.36		pg/g
C061	77	151	Pentachlorodibenzofuran homologs	Y	9.023		pg/g
C061	276	312	Pentachlorodibenzofuran homologs	Y	0.419		pg/g
C062	30	145	Pentachlorodibenzofuran homologs	Y	3.83	T	pg/g
C061	30	77	Pentachlorodibenzo-p-dioxin homologs	Y	2.841		pg/g
C061	77	151	Pentachlorodibenzo-p-dioxin homologs	Y	1.625		pg/g
C062	30	145	Pentachlorodibenzo-p-dioxin homologs	Y	0.729	T	pg/g
C062	261	340	Pentachlorodibenzo-p-dioxin homologs	Y	0.017		pg/g
C061	30	77	Phenanthrene	Y	100		ug/kg
C061	77	151	Phenanthrene	Y	830		ug/kg
C061	276	312	Phenanthrene	Y	23		ug/kg
C062	30	145	Phenanthrene	Y	27		ug/kg
C062	145	261	Phenanthrene	Y	18		ug/kg
C062	261	340	Phenol	Y	2.9	J	ug/kg
C061	30	77	Pyrene	Y	160		ug/kg
C061	77	151	Pyrene	Y	860		ug/kg
C061	276	312	Pyrene	Y	26		ug/kg
C062	30	145	Pyrene	Y	65		ug/kg
C062	145	261	Pyrene	Y	40		ug/kg
C061	77	151	Residual Range Organics	Y	420	J	mg/kg
C062	30	145	Residual Range Organics	Y	150	JT	mg/kg
C062	145	261	Residual Range Organics	Y	71	J	mg/kg
C061	77	151	Selenium	Y	0.08	J	mg/kg
C062	145	261	Selenium	Y	0.05	J	mg/kg
C061	30	77	Silver	Y	0.085		mg/kg
C061	77	151	Silver	Y	0.264		mg/kg
C061	276	312	Silver	Y	0.036		mg/kg
C062	30	145	Silver	Y	0.0285	T	mg/kg
C062	145	261	Silver	Y	0.047		mg/kg
C062	261	340	Silver	Y	0.021	J	mg/kg
C061	30	77	Tetrachlorodibenzofuran homologs	Y	2.505		pg/g
C061	77	151	Tetrachlorodibenzofuran homologs	Y	4.182		pg/g
C061	276	312	Tetrachlorodibenzofuran homologs	Y	0.05		pg/g
C062	30	145	Tetrachlorodibenzofuran homologs	Y	1.23	T	pg/g
C061	**30**	**77**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**0.365**		**pg/g**
C061	**77**	**151**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**1.055**		**pg/g**
C061	**276**	**312**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**0.048**		**pg/g**
C062	**30**	**145**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**0.297**	**T**	**pg/g**
C062	**261**	**340**	**Tetrachlorodibenzo-p-dioxin homologs**	**Y**	**0.027**		**pg/g**
C061	30	77	Trichloroethene	Y	0.2	J	ug/kg
C061	276	312	Trichloroethene	Y	0.71	J	ug/kg
C062	30	145	Trichloroethene	Y	0.51	J	ug/kg

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BZTO104(e)015518

Preliminary Round 2a Subsurface Sediment Sampling Results - Koppers/Time Oil Facility

Portland Harbor Superfund Site Study Area

Sample Location	Upper Depth (cm)	Lower Depth (cm)	Analyte	Detect Flag (Y or N)	Value	Qualifiers	Units
C062	145	261	Trichloroethene	Y	2.9		ug/kg
C062	261	340	Trichloroethene	Y	0.72	J	ug/kg
C061	**30**	**77**	**Zinc**	**Y**	**87.9**		**mg/kg**
C061	**77**	**151**	**Zinc**	**Y**	**198**		**mg/kg**
C061	**276**	**312**	**Zinc**	**Y**	**57.1**		**mg/kg**
C062	**30**	**145**	**Zinc**	**Y**	**54.6**	**T**	**mg/kg**
C062	**145**	**261**	**Zinc**	**Y**	**53.4**		**mg/kg**
C062	**261**	**340**	**Zinc**	**Y**	**44.8**		**mg/kg**

Notes

Bold indicates an analyte/contaminant detected in/on facility soils and/or groundwater and adjacent/receiving river sediments.

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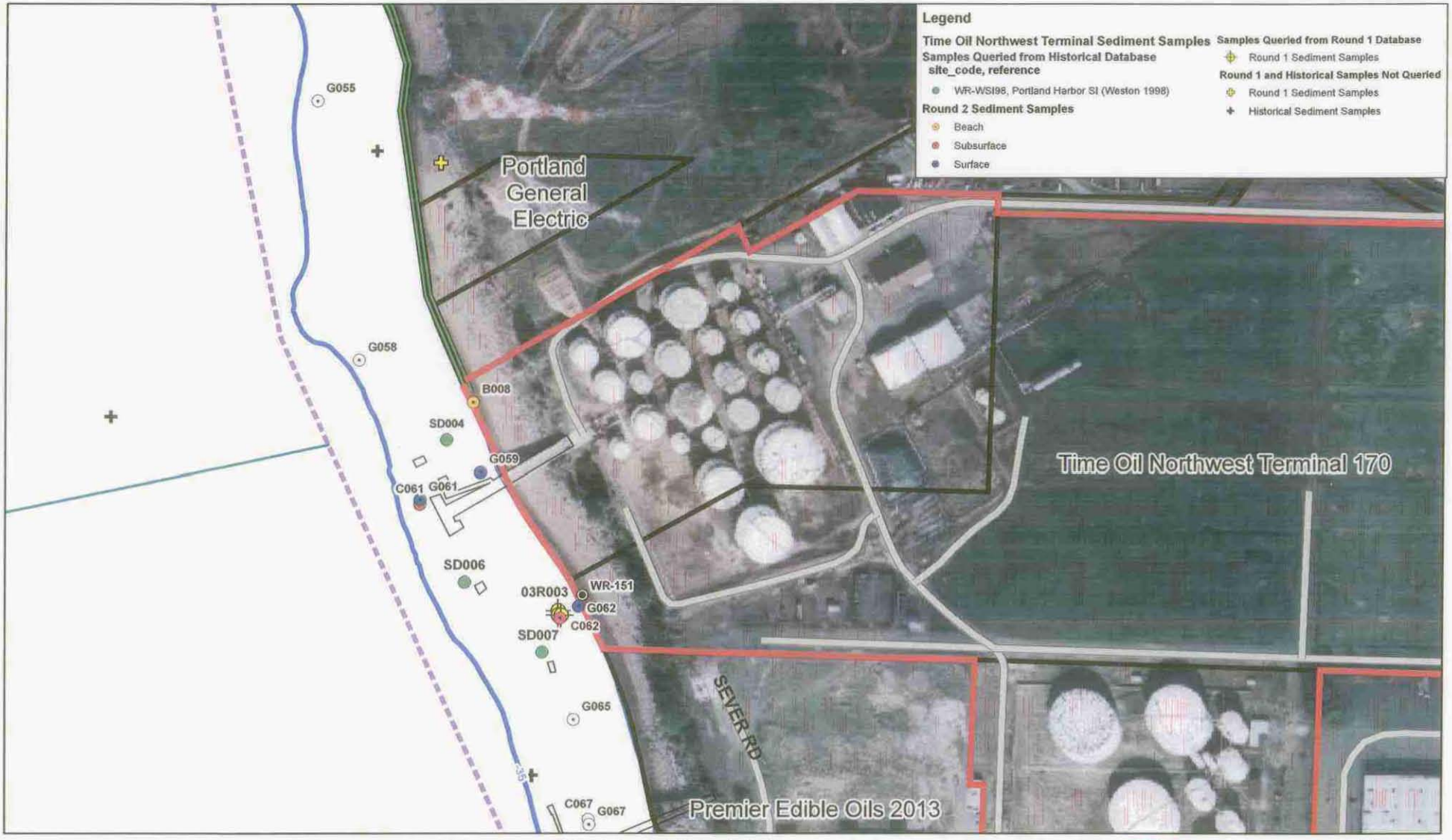

integral

LWG

Map Document: (C:\GIS\Projects\Portland_Harbor\LWG-Map-Projects\Conceptual_Site_Model\Sample_Locations.mxd)
Plot Date: 05/23/2004
Aerial Photo Date: October 2001.
Base Map features from Portland Metro's RLIS.

Outfall information contained on this map is accurate according to available records; however, the City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published (updated March 2005).

Outfalls
Seep Photo Location (Not location of actual Seep)
River Miles
Selected ECSI Site Property Boundary
Navigation Channel
-35ft. Contour (NAVD 88)
Docks & In-water Structures
Human Use Areas
Dockside Worker
Recreational Beach Use
Transient
Task_Code
Beach
Subsurface
Surface

0 100 200 400 Feet

DRAFT
DO NOT QUOTE OR CITE. This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Figure 1-Site Features
Portland Harbor
Time Oil Northwest Terminal
Former Koppers Facility
Historic, Round 1 and 2a
Sediment Samples

LWG00372

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

URGENT LEGAL MATTER
PRIORITY OVERNIGHT MAIL REQUESTED

April 28, 2006

Jill M. Blundon
President
Beazer East, Inc./Beazer Materials & Services, Inc.
1 Oxford Centre #3000
Pittsburgh, PA 15219

Re: Notice of Potential Liability for the Portland Harbor Superfund Site; Portland, Oregon

Dear Jill M. Blundon:

The United States Environmental Protection Agency ("EPA") is contacting you and your company regarding activities connected with the Portland Harbor Superfund Site (the "Site") located in Portland, Oregon. EPA believes your company and other potentially responsible parties ("PRPs") at the Site may be liable for money expended by EPA for response actions at the Site under the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), commonly known as the federal Superfund law.

EPA is contacting you and your company to confirm your potential responsibility for response costs incurred in the Portland Harbor Superfund Site and to request that you participate in the ongoing studies being undertaken, referred to as the remedial investigation and feasibility study (RI/FS). In response to the notice letters issued in 2000, 10 cooperating notice letter recipients entered into an Administrative Order on Consent ("AOC") with EPA for the performance of a RI/FS for the Site. These cooperating parties, along with five other notice letter recipients, have formed a coalition of private and public entities, known as the Lower Willamette Group ("LWG"), to jointly perform the RI/FS pursuant to the AOC. EPA is now providing you an opportunity to join in the investigation of the Site.

The parties who signed the AOC have conducted, with EPA oversight, extensive data collection and evaluation efforts. However, more data collection and analysis is required to determine the nature and extent of contamination and evaluate the risks to human health and the environment at the Site. RI/FS and PRP search efforts to date have confirmed your potential liability for the contamination at the Site. Therefore, EPA is requesting that you become a cooperating party for the RI/FS by participating in the LWG and entering into the AOC. A copy of the AOC is attached for your review.

LWG00605

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Explanation of Potential Liability

Under Section 107(a) of CERCLA, PRPs may be held liable for all costs incurred by the EPA (including interest) in responding to any release or threatened release of hazardous substances at the Site, unless the PRP can show any of the statutory defenses to liability. CERCLA PRPs include current and former owners and operators of a facility, as well as persons who arranged for treatment and/or disposal of any hazardous substances found at the Site, and persons who accepted hazardous substances for transport and selected the Site to which the hazardous substances were delivered

Based on the information that EPA evaluated during the course of its investigation of the Site, EPA believes that you may be liable under Section 107(a) of CERCLA, with respect to the Site, as an arranger for disposal at the Site. EPA has reason to believe that hazardous substances have been and/or are being released from the facility located at 10350 Time Oil Road, in Portland, Oregon, into the "study area" for the Portland Harbor Superfund Site, as defined under the AOC.

Settlement Opportunity

As noted earlier, an opportunity exists for you to become a cooperating party. There are advantages to joining the RI/FS process. By joining the RI/FS, you have an ability to shape the investigation and remedial alternatives that will be evaluated when EPA selects a remedy for the Site. Remaining outside of the process limits your opportunity to have a meaningful role in the critical decisions leading up to the development of the Proposed Plan.

Further, the LWG is beginning an allocation discussion in which they will develop a proposed allocation scheme for sharing costs of the RI/FS and remedial action among all identified PRPs. Even if you do not participate in the allocation, it is likely that you will be assigned a share in that process. Accordingly, it would be in your interest to be an active participant to ensure that your interests are fairly represented. Moreover, participating in the cleanup process will facilitate resolution of all viable PRPs' shares of responsibility for investigation and cleanup costs outside of court.

Respondents to the AOC also receive the benefit of obtaining an administrative settlement with EPA for the RI/FS work and costs. Such a settlement confers upon you the right to seek contribution from third parties for costs exceeding your fair share to the extent provided by the Superfund law. Through this AOC, you also receive statutory protection from third party lawsuits seeking contribution of their RI/FS costs.

If you choose not to join in the RI/FS by becoming a signatory to the AOC, EPA may take appropriate action which could include any of the following options: EPA may issue a Unilateral Administrative Order ("UAO") to you under Section 106(a) to perform some portion of the RI/FS work. Or, EPA may issue a Unilateral Participate and Cooperate Order requiring you to undertake completion of the RI/FS at the Site in cooperation with the PRPs who are already performing under the AOC. If you refuse to comply with an order issued against you, EPA may pursue civil litigation against you pursuant to Section 106(a) to compel compliance, or EPA may pursue a Section 107 cost recovery claim against you for costs incurred and to be

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incurred by EPA at the Site. In addition, EPA may pursue civil enforcement against you under Section 311(e) of the Federal Water Pollution Control Act, 33 U.S.C. § 132(e).

We strongly encourage you to contact the LWG to discuss your participation as a cooperating party for the performance or funding of the AOC. You may do so by contacting:

David Ashton
Port of Portland
P.O. Box 3529
121 NW Everett
Portland, OR 97208
(503) 944-7090
david.ashton@portofportland.com

William F. Joyce
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EPA understands that the LWG will soon be issuing an invitation for you and other PRPs to attend an informational meeting to discuss the LWG's past and ongoing activities and your potential participation in performing or funding the RI/FS. EPA representatives intend to participate in portions of such a meeting.

Reply Instructions

EPA asks that you provide a written response to this request for you to become a cooperating party before June 14, 2006. Your written response should be submitted to:

U.S. Environmental Protection Agency
Attn: Elizabeth McKenna, Attorney
Office of Regional Counsel
1200 Sixth Avenue, M/S ORC 158
Seattle, Washington 98101

Contacting Mr. Ashton or William Joyce alone will not be considered a sufficient response to EPA. If a response from you is not received by June 14, 2006, EPA will assume that you have declined this offer to become a signatory to the AOC and EPA may pursue, without further notice to you, one of the options for civil litigation and/or administrative relief, including issuance of a participate and cooperate order requiring you to undertake completion of the RI/FS at the Site in cooperation with the PRPs who are already performing under the AOC.

Questions may be directed to Ms. McKenna by contacting her at (206) 553-0016. At your request, Ms. McKenna will provide you with a standardized "letter of intent" for acknowledging

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your intent to engage in good faith negotiations to become a cooperating party and become a respondent to the existing AOC.

Sincerely,

Daniel D. Opalski, Director
Office of Environmental Cleanup

Enclosure:

Administrative Order on Consent

LWG00608

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EPA--REGION 10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION X

IN THE MATTER OF:	
Portland Harbor Superfund Site,	
ATOFINA Chemicals, Inc., Chevron U.S.A. Inc., Gunderson, Inc., Northwest Natural Gas, City of Portland, Port of Portland, Time Oil Co., Tosco Corporation, Union Pacific Railroad Company,	
RESPONDENTS,	
Proceeding Under Sections 104, 122(a), and 122(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C §§ 9604, 9622(a), 9622(d)(3).	**U.S. EPA Docket Number CERCLA-10-2001-0240**

ADMINISTRATIVE ORDER ON CONSENT
FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY

II. INTRODUCTION

1. This Administrative Order on Consent (Consent Order or Order) is entered into voluntarily by the United States Environmental Protection Agency (EPA) and the above-captioned Respondents. This Consent Order concerns the preparation of and performance of, and reimbursement for all costs incurred by EPA in connection with a Remedial Investigation and Feasibility Study (RI/FS) for the Portland Harbor Superfund Site (Site) in the state of Oregon.

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II. JURISDICTION

1. This Consent Order is issued under the authority vested in the President of the United States by Sections 104, 122(a), and 122(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9604, 9622(a), and 9622(d)(3) (CERCLA). This authority was delegated to the Administrator of EPA on January 23, 1987, by Executive Order 12580, 52 Fed. Reg. 2926 (1987), and further delegated to Regional Administrators by EPA Delegation No. 14-14-C. This authority has been redelegated by the Regional Administrator to the Region X Director, Environmental Cleanup Office, and Unit Managers thereunder. This Consent Order is further supplemented by authority vested in the President of the United States by Section 311(e) of the Federal Water Pollution Control Act, 33 U.S.C. § 1321(e), as amended (CWA), and Oil Pollution Act of 1990, 33 U.S.C. § 2701 et seq. This authority has been delegated to the Administrator of EPA by Executive Order No. 12777, 58 Fed. Reg. 54757 (1991), and further delegated to the Regional Administrators by EPA Delegation Nos. (2-85, 2-89), and redelegated by the Regional Administrator to the Region X Director, Environmental Cleanup Office.

2. Respondents agree to undertake all actions required by this Consent Order. In any action by EPA or the United States to enforce this Consent Order, Respondents consent to and agree not to contest the authority or jurisdiction of EPA to issue or enforce this Consent Order, and agree not to contest the validity of this Order.

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III.PARTIES BOUND

1. This Consent Order shall apply to and be binding upon EPA, and shall be binding upon Respondents, their agents, successors, assigns, officers, directors, and principals. Respondents are jointly and severally responsible for carrying out all actions required of them by this Consent Order. The signatories to this Consent Order certify that they are authorized to execute and legally bind the parties they represent to this Consent Order. No change in the ownership or corporate status of any Respondent or of any facility or the Site shall alter Respondents' responsibilities under this Consent Order.

2. Respondents shall provide a copy of this Consent Order to any subsequent owners or successors before ownership rights are transferred in any corporate acquisition or other transaction that results in: 1) the transfer of substantially all the assets of any entity that is a signatory to the Consent Order, or 2) the transfer of substantially all of the assets related to the Site (whether or not that constitutes substantially all the assets of the entity as a whole), or 3) constitutes a transfer of ownership rights that results in a change of control of any entity that is a signatory to this Consent Order. Respondents shall provide a copy of this Consent Order to all contractors, subcontractors, laboratories, and consultants which are retained to conduct any work performed under this Consent Order, within fourteen (14) days after the effective date of this Consent Order or the date of retaining their services, whichever is later. Respondents shall condition any such contracts upon satisfactory compliance with this Consent Order. Notwithstanding the terms of any contract, Respondents are responsible for compliance with this Consent Order and for ensuring that their subsidiaries, employees, contractors, consultants, subcontractors, agents, and attorneys comply with this Consent Order, to the extent that these persons are associated with the Site or perform any work or tasks for or on behalf of Respondents in furtherance of compliance with this Order.

IV. STATEMENT OF PURPOSE

1. In entering into this Consent Order, the objectives of EPA and Respondents are: (a) to determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site, including oil, by conducting an RI including identification of early actions which shall not be implemented or performed pursuant to this Order; (b) to determine and evaluate alternatives for remedial action to prevent, mitigate, or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site, by conducting an FS; (c) to recover response and oversight costs incurred by EPA and its Support Agency, the Oregon Department of Environmental Quality (DEQ), with respect to this Consent Order; and, (d) to accomplish the objectives as further described in the Statement of Work (SOW) (Attachment A), and the Stipulation Agreement (Attachment B), which are incorporated into this Order by this reference and made a part hereof as if fully set forth herein.

2. The activities conducted under this Consent Order are subject to approval by EPA. Respondents shall provide all appropriate necessary information for the RI/FS for a CERCLA Record of Decision (ROD) that is consistent with CERCLA and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, as now or hereafter amended. The activities conducted under this Consent Order shall be conducted in compliance with the NCP and consistent with all applicable EPA guidance, policies, and procedures.

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V.FINDINGS OF FACT

EPA makes the following Findings of Fact, which the Respondents neither admit nor deny:

1. The Site consists of the areal extent of contamination, and all suitable areas in proximity to the contamination necessary for implementation of response action, at, from and to the Portland Harbor Superfund Site Assessment Area from approximately River Mile (RM) 3.5 to RM 9.2 (Assessment Area), including uplands portions of the Site that contain sources of contamination to the sediments at, on or within the Willamette River. The boundaries of the Site will be initially determined upon issuance of a Record of Decision. RI/FS work for uplands facilities is being or will be conducted pursuant to separate agreements or orders issued by DEQ or EPA and is not covered by this Order which is for the in-water portion of the Site. Portland Harbor and the River have served as a major industrial water corridor for more than a century. Industrial use of the Harbor and River has been extensive. The River is also habitat to wildlife, numerous fish, shellfish, and other aquatic species, including species listed under the Endangered Species Act (ESA). The Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Confederated Tribes of the Warm Springs Reservation of Oregon have treaty-reserved rights and resources, and/or other rights, interests, or resources in the Site.

2. EPA and DEQ have agreed to share responsibility for investigation and cleanup of the Site. DEQ has the lead responsibility for conducting upland work necessary for source control, and EPA is the Support Agency for that work, consistent with the role of Support Agency as set forth in the NCP. DEQ may elect for any reason to ask EPA to assume Lead Agency responsibility for any upland source control, which shall in no event be within the scope of this Order. EPA has the lead responsibility for conducting in-water work, including coordination of EPA's lead work with DEQ's source identification and source control activities. DEQ is the Support Agency for EPA's in-water work, consistent with the role of Support Agency as set forth in the NCP.

3. Based on site assessment activities conducted by EPA in the Assessment Area, contaminants found in the Assessment Area include, but are not limited to, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-dioxins and furans (PCDD/PCDF), total petroleum hydrocarbons (TPHs), semi-volatile organic compounds (SVOCs), dichloro-diphenyl-trichloroethane (DDT) and other pesticides, herbicides, tributyl tin, mercury and other metals, and phthalates. The Site has been the subject of several studies by government and private entities. The Site has also been subject to historic dredging activities for many years. Sources of releases to the Site include releases over a long history of commercial shipping activities, releases from industrial and commercial operations, sewer outfalls, urban storm runoff, and agricultural runoff.

4. The Site has been listed on the National Priorities List pursuant to Section 105 of CERCLA, 42 U.S.C. 9605, at 65 Fed. Reg. 75179-01, December 1, 2000.

5. Respondent ATOFINA Chemicals, Inc. is a Pennsylvania Corporation doing business in the state of Oregon, primarily engaged in chemicals manufacturing. Respondent Chevron U.S.A. Inc. is a Pennsylvania Corporation doing business in the state of Oregon, primarily engaged in petroleum product production and distribution. Respondent Gunderson, Inc. is an Oregon Corporation primarily engaged in rail car and barge manufacturing. Respondent Northwest Natural Gas is an Oregon Corporation primarily engaged in the distribution of natural gas. Respondent Time Oil Co. is a Washington Corporation doing business in the state of Oregon, primarily engaged in retail petroleum distribution. Respondent Tosco Corporation is a Nevada Corporation doing business in the state of

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Oregon, primarily engaged in oil refining and petroleum product distribution and sales. Respondent Union Pacific Railroad is a Delaware Corporation doing business in the state of Oregon, primarily engaged in railroad transportation. Respondent Port of Portland is a public port duly organized under Oregon law. Respondent City of Portland is the most populous municipality in the state of Oregon.

6. EPA has not yet performed a potentially responsible party (PRP) search for the Site. Additional parties may be identified as potentially liable for releases and contamination at the Site.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

EPA makes the following Conclusions of Law and Determinations which Respondents neither admit nor deny.

1. The Site is a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9), and includes onshore facilities, offshore facilities, and inland waters of the United States and navigable waters, as defined in Sections 311(a)(10), (11) and (16) of CWA, 33 U.S.C. § 1321(a), and Sections 1001(24) and (21) of OPA, 33 U.S.C. §2701(24) and (21).

2. Wastes and constituents thereof at the Site, as identified in the preceding Section, are "hazardous substances" as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or constitute "any pollutant or contaminant" that may present an imminent and substantial danger to public health or welfare under Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1). TPHs at the Site, as identified in the preceding Section, are from discharges of oil, as defined in Sections 311(a)(1) and (2) of CWA, 33 U.S.C. § 1321(a)(1) and (2), and Sections 1001(23) and (7) of OPA, 33 U.S.C. §2701(23) and (7).

3. The presence of hazardous substances at the Site or the past, present, or potential migration of hazardous substances currently located at or emanating from the Site, constitute actual and/or threatened "releases" as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22). The presence of actual or threatened discharges of oil at the Site from vessels and/or facilities in violation of Section 311(b) of CWA, 33 U.S.C. § 1321(b), may be an imminent and substantial threat to the public health or welfare of the United States, including fish, shellfish, wildlife, public and private property, shorelines, beaches, habitat, and/or other living and nonliving natural resources under the jurisdiction or control of the United States.

4. Each Respondent is a "person" as defined in Section 101(21) of CERCLA, 42 U.S.C. § 9601(21), and/or Section 311(a)(7) of CWA, 33 U.S.C. § 1321(a)(7), and Section 1001(27) of OPA, 33 U.S.C. § 2701(27).

5. Each Respondent is a responsible party under Sections 104, 106, 107, and 122 of CERCLA, 42 U.S.C. §§ 9604, 9606, 9607, and 9622. In lieu of issuing an order to compel Respondents to conduct the RI/FS, or seeking reimbursement from Respondents for EPA's conduct of the RI/FS, EPA has entered into this Order through which Respondents have agreed to conduct the RI/FS.

6. The actions required by this Consent Order are necessary to protect the public health and welfare and the environment, are in the public interest, are consistent with CERCLA and the NCP, 42 U.S.C. §§ 9604(a)(1), will expedite effective remedial action and minimize litigation, 42 U.S.C. § 9622(a), and are consistent with Section 311 of CWA, OPA., and regulations thereunder.

VII. WORK TO BE PERFORMED

1. All work performed under this Consent Order shall be under the direction and supervision of qualified personnel. Within thirty (30) days of the effective date of this Order, and before the work outlined below begins, Respondents shall notify EPA in writing, of the names, titles, and qualifications of the personnel, including contractors, subcontractors, consultants, and laboratories to be used in carrying out such work. The qualifications of the persons undertaking the work for Respondents shall be subject to EPA review, for verification that such persons meet minimum technical background and experience requirements.

2. This Order is contingent on Respondents' demonstration to EPA's satisfaction that Respondents are qualified to perform properly and promptly the actions set forth in this Consent Order. If EPA disapproves, in writing, of any person(s)' technical qualifications Respondents shall notify EPA of the identity and qualifications of the replacement(s) within thirty (30) days of the written notice. If EPA subsequently disapproves of the replacement(s), EPA reserves the right to terminate this Order and to conduct a complete RI/FS, and to seek reimbursement for costs and penalties from Respondents. During the course of the RI/FS, Respondents shall notify EPA in writing of any changes or additions in the personnel used to carry out such work, providing their names, titles, and qualifications. EPA shall have the same right to approve changes and additions to personnel as they have hereunder regarding the initial notification.

3. Respondents shall conduct activities and submit deliverables as provided in the attached SOW. All such work shall be conducted in accordance with CERCLA, the NCP, as now or hereafter amended, and EPA guidance including, but not limited to, the "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (OSWER Directive # 9355.3-01), "Guidance for Data Usability in Risk Assessment" (OSWER Directive # 9285.7-05) and guidance referenced therein, and guidance referenced in the SOW, as may be amended or modified by EPA. The general activities that Respondents are required to perform are identified below, followed by a list of deliverables. The tasks that Respondents must perform are described more fully in the SOW.

4. For the purposes of this Order, day means calendar day unless otherwise noted in this Order. In addition, all deliverables, including progress reports, to be submitted to EPA pursuant to this Consent Order shall also be submitted to the Designated Project Coordinators listed in Section XV of this Order.

A. Task 1: Shared Server. Within ninety (90) days of the effective date of this Order, Respondents shall develop a shared server as described in the attached SOW to facilitate project management.

B. Task 2: Scoping. EPA has determined the preliminary Site-specific objectives of the RI/FS and has devised a general management approach for the Site as set forth in the attached SOW. Respondents shall conduct the remainder of scoping activities as described in the SOW and referenced guidance. Within sixty (60) days of the effective date of this Order, Respondents shall meet with EPA and DEQ to determine the most efficient manner for understanding and incorporating EPA and DEQ upland information into the scoping task, and shall document conclusions reached during this meeting in a technical memorandum. Within two hundred ten (210) days of the effective date of this Order, Respondents shall gather, evaluate, and present the existing Site information and data as described in the SOW. During, and at the conclusion of project scoping, Respondents shall submit the following deliverables to EPA for review and approval:

i. Site Background

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a. Within ninety (90) days of the effective date of this Order, Respondents shall submit a proposal for design of the Site relational database to EPA. If EPA disapproves of or requires revisions to the proposal for the Site relational database, in whole or in part, Respondents shall amend and submit a revised proposal for design of the Site relational database to EPA which is responsive to the directions in all EPA comments, within sixty (60) days of receiving EPA's comments.

b. Within ninety (90) days of the effective date of this Order, Respondents shall submit Data Quality Objectives to EPA which specify the usefulness of existing data. If EPA disapproves of or requires revisions to the Data Quality Objectives, in whole or in part, Respondents shall amend and submit the revised Data Quality Objectives to EPA which are responsive to the directions in all EPA comments, within sixty (60) days of receiving EPA's comments.

c. Within two hundred ten (210) days of the effective date of this Order, or within sixty (60) days of receiving EPA's comments on the design of the Site relational database, whichever is later, Respondents shall complete the Site relational database. If EPA disapproves of or requires revisions to the Site relational database, in whole or in part, Respondents shall revise the Site relational database in a manner responsive to the directions of EPA, within thirty (30) days of receiving EPA's comments. Within one hundred fifty (150) days of Respondents' receipt of a memorandum from EPA describing the requirements of the cultural resources analysis, or such longer time for submittal as EPA may determine, Respondents shall submit this analysis.

d. Within two hundred ten (210) days of the effective date of this Order, Respondents shall construct and complete a table that identifies data gaps, lists the preferred method of filling those gaps, and specifically addresses how additional data will be used. The table shall include an analysis identifying additional information and data that will be required to complete the baseline human health and ecological risk assessments, and to identify and screen remedial action alternatives. If EPA disapproves of or requires revisions to the table, in whole or in part, Respondents shall amend and submit a revised table to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

e. Within ninety (90) days of the effective date of this Order, Respondents shall conduct a Site visit by boat, document collected information in a trip report primarily consisting of a narrated video, and submit a Site visit trip report to EPA. If EPA disapproves of or requires revisions to the trip report, in whole or in part, Respondents shall amend and submit the revised trip report to EPA which is responsive to the directions in all EPA comments, within sixty (60) days of receiving EPA's comments.

ii. Project Planning.

a. Within one hundred twenty (120) days of the effective date of this Order, Respondents shall meet with EPA and submit a draft risk assessment scoping memorandum that includes preliminary analytical concentration goals described in the SOW. If EPA disapproves of or requires revisions to the memorandum, in whole or in part, Respondents shall amend and submit the revised memorandum to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

b. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit and/or complete deliverables and/or work products described in the attached Stipulated Agreement. If EPA disapproves of or requires revisions to any deliverable or work product described in the Stipulated Agreement, in whole or in part, Respondents shall amend and submit a revised deliverable or work product to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

c. Within one hundred fifty (150) days of the effective date of this Order, Respondents shall submit a preliminary conceptual Site model (CSM) to EPA. If EPA disapproves of or requires revisions to the preliminary CSM, in whole or in part, Respondents shall amend and submit the revised preliminary CSM to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

d. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit a draft technical memorandum to EPA identifying potential criteria for identification of candidate early action areas, and which then uses these criteria to identify areas that may be candidates for early action. If EPA disapproves of or requires revisions to the memorandum, in whole or in part, Respondents shall amend and submit a memorandum to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

e. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit draft technical memoranda to EPA that identifies preliminary RAOs, describes the process needed to identify and obtain disposal site options for contaminated sediment, identifies potential sources of sediment capping materials and outlines testing requirements needed to evaluate the acceptability of the material, and identifies the data needed to evaluate natural attenuation. If EPA disapproves of or requires revisions to any one or more of these memoranda, in whole or in part, Respondents shall amend and submit a revised memorandum to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

f. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit a draft RI/FS work plan for the Initial Study Area (ISA) and adjacent areas as these areas are described in the SOW to EPA, which shall document the decisions and evaluations completed during the scoping process. If EPA disapproves of or requires revisions to the draft RI/FS work plan, in whole or in part, Respondents shall amend and submit a revised work plan to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

g. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit the sampling & analysis plan (SAP) to EPA. This plan shall consist of a field sampling plan (FSP) and a quality assurance project plan (QAPP), as described in the SOW and applicable guidance. If EPA disapproves of or requires revisions to any of these plans, in whole or in part, Respondents shall amend and submit a revised plans to EPA which are responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

h. Within two hundred ten (210) days of the effective date of this Order, Respondents shall submit a project management plan, a data management plan, and a site health & safety plan to EPA, as described in the SOW. If EPA disapproves of or requires revisions to any of these plans, in whole or in part, Respondents shall amend and submit revised plans to EPA which are responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

iii. Following approval or modification by EPA of deliverables submitted by Respondents, such deliverables shall be incorporated by reference herein.

C. Task 3: Community Relations Plan. EPA will prepare an in-water Community Relations/Public Participation Plan, in accordance with EPA guidance and the NCP. Respondents shall provide information supporting EPA's in-water community relations programs. (See SOW for Task 4.)

D. Task 5: Site Characterization. Following EPA approval or modification of the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, and the SAP, or following EPA approval or modification of any required addenda for these plans, Respondents shall implement the

provisions of these plans to characterize the Site. Respondents shall complete Site characterization within twelve (12) months of EPA approval or modification of the RI/FS work plan for the ISA and adjacent areas, or in accordance with the approved project schedule. Respondents shall provide EPA with analytical data within sixty (60) days of each sampling activity, in an electronic format showing the location, medium, and results. Respondents shall notify EPA in writing within seven (7) days of completion of field activities. During Site characterization, Respondents shall provide EPA with the following deliverables, as described in the SOW and/or work plan.

i. If EPA determines, or Respondents propose and EPA approves the proposal that modeling is appropriate, within sixty (60) days of approval of the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, Respondents shall submit a technical memorandum on modeling of Site characteristics, as described in the SOW. If EPA disapproves of or requires revisions to the technical memorandum on modeling of Site characteristics, in whole or in part, Respondents shall amend and submit a revised technical memorandum on modeling of Site characteristics to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

ii. Within one hundred twenty (120) days after completion of field sampling and analysis, as specified in the SOW, for the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, or as may be required for subsequent work plan addenda, Respondents shall submit a Site characterization summary to EPA. If EPA disapproves of or requires revisions to the Site characterization summary, in whole or in part, Respondents shall amend and submit a revised Site characterization summary to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

E. Draft Remedial Investigation Report. Within one hundred twenty (120) days after completion of field sampling and analysis, as specified in the SOW, and after completion of work set forth in the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, and any subsequent addenda as determined to be necessary by EPA, Respondents shall submit a draft remedial investigation report (RI report) consistent with the SOW, work plans, and SAP. If EPA disapproves of or requires revisions to the draft RI report, in whole or in part, Respondents shall amend and submit a revised RI report to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

F. Task 6: Treatability Studies. Respondents shall conduct treatability studies, except where Respondents can demonstrate to EPA's satisfaction that they are not needed. Major components of the treatability studies include determination of the need for, and scope of, studies, the design of the studies, and the completion of the studies, as described in the SOW. During treatability studies, Respondents shall submit the following deliverables to EPA:

i. An identification of candidate technologies memorandum shall be submitted within sixty (60) days of receipt of EPA's written confirmation notice that treatability studies are required. If EPA disapproves of or requires revisions to the technical memorandum identifying candidate technologies, in whole or in part, Respondents shall amend and submit a revised technical memorandum identifying candidate technologies to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

ii. If EPA determines that treatability testing is required, within ninety (90) days of receipt of EPA's written confirmation notice that treatability studies are required or such longer time as EPA may specify, Respondents shall submit a treatability testing statement of work. If EPA disapproves of or requires revisions to the treatability testing statement of work, in whole or in part, Respondents

shall amend and submit a revised treatability testing statement of work to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

iii. Within sixty (60) days of receipt of EPA's written comments on the treatability testing statement of work, Respondents shall submit a treatability testing work plan, including a schedule to EPA. If EPA disapproves of or requires revisions to the treatability testing work plan, in whole or in part, Respondents shall amend and submit a revised Treatability Testing Work Plan to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

iv. Within sixty (60) days of the identification of the need for a separate or revised QAPP or FSP, Respondents shall submit a treatability study SAP to EPA. If EPA disapproves of or requires revisions to the treatability study SAP, in whole or in part, Respondents shall amend and submit a revised treatability study SAP to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

v. Within sixty (60) days of the identification of the need for a revised health & safety plan, Respondents shall submit a treatability study Site health & safety plan to EPA.

vi. Within one hundred twenty (120) days of completion of any treatability testing, Respondents shall submit a treatability study evaluation report as provided in the SOW and/or work plan to EPA. If EPA disapproves of or requires revisions to the treatability study report, in whole or in part, Respondents shall amend and submit a Revised treatability study report to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

G. Task 7: Development and Screening of Remedial Alternatives. Respondents shall develop an appropriate range of waste management options that will be evaluated through the development and screening of alternatives, as provided in the SOW. During the development and screening of alternatives, Respondents shall submit the following deliverables to EPA:

i. Within ninety (90) days after receipt of EPA's comments on the draft RI report, Respondents shall refine and document Site-specific RAOs using data collected during site characterization, and using results of the baseline human health and ecological risk assessments; if the risk assessments are not completed and approved by EPA by this time, Respondents shall use whatever draft baseline risk assessment information and data has been generated by the time refined Site-specific RAOs are due to EPA. If the refined RAOs are submitted to EPA prior to approval of the baseline risk assessment reports, after thirty (30) days of such written EPA approval of these reports, Respondents shall submit revised Site-specific RAOs. If EPA disapproves of or requires revisions to the Site-specific RAOs, in whole or in part, Respondents shall amend and submit revised Site-specific RAOs to EPA which are responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

ii. Within ninety (90) days after receipt of EPA's comments on the Site-specific RAOs, Respondents shall submit a memorandum summarizing the development and screening of remedial alternatives, including an alternatives array document as described in the SOW, to EPA. If EPA disapproves of or requires revisions to the memorandum summarizing the development and screening of remedial alternatives, in whole or in part, Respondents shall amend and submit a revised memorandum summarizing the development and screening of remedial alternatives to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments.

H. Task 8: Detailed Analysis of Remedial Alternatives. Respondents shall conduct a detailed analysis of remedial alternatives, as described in the SOW. During the detailed analysis of alternatives, Respondents shall provide the following to EPA:

i. Within one hundred twenty (120) days after receipt of EPA's comments on the memorandum summarizing the development and screening of remedial alternatives, Respondents shall submit a report on comparative analyses to EPA summarizing the results of the comparative analyses performed among the remedial alternatives. If EPA disapproves of or requires revisions to the report on comparative analyses, Respondents shall amend and submit a revised report on comparative analyses to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments. Within two (2) weeks of submitting the original report on comparative analyses, Respondents shall make a presentation to EPA during which Respondents shall summarize the findings of the RI and RAOs, and present the results of the nine criteria evaluation and comparative analyses, as described in the SOW.

ii. Within ninety (90) days after receipt of EPA's comments on the report on comparative analyses, Respondents shall submit a draft FS report which reflects the data collected during site characterization, the Site-specific RAOs, and the results of the baseline human health and ecological risk assessments. Respondents shall refer to Table 6-5 of the RI/FS Guidance for report content and format. If EPA disapproves of or requires revisions to the draft FS report, in whole or in part, Respondents shall amend and submit a revised FS report to EPA which is responsive to the directions in all EPA comments, within thirty (30) days of receiving EPA's comments. The report, as amended, and the administrative record, shall provide the basis for the Proposed Plan under CERCLA §§ 113(k) and 117(a) by EPA, and shall document the development and analysis of remedial alternatives.

iii. Upon receipt of the draft FS report, EPA will evaluate, as necessary, the estimates of the risk to the public and environment that are expected to remain after a particular remedial alternative has been completed.

VIII. BASELINE RISK ASSESSMENTS

1. The baseline risk assessments shall be performed as set forth in the SOW.

2. If EPA does not approve of Respondents' qualifications to conduct the baseline risk assessments, EPA will determine the appropriate means of conducting the baseline risk assessments.

IXIX. APPROVALS/MODIFICATIONS

1. EPA reserves the right to comment on, modify, and direct changes for all deliverables in writing. EPA's review will include consultation with DEQ, Tribes, and Natural Resource Trustees. EPA will meet with the Respondents in an effort to resolve disputes. At EPA's discretion, Respondents must fully correct all deficiencies and incorporate and integrate all information and comments supplied by EPA either in subsequent or resubmitted deliverables within a time frame specified by EPA. EPA will consider input from Respondents in specifying such timeframes.

2. Respondents shall not proceed further with any dependent subsequent activities or tasks until Respondents receive EPA approval for all deliverables identified in Section VII.4, including the following deliverables: draft RI/FS work plan described in subparagraph B. Task 2.ii.f, above, draft RI report, treatability testing work plan, draft FS report, and those deliverables identified by EPA related to the baseline risk assessments. While awaiting EPA approval on these deliverables, Respondents shall proceed with all other tasks and activities which may be conducted independently of these deliverables, in accordance with the schedule set forth in this Consent Order.

3. For all remaining deliverables not enumerated in Section VII.4 above, Respondents shall proceed with all subsequent tasks, activities, and deliverables. EPA reserves the right

to stop Respondents from proceeding further, either temporarily or permanently, on any task, activity, or deliverable at any point during the RI/FS.

4. If Respondents amend or revise a report, plan, or other submittal in response to EPA comments, and EPA subsequently disapproves of the revised submittal, or if such subsequent submittals do not fully reflect EPA's directions for changes, EPA retains the right to seek penalties, perform its own studies, complete the RI/FS (or any portion of the RI/FS) under CERCLA and the NCP, and seek reimbursement from Respondents for costs, and/or seek any other appropriate relief.

5. If EPA takes over some of the tasks, but not the preparation of the RI/FS, Respondents shall incorporate and integrate information supplied by EPA into the final RI/FS report.

6. Neither failure of EPA to expressly approve or disapprove of Respondents' submissions within any specified time period(s), nor the absence of comments, shall be construed as approval by EPA. EPA will provide approvals and disapprovals of deliverables required pursuant to this Order in writing.

7. Respondents shall, prior to any off-Site shipment of hazardous substances from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving state and to EPA's Designated Project Coordinators of such shipment of hazardous substances. However, the notification of shipments shall not apply to any such off-Site shipments when the total volume of such shipments will not exceed ten (10) cubic yards. The notification shall be in writing, and shall include the following information, where available: (1) the name and location of the facility to which the hazardous substances are to be shipped; (2) the type and quantity of the hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method of transportation. Respondents shall notify the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state, or to a facility in another state.

X. MODIFICATION OF THE WORK PLAN

1. If at any time during the RI/FS process, Respondents identify a need for additional data or need for a change in any element of the work plan, a memorandum documenting the need for additional data or other change shall be submitted to the EPA Project Coordinator within twenty (20) days of identification. EPA, in its discretion, will determine whether the additional data will be collected by Respondents or the requested change made and whether it will be incorporated into reports and deliverables.

2. Upon discovery of conditions posing an immediate threat to human health or welfare or the environment, Respondents shall notify EPA immediately. In the event of unanticipated or changed circumstances at the Site, Respondents shall notify the EPA Project Coordinator by telephone within twenty-four (24) hours of discovery of the unanticipated or changed circumstances. If EPA determines that the immediate threat or the unanticipated or changed circumstances warrant changes in the work plans, in addition to EPA's authorities in the NCP, EPA may modify or amend the work plans consistent with this Order, in writing. Respondents shall perform the work plans as modified or amended.

3. EPA may determine that in addition to tasks defined in the initially approved work plans, other additional work may be necessary to accomplish the objectives of the RI/FS. EPA may require Respondents to perform these response actions in addition to those required by this Order.

Respondents shall confirm their willingness to perform the additional work, in writing, to EPA within seven (7) days of receipt of the EPA request or Respondents shall invoke dispute resolution. Subject to EPA resolution of any dispute, Respondents shall implement the additional tasks which EPA determines are necessary. The additional work shall be completed according to the standards, specifications, and schedule set forth or approved by EPA in a written modification to the work plans or written work plan addenda. EPA reserves the right to conduct the work itself at any point, to seek reimbursement from Respondents, and/or to seek any other appropriate relief.

4. If EPA determines that conditions at the Site are creating or have the potential to create a danger to human health or welfare on-site or in the surrounding area or to the environment, EPA may order Respondents to stop further implementation of this Order for such period of time in the judgment of EPA is needed to abate the danger.

XI. QUALITY ASSURANCE

1. Respondents shall assure that work performed, samples taken, and analyses conducted conform to the requirements of the SOW, QAPP, and guidance identified therein. Respondents shall assure that field personnel used by Respondents are properly trained in the use of field equipment and in chain-of-custody procedures.

XII.FINAL RI/FS, PROPOSED PLAN, PUBLIC COMMENT, RECORD OF DECISION AND ADMINISTRATIVE RECORD

1. EPA retains the responsibilities for release to the public of the RI/FS report and the preparation and release of the Proposed Plan and the Record of Decision, in accordance with CERCLA and the NCP.

2. EPA shall provide Respondents with the Proposed Plan and Record of Decision.

3. EPA will determine the contents of its administrative record file for selection of the remedial action. Respondents must submit documents developed during the course of the RI/FS to EPA upon which selection of the response action may be based. If requested by EPA, Respondents shall provide copies of plans, task memoranda, including documentation of field modifications, recommendations for further action, quality assurance memoranda and audits, validated data, raw data, field notes, laboratory analytical reports, and other reports, concerning the implementation of this Order. Respondents must additionally submit any previous studies conducted under state, local, or other federal authorities relating to selection of the response action, and all communications between Respondents and state, local, or other federal authorities concerning selection of the response action. At EPA's discretion, Respondents may establish a community information repository at or near the Site, to house one copy of the administrative record.

XIII. PROGRESS REPORTS AND MEETINGS

1. Respondents shall make presentations at, and participate in, meetings at the request of EPA during the initiation, conduct, and completion of the RI/FS. In addition to discussion of the technical aspects of the RI/FS, topics will include anticipated problems or new issues. Meetings will be scheduled at EPA discretion.

2. In addition to the deliverables set forth in this Order, Respondents shall submit monthly progress reports to EPA by the tenth (10th) day of each month. At a minimum, with respect to the preceding month, these progress reports shall: (1) describe the actions which have been taken to

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comply with this Consent Order during that month; (2) include all results of sampling and tests and all other data received by Respondents that have been subjected to quality assurance pursuant to the QAPP; (3) describe work planned for the next two (2) months with schedules relating such work to the overall project schedule for RI/FS completion; and (4) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

XIV. SAMPLING, ACCESS, AND DATA AVAILABILITY/ADMISSIBILITY

1. All results of sampling, tests, modeling, or other data generated by Respondents, or on Respondents' behalf, for the implementation of this Consent Order, shall be submitted to EPA monthly as described in the preceding section of this Order. Raw data shall be submitted to EPA upon request. EPA will make validated data generated by EPA or DEQ available to Respondents unless it is exempt from disclosure by federal or state law or regulation. If there is a discrepancy between EPA's QAPP data and the Respondents' QAPP data, EPA will, upon the request of Respondents, make the raw data that was subject to the quality assurance resulting in such a discrepancy available to Respondents.

2. Respondents shall orally notify EPA at least fifteen (15) days prior to conducting significant field events as described in the SOW, work plans, or SAPs. At EPA's oral or written request, or the request of EPA's oversight assistant, Respondents shall allow split or duplicate samples to be taken by EPA (and/or its authorized representatives) of any samples collected by Respondents in implementing this Order. All split samples of Respondents shall be analyzed by the methods identified in the QAPP.

3. At all reasonable times EPA, its authorized representatives, DEQ and its authorized representatives, and designated representatives of Tribes and Natural Resource Trustees accompanied by EPA shall have the authority to enter and freely move about all property over which Respondents have possession or control at the Site where work, if any, is to be carried out pursuant to this Order. EPA and DEQ and their authorized representatives shall also have full access for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to this Order; reviewing the progress of the Respondents in carrying out the terms of this Order; conducting tests as EPA or its authorized representatives deem necessary; using a camera, sound recording device, or other documentary type equipment to record matters related to this Order; and verifying the data developed pursuant to this Order and submitted to EPA by Respondents. Respondents shall allow EPA and DEQ and their authorized representatives to inspect and copy all records, files, photographs, documents, sampling and monitoring data, and other writings related to work undertaken in carrying out this Order. Nothing herein shall be interpreted as limiting or affecting the United States' right of entry or inspection authority under federal law. Nothing in this Section shall alter existing access provisions within voluntary agreements between any Respondent and DEQ, which provisions shall continue to govern access for DEQ as Lead Agency for work conducted under those voluntary agreements and shall not govern access for DEQ as a Support Agency under this Order. EPA shall make reasonable efforts to avoid interfering with Respondents' business activities when present at Respondents' properties. All parties with access to the Site under this paragraph shall comply with all approved Health and Safety Plans applicable to the property, as well as applicable laws and regulations. Tribes and their authorized representatives shall be permitted reasonable access to Respondents' properties at the Site without EPA accompaniment as described in an approved work plan for the Cultural Resource Analysis described in the SOW.

4. Respondents may assert a claim of business confidentiality covering part or all of the information submitted to EPA pursuant to the terms of this Consent Order under 40 C.F.R. 2.203,

provided such claim is allowed by Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7). This claim shall be asserted in the manner described by 40 C.F.R. 2.203(b), and substantiated at the time the claim is made. Information determined to be confidential by EPA will be given the protection specified in 40 C.F.R. Part 2. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA or DEQ without further notice to Respondents. Respondents agree not to assert business confidentiality claims with respect to any data related to Site conditions, sampling, or monitoring.

5. By entering into this Order, Respondents waive any objections in any proceeding by EPA to any data gathered, generated, or evaluated by EPA, DEQ, or Respondents in the performance or oversight of the work that has been verified according to the quality assurance/quality control (QA/QC) procedures required by the Consent Order. If Respondents object to any other data relating to the RI/FS, Respondents shall submit a report to EPA that identifies and explains its objections, describes the acceptable uses of the data, if any, and identifies any limitations to the use of the data. The report must be submitted to EPA within thirty (30) days of the monthly progress report containing the data.

6. If the Site, or any off-Site area that is to be used for access for purposes of implementing this Order, is owned in whole or in part by parties other than those bound by this Consent Order, Respondents will obtain, or use best efforts to obtain Site access agreements from the present owner(s) within ninety (90) days from the date EPA determines that access is needed. Such agreements shall provide access for EPA, its contractors and oversight officials, DEQ and its contractors, the designated representatives of the Tribes and Natural Resource Trustees accompanied by EPA, and Respondents or their authorized representatives, and such agreements shall specify that Respondents are not EPA, DEQ's, Tribes' or Natural Resource Trustees' representative with respect to liability associated with Site activities. Copies of such agreements shall be submitted to EPA prior to Respondents' initiation of field activities. Respondents' best efforts shall include providing reasonable compensation to any off-Site property owner, unless such owner qualifies as a potentially responsible party under Section 107(a) of CERCLA. If access agreements are not obtained within the time referenced above, Respondents shall immediately notify EPA of their failure to obtain access and EPA and Respondents will discuss a strategy for gaining access to such properties in the most expeditious and cost effective manner. EPA may obtain access for Respondents or perform those tasks or activities with EPA contractors. If EPA performs those tasks or activities with EPA contractors, Respondents shall perform all other activities not requiring access to that portion of the Site, and shall reimburse EPA for all costs incurred in accordance with this Order, which are not inconsistent with the NCP in performing such activities. Respondents shall integrate the results of any such tasks undertaken by EPA into its reports and deliverables. Respondents also agree to indemnify the United States as specified in Section XXIV of this Order.

VIII. DESIGNATED PROJECT COORDINATORS

1. Deliverables submitted under this Consent Order, shall be sent by certified mail, return receipt requested, to the following addressees or to any other addressees which EPA may designate in writing:

(a) five copies to EPA:

Wallace Reid
EPA Project Coordinator,
U.S. Environmental Protection Agency
1200 Sixth Avenue, M/S ECL-115
Seattle, WA 98101

ph: 206-553-1728
fax: 206-553-0124
[reid.wallace@epa.gov]

(b) one copy to DEQ:

Eric Blischke
Oregon DEQ
2020 SW 4th Ave. #400
Portland, OR 97201
ph: 503-229-5648
fax: 503-229-6899
[blischke.eric@deq.state.or.us]

(c) one copy to Oregon Department of Fish & Wildlife:
Rick Kepler
Oregon Department of Fish & Wildlife
2501 SW First Ave.
Portland, OR 97207
ph: 503-872-5255 x.5426
fax: 503-872-5269
[rick.j.kepler@state.or.us]

(d) one copy to NOAA:

Helen Hillman
NOAA Resources Coordinator
c/o EPA Region 10
1200 Sixth Avenue (M/S ECL-117)
Seattle, WA 98101
ph: 206-553-2101
fax: 206-553-0124
[hillman.helen@noaa.gov]

(e) one copy to the U.S. Department of Interior
Preston Sleeger
Regional Environmental Officer
Pacific Northwest Region
500 NE Multnomah St.
Suite 356
Portland, OR 97232
ph: 503-321-6157
fax: 503-231-2361

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[preston_sleeger@ios.doi.gov]

(f) one copy to the Confederated Tribes of the Warm Springs Reservation of Oregon

Brad Nye
Natural Resources Department
P.O. Box C
Warm Springs, OR 97761
ph: 541-553-2041
fax: 541-553-1994
[bnye@wstribes.org]

(g) one copy to the Confederated Tribes and Bands of the Yakama Nation:

Lynn Hatcher
Yakama Nation
Fisheries Management Program
P.O. Box 151
4690 SR 22
Toppenish, WA 98948
ph: 509-865-6262
fax: 509-865-6293
[lynn@yakama.com]

(h) one copy to the Confederated Tribes of the Grand Ronde Community of Oregon:

Kathleen Feehan
Confederated Tribes of the Grand Ronde Community of Oregon
47010 SW Hebo Road
Grand Ronde, OR 97347
ph: 503-879-2395
fax: 503-879-5622
[kathleen.feehan@grandronde.org]

(i) one copy to the Confederated Tribes of the Siletz Indians:

Tom Downey
Environmental Specialist
Confederated Tribes of the Siletz Indians
P.O. Box 549
Siletz, OR 97380
ph: 541-444-8226
fax: 541-444-9688

[tomd@ctsi.nsn.us]

(j) one copy to the Confederated Tribes of the Umatilla Indian Reservation:

Audie Huber
Confederated Tribes of the Umatilla Indian Reservation
Department of Natural Resources
73239 Confederated Way
Pendelton, OR 97801
ph: 541-966-2334
fax: 503-276-3317
[audiehuber@ctuir.com]

(k) one copy to the Nez Perce Tribe:

Patti Howard
Water Resources Division
Nez Perce Tribe
P.O. Box 365
Lapwai, ID 83540
ph: 208-843-7368
fax: 208-843-7371
[pattih@nezperce.org]

(l) one copy each to Respondents' Co-Project Coordinators

Robert Wyatt
Northwest Natural
220 NW Second Avenue
Portland, OR 97209
ph: 503-226-4211 x5425
fax: 503-273-4815
[rjw@nwnatural.com]

Trey Harbert
Port of Portland
P.O. Box 3529
Portland, OR 97208
ph: 503-944-7325
fax: 503-944-7354
[harbet@portptld.com]

2. On or before the effective date of this Order, EPA and Respondents shall each designate their own Project Coordinator. Each Project Coordinator shall be responsible for overseeing the implementation of this Consent Order. To the maximum extent possible, written communications between Respondents and EPA shall be directed to the Project Coordinator by mail or electronic mail, with copies to such other persons as EPA may designate.

3. EPA and Respondents have the right to change their respective Project Coordinator upon at least ten (10) days notice in writing prior to the change.

4. EPA's Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager (RPM) and On-Scene Coordinator (OSC) by the NCP. EPA's Project Coordinator shall have the authority consistent with the NCP, to halt any work required by this Consent Order, and to take any necessary response when he or she determines that conditions at the Site may present an immediate endangerment to public health or welfare or the environment. The absence of the EPA Project Coordinator from the Site pursuant to this Consent Order shall not be cause for the stoppage or delay of any work.

5. EPA shall arrange for a qualified person to assist in its oversight and review of the conduct of the RI/FS, as required by Section 104(a) of CERCLA, 42 U.S.C. § 9604(a). The oversight assistant may observe work and make inquiries in the absence of EPA, but is not authorized to modify any approved deliverable.

IX. OTHER APPLICABLE LAWS

1. Respondents shall comply with all applicable laws and regulations in implementing this Order. No local, state, or federal permit shall be required for any portion of any action conducted entirely on-Site, including studies, where such action is selected and carried out in compliance with Section 121 of CERCLA, 42 U.S.C. § 9621.

XVII. RECORD PRESERVATION

1. All records and documents in Respondents', their employees', contractors', consultants', agents', accountants', or attorneys' possession, whether they have been submitted to EPA or not, that concern the implementation of this Order, including those documents relevant to the performance of Task 2.a. of the SOW (Data Compilation/Site Background), and/or those documents related to the release or threatened release of hazardous substances, pollutants, or contaminants to the sediments in the Lower Willamette River, shall be preserved during the conduct of this Consent Order and for a minimum of ten (10) years after the completion of remedial action at the Site, unless permission has been sought and obtained in writing from EPA and DEQ prior to destruction of such documents. Respondents reserve the right to claim the attorney-client privilege and/or attorney work product immunity in accordance with FRCP 26, for such documents, and EPA reserves the right to challenge any such claims by Respondents. After this 10-year period, Respondents shall notify EPA and DEQ at least ninety (90) days before the documents are scheduled to be destroyed. If EPA or DEQ requests that the documents be saved, Respondents shall, at no cost to EPA or DEQ, give the requesting agency the documents or copies of the documents.

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XVIII. DISPUTE RESOLUTION

1. Any disputes concerning activities or deliverables required under this Order may be resolved as follows: If Respondents object to any EPA notice of disapproval or requirement made pursuant to this Consent Order, Respondents shall notify the EPA Project Coordinator in writing of their objection(s) within fourteen (14) days of receipt of the disapproval notice or requirement. Respondents' written objection(s) shall define the dispute, state the basis of Respondents' objection(s), and be sent certified mail, return receipt requested. EPA and Respondents then have an additional fourteen (14) days from Respondents' receipt of the return receipt to reach agreement. If an agreement is not reached within fourteen (14) days, Respondents may request a determination by EPA's Environmental Cleanup Office (ECL) Director. The ECL Director's determination is EPA's final decision. Respondents shall proceed in accordance with EPA's final decision regarding the matter in dispute, regardless of whether Respondents agree with the decision. If Respondents do not agree to perform or do not actually perform the work in accordance with EPA's final decision, EPA reserves the right in its sole discretion to conduct the work itself, to seek reimbursement from Respondents, to seek enforcement of the decision, to seek penalties, and/or to seek any other appropriate relief.

2. Respondents are not relieved of any obligations to perform and conduct activities and submit deliverables on the schedule set forth in the SOW or work plan, while a matter is pending in dispute resolution. The invocation of dispute resolution does not stay stipulated penalties under this Order.

XIX. DELAY IN PERFORMANCE/STIPULATED PENALTIES

1. Unless there is a Force Majeure event as defined in Section XX below, for each day that Respondents fail to complete a deliverable in a timely manner or fail to produce a deliverable of acceptable quality, or otherwise fail to perform in accordance with the requirements of this Order, Respondents shall be liable for stipulated penalties. DEQ may identify a violation of the Order and recommend to EPA that EPA impose stipulated penalties for such violation. Penalties begin to accrue on the day that performance is due or a violation occurs, and extend through the period of correction. Where a revised submission by Respondents is required, stipulated penalties shall continue to accrue until a satisfactory deliverable is produced. EPA will provide written notice for violations that are not based on timeliness; nevertheless, penalties shall accrue from the day a violation commences. EPA may, at its discretion, waive imposition of stipulated penalties if it determines that Respondents have attempted in good faith to comply with this Order, or have timely cured defects in initial submissions. Payment shall be due within thirty (30) days of receipt of a demand letter from EPA, unless otherwise agreed to by EPA.

2. Unless EPA has agreed to a longer period of time for payment pursuant to paragraph 1, above, Respondents shall pay interest on the unpaid balance, which shall begin to accrue at the end of the 30-day period, at the rate established by the Department of Treasury pursuant to 30 U.S.C. § 3717. Respondents shall further pay a handling charge of one percent (1%), to be assessed at the end of each thirty-one (31) day period, and a six percent (6%) per annum penalty charge, to be assessed if the penalty is not paid in full within ninety (90) days after it is due.

3. Respondents shall make all payments by check to: U.S. Environmental Protection Agency, Superfund Accounting, P.O. Box 360903M, Pittsburgh, Pennsylvania 15251.

Checks should identify the name of the Site, the Site identification number, the account number and the title of this Order. A copy of the check and/or transmittal letter shall be forwarded to the EPA Project Coordinator.

4. For the following deliverables, stipulated penalties shall accrue in the amount of $500 per day, per violation, for the first seven days of noncompliance; $1,000 per day, per violation, for the 8th through 14th day of noncompliance; $2,500 per day, per violation, for the 15th day through the 30th day; and $5,000 per day per violation for the 30th day through the 90th day.

a) An original and any revised deliverables and/or work products described in the Stipulation and Agreement.

b) An original and any revised RI/FS work plan, including addenda.

c) An original and any revised SAP.

d) An original and any revised Site health & safety plan.

e) An original and any revised RI report.

f) An original and any revised treatability statement of work.

g) An original and any revised treatability testing work plan.

h) An original and any revised treatability study sampling & analysis plan.

i) An original and any revised treatability study health & safety plan.

j) An original and any revised risk assessment scoping memorandum; the original risk assessment scoping memorandum shall be the version submitted in response to EPA's first round of comments on Respondents' draft memorandum submitted to EPA pursuant to this Order within 120 days after the effective date.

k) An original and any revised FS report.

l) An original and any revised baseline risk assessment report.

5. For the following interim deliverables, stipulated penalties shall accrue in the amount of $250 per day, per violation, for the first week of noncompliance; $500 per day, per violation, for the 8th through 14th day of noncompliance; $1,500 per day, per violation, for the 15th day through the 30th day of noncompliance; and $2,500 per day per violation for the 30th day through the 90th day of noncompliance.

a) An original and any revised Data Quality Objectives submitted with the RI/FS work plan for the ISA and adjacent areas, including addenda.

b) An original and any revised completed Site relational database.

c) An original and any revised data gaps table submitted with the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, including addenda.

d) An original and any revised Site trip report submitted with the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, including addenda.

e) An original and any revised preliminary analytical goals submitted with the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, including addenda.

f) An original and any revised preliminary CSM submitted with the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, including addenda.

g) An original and any revised technical memorandum identifying potential criteria for identification of candidate early action areas, and any deliverable using these criteria to identify areas that may be candidates for early action.

h) An original and any revised technical memorandum on modeling of Site characteristics submitted with the RI/FS work plan described in subparagraph B. Task 2.ii.f, above, including addenda.

i) An original and any revised Site characterization summary.

j) An original and any revised identification of candidate technologies memorandum.

k) An original and any revised technical memorandum identifying preliminary RAOs.

l) An original and any revised technical memorandum describing process(es) to identify and obtain disposal site options for contaminated sediment.

m) An original and any revised technical memorandum identifying potential sources of sediment capping materials and/or outlining testing requirements needed to evaluate the acceptability of any such material.

n) An original and any revised technical memorandum identifying the data to evaluate natural attenuation options.

o) An original and any revised treatability testing evaluation report.

p) An original and any revised treatability study evaluation report.

q) An original and any revised Site-specific remedial action objectives refined and documented pursuant to this Order (due ninety (90) days after Respondents' receipt of EPA's comments on the draft RI report).

r) Memoranda on development and preliminary screening of alternatives, assembled alternatives screening results, and final screening.

s) Comparative analyses of remedial alternatives report.

t) An original and any revised cultural resource analysis.

6. For the monthly progress reports, stipulated penalties shall accrue in the amount of $200 per day, per violation, for the first week of noncompliance; $500 per day, per violation, for the 8th through 14th day of noncompliance; $1,000 per day, per violation, for the 15th day through the 30th day; and $2,000 per day, per violation, for the 30th day through the 90th day. Stipulated penalties for monthly progress reports shall not accrue during the first two hundred ten (210) days after the effective date of this Order.

7. Respondents may dispute EPA's right to the stated amount of penalties by invoking the dispute resolution procedures under Section XVIII herein. Penalties may, at EPA's discretion, accrue, but need not be paid, during the dispute resolution period. If Respondents do not prevail upon resolution, all penalties shall be due to EPA within thirty (30) days of resolution of the dispute, unless otherwise agreed to by EPA. If Respondents prevails upon resolution, no penalties shall be paid.

8. If EPA requires corrections to be reflected in the next deliverable and does not require resubmission of that deliverable, stipulated penalties for that interim deliverable shall cease to accrue on the date of such decision by EPA.

9. The stipulated penalties provisions do not preclude EPA from pursuing any other remedies or sanctions which are available to EPA because of Respondents' failure to comply with this Consent Order, including, but not limited to, conduct of all or part of the RI/FS by EPA. Payment of stipulated penalties does not alter Respondents' obligation to complete performance under this Consent Order.

10. Respondents are each jointly and severally liable to comply with this Order. Failure to comply by one Respondent does not excuse performance by any other Respondents.

XX. FORCE MAJEURE

1. "Force Majeure," for purposes of this Consent Order, is defined as any event arising from causes ~~entirely~~ beyond the control of Respondents and of any entity controlled by Respondents, including their contractors and subcontractors, that delays the timely performance of any obligation under this Consent Order notwithstanding Respondents' best efforts to avoid the delay. The requirement that the Respondents exercise "best efforts to avoid the delay" includes using best efforts to anticipate any potential Force Majeure event and best efforts to address the effects of any potential Force Majeure event (1) as it is occurring, and (2) following the potential Force Majeure event, such that the delay is minimized to the greatest extent practicable. Examples of events that are not Force Majeure events include, but are not limited to, increased costs or expenses of any work to be performed under this Order or the financial difficulty of Respondents to perform such work.

2. If any event occurs or has occurred that may delay the performance of any obligation under this Order, whether or not caused by a Force Majeure event, Respondents shall notify, by telephone, the EPA RPM or, in his or her absence, the ECL Director, within forty-eight (48) hours of when Respondents knew or should have known that the event might cause a delay. Within seven (7) business days thereafter, Respondents shall provide, in writing, the reasons for the delay, the anticipated duration of the delay, all actions taken or to be taken to prevent or minimize the delay, a schedule for implementation of any measures to be taken to mitigate the effect of the delay, and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare, or the environment. Respondents shall exercise best efforts to avoid or minimize any delay and any effects of a delay. Failure to comply with the above requirements shall preclude Respondents from asserting any claim of Force Majeure.

3. If EPA agrees that the delay or anticipated delay is attributable to Force Majeure, the time for performance of the obligations under this Order that are directly affected by the Force Majeure event shall be extended by written agreement of the parties, for a period of time not to exceed the actual duration of the delay caused by the Force Majeure event. An extension of the time for performance of the obligation directly affected by the Force Majeure event shall not extend the time for performance of any subsequent obligation.

4. If EPA does not agree that the delay or anticipated delay has been or will be caused by a Force Majeure event, or does not agree with Respondents on the length of the extension, the issue shall be subject to the dispute resolution procedures set forth in Section XVII of this Order. In any such proceeding, to qualify for a Force Majeure defense, Respondents shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a Force Majeure event, that the duration of the delay was or will be warranted under the circumstances, that Respondents did exercise or are exercising due diligence by using their best efforts to avoid and mitigate the effects of the delay, and that Respondents complied with the requirements of this Section.

5. Should Respondents carry the burden set forth in the preceding paragraph, the delay at issue shall be deemed not to be a violation of the affected obligation of this Consent Order.

X.RESERVATIONS OF RIGHTS

1. EPA reserves the right to bring an action against Respondents under Section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of all response costs including oversight costs, incurred by the United States, and by DEQ as support agency, for activities relating to this RI/FS, at the Site that are not reimbursed by Respondents, any costs incurred if EPA performs the RI/FS or any part thereof, and any future costs incurred by the United States in connection with response activities conducted under CERCLA at the Site. Respondents reserve all rights consistent with this Order to defend against any such action. EPA will not bring an action against Respondents to recover response costs incurred prior to January 26, 2001 while this Consent Order is in effect.

2. EPA reserves the right to bring an action against Respondents to enforce the response and oversight cost reimbursement requirements of this Consent Order, to collect stipulated penalties assessed pursuant to this Consent Order, and to seek penalties pursuant to Section 109 of CERCLA, 42 U.S.C. § 9609. Respondents reserve all rights consistent with this Order to defend against any such action by EPA, though Respondents waive any defenses to such actions on the basis of claim-splitting or any applicable statute of limitations or laches while this Consent Order is in effect.

3. EPA or Respondents' failure to specifically reserve a particular right herein shall not be construed as a waiver of that right. Except as expressly provided in this Order, each party reserves all rights and defenses it may have. Nothing in this Consent Order shall affect EPA's removal authority or EPA's response or enforcement authorities including, but not limited to, the right to seek injunctive relief, stipulated penalties, statutory penalties, and/or punitive damages.

4. Following satisfaction of the requirements of this Consent Order, Respondents shall have resolved their liability to EPA for the work performed by Respondents pursuant to this Consent Order. Respondents are not released from liability, if any, for any response actions taken beyond the scope of this Order regarding removals, other operable units, remedial design/remedial action, or activities arising pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c).

5. Respondents reserve the right to claim the attorney-client privilege and/or attorney work product immunity in accordance with FRCP 26, for documents, and EPA reserves the right to challenge any such claim by Respondents.

6. EPA recognizes that Respondents are entering into this Order notwithstanding that contamination at the Site may have been caused by entities other than Respondents. In actions concerning the Site, EPA agrees to apply the EPA Orphan Policy, Attachment C hereto.

XXII. REIMBURSEMENT OF EPA RESPONSE COSTS

1. Following the issuance of this Consent Order, EPA shall submit an accounting to Respondents on a periodic basis of all response and oversight costs incurred by the United States in the implementation and oversight of this Order. Such response costs may include, but are not limited to, costs incurred by the United States in overseeing Respondents' implementation of the requirements of this Consent Order and activities performed by the United States as part of this RI/FS, including any costs incurred to obtain access for Respondents pursuant to this Consent Order, in connection with preparation of the risk assessment for the site, and for community relations activities for this RI/FS. However, where consistent with any access strategy developed by the parties pursuant to Section XIV.6, EPA may, in its discretion, use its enforcement authority to obtain access and seek cost recovery from any party who denies access. Costs shall include all direct and indirect costs, including, but not limited to, time and travel costs of EPA personnel and associated indirect costs, coordination between DEQ and EPA regarding uplands source identification and control and in-water investigation, contractor costs,

cooperative agreement costs, compliance monitoring, including the collection and analysis of split samples, inspection of RI/FS activities, site visits, discussions regarding disputes that may arise as a result of this Consent Order, review and approval or disapproval of reports, and costs incurred by EPA of redoing any of Respondents' tasks. Any necessary summaries, including, but not limited to EPA's certified Agency Financial Management System summary data (SCORES Reports), or such other summary as certified by EPA, shall serve as basis for payment demands. However, Respondents may review the following underlying EPA oversight cost documentation: EPA personnel time sheets, travel authorizations and vouchers; EPA contractor monthly invoices; and all applicable contract laboratory program (CLP) invoices. Costs reimbursable under this Order shall not include costs incurred prior to January 26, 2001.

2. Respondents shall, within 30 days of receipt of each accounting, remit a certified or cashier's check for the amount of the costs set forth in the accounting. If payment of such costs is not made within 30 days of receipt of the accounting, interest shall accrue from the date of receipt of the accounting through the date of payment. The interest rate is the rate of interest on investments for the Hazardous Substances Superfund in section 107(a) of CERCLA, compounded annually on October 1.

3. Checks shall be made payable to the Hazardous Substances Superfund and should include the name of the site, the site identification number (103R), and the title of this Consent Order. Checks shall be forwarded to: Mellon Bank, EPA-Region 10, Superfund Accounting, P.O. Box 360903M, Pittsburgh, PA 15251.

4. Copies of the transmittal letter and check should be sent simultaneously to the EPA Project Coordinator.

5. Respondents agree to limit any disputes concerning costs to accounting errors and the inclusion of costs outside the scope of this Consent Order, including, but not limited to, costs for work which is inconsistent with this Order. Respondents shall identify any contested costs and the basis of their objection. All undisputed costs shall be remitted by Respondents in accordance with the schedule set forth above. Disputed costs shall be paid by Respondents into an escrow account while the dispute is pending. Respondents bear the burden of establishing an EPA accounting error or the inclusion of costs outside the scope of this Order, or that such costs do not meet the standard for recovery of costs set forth in Section 107(a)(4)(A) of CERCLA.

XXIII. REIMBURSEMENT OF DEQ RESPONSE COSTS

1. Following the issuance of this Consent Order, DEQ will submit an accounting to Respondents on a monthly basis of all Support Agency oversight costs incurred by DEQ in implementation and oversight of this Order. Respondents shall pay all direct and indirect Support Agency costs incurred by DEQ consistent with this Consent Order, including but not limited to DEQ's costs of coordinating with EPA regarding uplands source identification and control and in-water investigations, identifying state ARARs and reviewing data and documents in relation to state ARARs, including but not limited to ORS 465 and state laws pertaining to releases of petroleum. Respondents are not responsible under this Order for DEQ's Lead Agency response costs incurred in conducting or overseeing site assessments and RI/FSs pursuant to ORS Chapter 465, which include source identification and source control. Respondents shall not be obligated to pay under this Order any assessment under ORS 465.333, although DEQ may continue to recover such assessments under its negotiated cost recovery agreements or, where applicable, through other independent legal means. Costs reimbursable under this Order shall not include costs incurred prior to January 26, 2001.

2. Respondents shall, within 30 days of receipt of each DEQ invoice, remit a check payable to "State of Oregon, Hazardous Substance Remedial Action Fund", mailed to Oregon Department of Environmental Quality, Accounting, 811 S.W. Sixth Ave., Portland, OR 97204. Respondents shall pay simple interest of 9% per annum on the balance of any unpaid DEQ costs, which interest shall begin to accrue at the end of the 30-day payment period.

3. DEQ invoices will include a summary of costs billed to date. Upon request to DEQ, Respondents may review underlying documentation including but not limited to: DEQ personnel time sheets; travel authorizations and vouchers; DEQ contractor monthly invoices; and all applicable laboratory invoices. Respondents agree to limit any disputes concerning costs to accounting errors and the inclusion of costs outside the scope of this Consent Order, including, but not limited to, costs for work which is inconsistent with this Order. Respondents shall identify any contested costs and the basis for their objection. All undisputed costs shall be remitted by Respondents in accordance with the schedule set forth above. Respondents bear the burden of establishing a DEQ accounting error or the inclusion of costs outside the scope of this Order, or that such costs do not meet the standard for recovery of costs set forth in ORS 465.200(23).

XXIVDISCLAIMER

1. In entering into this Consent Order, Respondents neither admit nor deny EPA's Findings of Fact and Conclusions of Law. Respondents' participation in this Order shall not be considered an admission of liability and is not admissible in evidence against Respondents in any judicial or administrative proceeding other than a proceeding by the United States, including EPA, to enforce this Consent Order or a judgment relating to it. Respondents retain their rights to assert claims against other potentially responsible parties at the Site. However, Respondents agree not to contest the validity or terms of this Order, or the procedures underlying or relating to it in any action brought by the United States, including EPA, to enforce this Order.

XXV. OTHER CLAIMS

1. In entering into this order, Respondents also waive any right to seek reimbursement under Section 106(b) of CERCLA, 42 U.S.C. §9606(b). Respondents also waive any right to present a claim under Section 111 or 112 of CERCLA, 42 U.S.C. §§ 9611 or 9612. This Order does not constitute any decision on preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). Respondents further waive all other statutory and common law claims against EPA relating to or arising out of conduct of the RI/FS, including, but not limited to, contribution and counterclaims.

2. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, subsidiary, or corporation not a signatory to this Consent Order for any liability it may have arising out of, or relating in any way to, the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, pollutants, or contaminants found at, taken to, or taken from the Site. If any Section or portion of this Order is invalidated for any reason, all remaining Sections or portions shall remain in full force and effect.

XXVI. FINANCIAL ASSURANCE/INSURANCE/INDEMNIFICATION

1. Respondents shall establish and maintain a financial instrument or trust account or other financial mechanism acceptable to EPA, including a demonstration that one or more of the Respondents satisfy the requirements of 40 C.F.R. 264.143(f) to perform the work and any other obligations required under this Consent Order, including a margin for cost overruns. Within forty-five (45) days after the effective date of this Consent Order, Respondents shall make the demonstration or fund the financial instrument or trust account sufficiently to perform the work required under this Consent Order projected for the period beginning with the effective date of the Order through December 31, 2001. Beginning January 1, 2002, and on or before the 15th day of January of each calendar year thereafter, Respondents shall make the demonstration or fund the financial instrument or trust account sufficiently to perform the work and other activities required under this Order projected for the succeeding calendar year quarter.

2. To the extent that financial assurance is provided by financial instrument or trust account, if at any time the net worth of the financial instrument or trust account is insufficient to perform the work and other obligations under this Order for the upcoming quarter, Respondents shall provide written notice to EPA within seven (7) days after the net worth of the financial instrument or trust account becomes insufficient. The written notice shall describe why the financial instrument or trust account is funded insufficiently and explain what actions have been or will be taken to fund the financial instrument or trust account adequately.

3. (a) Prior to commencement of any work under this Order, Respondents shall either make the demonstration required in paragraph 3(d) below, or shall secure, and shall maintain in force for the duration of this Order, and for two (2) years after the completion of all activities required by this Consent Order the following insurance policies naming the United States as an additional insured:

i. Comprehensive General Liability (CGL) in the amount of at least $1 million combined single limit, $2 million aggregate, including Contractual Liability Insurance in the amount of one million dollars per occurrence;

ii. Automobile insurance, with limits of $1 million, combined single limit, and

iii. Umbrella Liability Insurance in excess of CGL and automobile liability coverage in the amount of $5 million per occurrence.

(a) Respondents shall also either make the demonstration required in paragraph 3(d) below or shall secure, and maintain in force for the duration of this Order and for two (2) years after the completion of all activities required by this Consent Order the following:

i. Professional Errors and Omissions Insurance in the amount of at least two million dollars per occurrence.

LWG00635

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ii. Pollution Liability Insurance in the amount of at least two million dollars per occurrence, covering as appropriate both general liability and professional liability arising from pollution conditions.

(c) For the duration of this order, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of employer's liability insurance and workmen's compensation insurance for all persons performing work on behalf of the Respondents, in furtherance of this Order.

(d) If Respondents demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then with respect to that contractor or subcontractor Respondents need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

(e) Prior to commencement of any work under this Order, and annually thereafter on the anniversary of the effective date of this Order, Respondents shall provide certificates of such insurance and a copy of each insurance policy to EPA.

4. At least seven (7) days prior to commencing any work under this Consent Order, Respondents shall certify to EPA that the required insurance has been obtained by that contractor.

5. Respondents agree to indemnify and hold the United States, its agencies, departments, agents, and employees harmless from any and all claims or causes of action arising from or on account of acts or omissions of Respondents, their employees, agents, servants, receivers, successors, assignees, or any persons including, but not limited to, firms, corporations, subsidiaries, and contractors, in carrying out activities under this Consent Order. The United States or any agency or authorized representative of the United States shall not be held as a party to any contract entered into by respondents in carrying out activities under this Consent Order.

XXVII. EFFECTIVE DATE AND SUBSEQUENT MODIFICATIONS

1. The effective date of this Consent Order shall be the date it is signed by EPA.

2. This Consent Order may be amended by mutual agreement of EPA and Respondents. Amendments shall be in writing and shall be effective when signed by EPA's delegated authority. EPA Project Coordinators may adjust schedules but do not have the authority to sign amendments to this Consent Order.

3. No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by Respondents will be construed as relieving Respondents of their obligation to obtain such formal approval as may be required by this Order. Any deliverables, plans, technical memoranda, reports (other than progress reports), specifications, schedules, and attachments required by this Consent Order or EPA are incorporated into this Order upon approval by EPA.

XXXVIII. TERMINATION AND SATISFACTION

1. This Consent Order shall terminate when Respondents demonstrate, in writing, and certify to the satisfaction of EPA that all activities required under this Consent Order, as amended by any modifications, including any additional work, payment of oversight costs, and any stipulated penalties demanded by EPA, have been performed and EPA has approved the certification. This notice shall not, however, terminate Respondents' obligation to comply with Sections XVII and XXII of this Consent Order.

2. The certification shall be signed by a responsible official representing each Respondent. Each representative shall make the following attestation: "I certify under penalty of perjury under the laws of the United States that the information contained in or accompanying this certification is true, accurate, and complete." For purposes of this Consent Order, a responsible official is a corporate official who is in charge of a principal business function.

Issued this _____ day of _____, 2001

U.S. EPA, Region X, Office of Environmental Cleanup

BY: _____

Amber L. Wong, Manager, Site Assessment & Cleanup Unit

For

BY: _____ DATE: _____

_____

LWG00637

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(title)

LWG00638

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HEARINGS CLERK
EPA--REGION 10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION X

IN THE MATTER OF: **Portland Harbor Superfund Site,** **ATOFINA Chemicals, Inc., Chevron U.S.A., Inc., Gunderson, Inc., Northwest Natural Gas, City of Portland, Port of Portland, Time Oil Co., ConocoPhillips Company (formerly Tosco Corporation), Union Pacific Railroad Company, Oregon Steel Mills, Inc.** **RESPONDENTS,** **Proceeding Under Sections 104, 122(a), and 122(d)(3) of the Comprehensive Environmental Response Compensation, and Liability Act, (CERCLA) as amended, 42 U.S.C. §§ 9604, 9622(a), and 9622(d)(3).**	**U.S. EPA Docket Number CERCLA-10-2001-0240** **AMENDMENT NO. 1**

ADMINISTRATIVE ORDER ON CONSENT FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY

The undersigned hereby unanimously agree that the Administrative Order on Consent is amended as follows:

Section V. of the AOC is amended by the addition of paragraph 7 set forth below:

7. EPA has entered into a Memorandum of Understanding for the Portland

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Harbor Superfund Site (the "MOU") with, among others, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe (collectively, the "the Tribes") to ensure the Tribes' participation in RI/FS activities at the Site.

Section XXII. of the AOC is amended in the following ways:

The title to Section XXII. is amended to be "**REIMBURSEMENT OF EPA AND TRIBAL RESPONSE COSTS**"

A paragraph 6 is added and set forth below:

6. EPA funding to support Tribal participation at CERCLA sites is increasingly uncertain. In order to advance an efficient, focused, collaborative RI/FS for the Site, Respondents desire to fund the Tribes' response and oversight costs consistent with EPA policy, regulations, and guidance on supporting Tribal involvement, regardless of the availability of federal funds.

A paragraph 7 is added and set forth below:

7. Respondents may pay directly response and oversight costs incurred by the Tribes in the amount and in the manner as the Respondents and one or more of the Tribes may agree. If requested by Respondents, EPA will review annually Tribal budgets and invoices for costs payable under this paragraph for the sole purpose of determining if the costs are within the

scope of the Consent Order and consistent with the NCP. EPA will use best efforts to make its determination within sixty (60) days of EPA's receipt of the budgets or invoices. EPA's determination under this paragraph is not subject to Section XVIII. of this Consent Order (Dispute Resolution). If no agreement exists between the Respondents and the Tribes, Respondents shall have no obligation to pay Tribes' response and oversight costs directly pursuant to this paragraph. Nothing in this paragraph, however, affects Respondents' obligations under this Consent Order to reimburse EPA's response and oversight costs, including Tribal cooperative agreement costs, pursuant to paragraph 1 of this Section.

ADMINISTRATIVE ORDER ON CONSENT, DOCKET NO. CERCLA 10-2001-0240
AMENDMENT NO. 1 IS APPROVED AND ORDERED

Issued this 16th day of June, 2003

BY: Sylvia Kawabata
Sylvia Kawabata, Manager
Site Assessment and Environmental Cleanup Unit #2

LWG00641

BZTO104(e)015557

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For ConocoPhillips Company
(formerly TOSCO Corporation)

BY: William J. Lundeen DATE: 5/4/2003
Name: William J. Lundeen
Title: RMR Regional Manager

For ATOFINA Chemicals, Inc.

BY:_____ DATE:
Name:
Title:

For Chevron U.S.A., Inc.

BY:_____ DATE:
Name:
Title:

LWG00642

BZTO104(e)015558

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For ConocoPhillips Company
(formerly TOSCO Corporation)

BY:_____ DATE: ____
Name:
Title:

For ATOFINA Chemicals, Inc.

BY: _____ DATE: 5/16/03
Name:
Title: VP HES

For Chevron U.S.A., Inc.

BY:_____ DATE: ____
Name:
Title:

LWG00643

BZTO104(e)015559

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For ConocoPhillips Company
(formerly TOSCO Corporation)

BY:_____ DATE:
Name:
Title:

For ATOFINA Chemicals, Inc.

BY:_____ DATE:
Name:
Title:

For Chevron U.S.A., Inc.

BY: _____ DATE: May 1, 2003
Name: Gordon Turl
Title: Business Unit Manager
Superfund and Property Management
Chevron Environmental Management Company

LWG00644

BZTO104(e)015560

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Gunderson, Inc.

Thomas J Sass

BY: Thomas J. Sass DATE: May 13, 2003
Name: Thomas J. Sass
Title: President

For Northwest Natural Gas

BY:_____ DATE:
Name:
Title:

For City of Portland

BY:_____ DATE:
Name:
Title:

For Port of Portland

BY:_____ DATE:

LWG00645

BZTO104(e)015561

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Gunderson, Inc.

BY:_____ DATE:
Name:
Title:

For Northwest Natural Gas

BY: [signature] DATE: 5-6-03
Name: Beth A. Ugoretz
Title: Sr VP, General Counsel

For City of Portland

BY:_____ DATE:
Name:
Title:

For Port of Portland

BY:_____ DATE:

LWG00646

BZTO104(e)015562

For City of Portland

BY: Dan Saltzman DATE: 6/9/03

Name: Dan Saltzman

Title: City Commissioner, Public Affairs

LWG00647

BZTO104(e)015563

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Gunderson, Inc.

BY:_____ DATE:
Name:
Title:

For Northwest Natural Gas

BY:_____ DATE:
Name:
Title:

For City of Portland

BY:_____ DATE:
Name:
Title:

For Port of Portland

APPROVED AS TO LEGAL SUFFICIENCY
FOR THE PORT
By:_____
Counsel for the Port of Portland

BY:_____ DATE:

LWG00648

BZTO104(e)015564

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Time Oil Co.

BY: _____ DATE: May 1, 2003
Name: H. Roger Holliday
Title: President

For Union Pacific Railroad Company

BY: _____ DATE:
Name:
Title:

For Oregon Steel Mills, Inc.

BY: _____ DATE:
Name:
Title:

LWG00649

BZTO104(e)015565

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Time Oil Co.

BY:_____ DATE: ____
Name:
Title:

For Union Pacific Railroad Company

BY: _____ DATE: 5-1-03
Name: J. Michael Hemmer
Title: Vice President - Law

For Oregon Steel Mills, Inc.

BY:_____ DATE: ____
Name:
Title:

LWG00650

BZTO104(e)015566

RESPONDENTS hereby consent to the issuance of this Amended order, and agree to abide by each and every provision to Administrative Order on Consent, Docket No. CERCLA 10-2001-0240 as amended herein.

For Time Oil Co.

BY:_____ DATE: _____
Name:
Title:

For Union Pacific Railroad Company

BY:_____ DATE: _____
Name:
Title:

For Oregon Steel Mills, Inc.

BY: _____ DATE: 5/6/03
Name: L. K. Adams
Title: CFO

LWG00651

BZTO104(e)015567

-----Original Message-----
From: CUndercofler@lecg.com [mailto:CUndercofler@lecg.com]
Sent: Friday, May 26, 2006 3:56 PM
To: jim.dragna@bingham.com; ted@mccalloil.com; kshump@ch2m.com; carycewicz@ambroselaw.com; dpm@ambroselaw.com; John_Stillmun@fmc.com; Charles.mcchesney@hanson.biz; garne0@bp.com; jedwards@anchorenv.com; MWSchneider@perkinscoie.com; JohnDugdale@andrewskurth.com; Stephanie.Payne@Airliquide.com; alovely@seanet.com; jring@prestongates.com; pbender@prestongates.com; rdr@shavertransportation.com; mark@reevekearns.com; Lacampagne, Suzanne C.; mcrinnion@acfindustries.com; cgibson@archerlaw.com; chuck@calbag.com; AKGordon@duanemorris.com; DBlount@landye-bennett.com; chrisw@wohlersenvironmental.com; jcm@woodtatum.com; lschenck@gsblaw.com; kathryns@zidell.com
Cc: Ashton, David; McKenna, James (Jim); Patty Dost (Schwabe); rjw@nwnatural.com; Dunn, Loren; William Joyce; BHengemihle@lecg.com; voster@anchorenv.com; Tod A. Gold
Subject: Portland Harbor

Confidential - For Settlement Purposes Only

As mentioned in my preceding message, the LWG has established a web site containing documents intended to assist you in your evaluation of the group's offer. Presently the site contains the Joint Source Control Report and related documents. The site also contains a number of other documents developed during the ongoing RI/FS process. Finally, the state's proposed settlement term sheet should also be available for download before the close of business today. Please note that the LWG will be periodically updating this site to include additional information.

In order to access these materials follow the link below and enter the user name and password provided.

http://lwg.webpe.com/phcp

Username: LWG_GUEST_01
Password: T5A12R

Once the password has been accepted, click Review on the navigation bar at the left of the screen. The Review link will take you to a list of documents available for download.

Clayton Undercofler

J. Clayton Undercofler
Senior Consultant
LECG, LLC
1255 Drummers Lane, Suite 320
Wayne, Pennsylvania 19087

(610) 254-4010
(610) 254-4019 - direct
(610) 254-1188 - fax

LWG00746

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LWG00747

BZTO104(e)015569

DRAFT

[DEQ Revisions 6-5-06]

IN THE CIRCUIT COURT OF THE STATE OF OREGON

FOR THE COUNTY OF MULTNOMAH

STATE OF OREGON, ex rel STEPHANIE HALLOCK, DIRECTOR, DEPARTMENT OF ENVIRONMENTAL QUALITY, Plaintiff, v Defendants	Case No CONSENT JUDGMENT ("General Judgment")

Contents

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Error! No table of contents entries found. EPA Settlement Agreement
Exhibit B Notice Mailing List
Exhibit C Public Comment

1 Purpose

This Consent Judgment is filed pursuant to ORS 465 325, and is filed simultaneously with and for the purpose of resolving the underlying complaint by the State of Oregon Plaintiff State of Oregon ex rel the Oregon Department of Environmental Quality ("DEQ") and Defendants _____ (collectively, "Defendants") desire to resolve this action without litigation and have agreed to entry of the Consent Judgment without admission or adjudication of any issue of fact or law The mutual objectives of the parties are (a) to resolve Defendants' liability for certain remedial action costs at the Portland Harbor Superfund Site, and (b) to protect public health, safety, and welfare and the environment by the implementation of a remedial investigation and feasibility study at the Portland Harbor Superfund Site in accordance with the federal Comprehensive Environmental

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To delete line numbering and/or firm address "watermark" View Header/Footer select the text boxes that contain the unwanted information and delete

Deleted: 1 Purpose ¶
2 Stipulations and Findings ¶
3 Payment of Remedial Action Costs ¶
4 Work to Be Performed ¶
5 Notices ¶
6 Records ¶
7 Effect of Settlement ¶
8 Covenant Not to Sue by State of Oregon [1]
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Response, Compensation and Liability Act, 42 U S C § 9601, *et seq* ("CERCLA"), and Oregon's Hazardous Substance Removal and Remedial Action Statute, ORS 465 200 et seq

2 Stipulations and Findings

A Each Defendant stipulates

(1) To entry of this Consent Judgment,

(2) To perform and comply with all provisions of this Consent Judgment, and

(3) In any proceeding brought by DEQ to enforce this Consent Judgment, not to litigate this Court's jurisdiction over this matter or the validity of the Consent Judgment

B DEQ makes the following findings of fact, which Defendants neither admit nor deny

(1) Investigations of sediments and water quality in the Willamette River within the area commonly known as Portland Harbor have revealed a broad range of hazardous substance contaminants, including but not limited to petroleum hydrocarbons, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, pentachlorophenol, phthalates, dioxins and furans, DDT and other pesticides, and lead, arsenic, mercury, and other metals These chemicals have entered groundwater, surface water, and sediments at Portland Harbor through releases from upland properties, storm water, and upstream sources as a result of industrial, commercial, and shipping activities, urban and agricultural runoff, and sewer outfalls These chemicals are "hazardous substances" within the meaning of ORS 465 200(16), and are "hazardous substances" within the meaning of 42 U S C § 9601(14), and constitute a "release" or "threat of release" of hazardous substances into the environment within the meaning of ORS 465 200(22) and 42 U S C § 9601(22) The Portland Harbor area is a "facility" within the meaning of ORS 465 200(13) and 42 U S C § 9601(9) *[< Placeholder issue Insert citations to ORS 468B?]*

Comment Why is this COI list different than in the EPA AOC?

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(2) In response to this contamination, DEQ undertook a number of measures for the protection of public health and the environment, including but not limited to site discovery and assessment to locate sources of the contamination, development of a Portland Harbor Sediment Investigation Work Plan to guide investigation of the sediments contamination, consultation and negotiation with potentially responsible parties ("PRPs") regarding the design and implementation of the plans, coordination with federal agencies and tribes having interests in the Willamette River, and the entry of cooperative agreements and public outreach necessary to these efforts DEQ undertook these measures pursuant to its authorities under the state environmental cleanup law, ORS 465 200 *et seq* , and consistent with the National Contingency Plan ("NCP"), 40 C F R Part 300 DEQ incurred unreimbursed costs of $1,902,171 31 through December 31, 2000 in undertaking these activities ("Past Remedial Action Costs") These costs are "remedial action costs" within the meaning of ORS 465 200(24) and "response costs" under 42 U S C § 9607(a) *[< Insert citations to ORS 468B?]*

(3) On December 1, 2000, the U S Environmental Protection Agency ("EPA") placed the Portland Harbor on the National Priority List pursuant to CERCLA, as the Portland Harbor Superfund Site ("Site") The final boundaries of the Portland Harbor Superfund Site will be established by EPA when it selects a final cleanup remedy for the Site On September 28, 2001, EPA issued an Administrative Order on Consent for Remedial Investigation/Feasibility Study entered with a number of PRPs On April 27, 2006, EPA and the PRPs entered an Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, which amended the September 28, 2001 consent order The consent order as amended, U S EPA Docket No CERCLA-10-2001-0240, is referred to in this Consent Judgment as the "EPA Settlement Agreement" The EPA Settlement Agreement

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requires the signatory PRPs to that agreement to perform an in-water remedial investigation and feasibility study ("RI/FS") for the Site, provides for EPA oversight and enforcement of that work, provides for DEQ oversight of the work as a support agency to EPA, and requires reimbursement by signatory PRPs of costs incurred by DEQ as support agency on or after January 26, 2001

(4) DEQ and EPA have agreed to share responsibility for investigation and cleanup of the Portland Harbor Superfund Site DEQ is responsible for overseeing the investigation and control of contaminant sources to the Site EPA is responsible for overseeing the investigation and cleanup of in-water contamination Each agency also acts as a support agency to the other agency's efforts

(5) *[Insert description of Defendants]*

(6) On July 1, 2006, DEQ published notice of this Consent Judgment as a proposed consent judgment and provided opportunity for public comment In accordance with ORS 465 325(4)(d) and 465 320(1), the notice was published in the *Secretary of State's Bulletin* and *The Oregonian* newspaper Further, on July 1, 2006, DEQ mailed notice to the individuals and entities shown on the mailing list attached to and incorporated by reference into this Consent Judgment as Exhibit B On July __, 2006, DEQ held a public hearing regarding the proposed consent judgment The public comment period ended August 1, 2006 DEQ received *[summarize any comments received] [The written comments received]* are attached to and incorporated into this Consent Judgment as Exhibit C

(7) After consideration of the public comments, the Director of DEQ determines _ *[Omit the remainder of this paragraph from the public review version of the consent judgment, but review the wording for inclusion in the final executed CJ > , in accordance with ORS 465 325(4)(d),* that the comments do not disclose facts or considerations indicating that the proposed consent judgment is inappropriate, improper, or inadequate Further, based upon the administrative record for the Site, the Director of DEQ determines in

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accordance with ORS 465 325(1) that this Consent Judgment would expedite removal or remedial action, minimize litigation, be consistent with rules adopted under ORS 465 400, and be in the public interest <*/*>

3 Payment of Remedial Action Costs

A Past Remedial Action Costs Within 30 days of entry of this Consent Judgment, Defendants shall make payment to DEQ in the following amounts

_____

_____

_____

These payments are made in reimbursement of, and satisfaction of each Defendant's liability for, DEQ's Past Remedial Action Costs incurred through December 31, 2000 Payment shall be made by certified or cashier's check(s) made payable to "State of Oregon, Hazardous Substances Remedial Action Fund", and mailed to Oregon Department of Environmental Quality, Accounting, 811 SW Sixth Ave., Portland, OR 97204 The payment(s) shall reference the "Portland Harbor Consent Judgment" Upon receipt of the payment(s) by DEQ, sole legal and equitable right, title, and interest in such money and interest earned on the money irrevocably vests in the State of Oregon, and each Defendant waives, discharges, and releases any claim to or recourse against the money

B Interim Remedial Action Costs Within 30 days of entry of this Consent Judgment, Defendants shall pay DEQ $ _____ This payment is made in reimbursement of, and satisfaction of each Defendant's liability for, costs incurred by DEQ in connection with developing this Consent Judgment ("Interim Remedial Action Costs") Payment shall be made by certified or cashier's check(s) made payable to "State of Oregon, Hazardous Substances Remedial Action Fund", and mailed to: Oregon Department of Environmental Quality, Accounting, 811 SW Sixth Ave , Portland, OR 97204 The payment shall reference the "Portland Harbor Consent Judgment"

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Comment We assume that we could still enforce § 3D under 15B?

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C Oversight Costs Defendants shall reimburse costs incurred by DEQ in implementation and oversight of the EPA Settlement Agreement and billed on or after the date of entry of the EPA Settlement Agreement ("Oversight Costs") Payments shall be made subject to the provisions of and in accordance with Section XXIII of the EPA Settlement Agreement

D Earmarked Work Upon receipt of all payment(s) for Past Remedial Action Costs required under Section 3 A above, DEQ shall forward _____% of those payment(s) < *placesaver for specified percentage?]* to the Oregon State Treasurer for deposit into an interest-bearing site-specific account within the Hazardous Substances Remedial Action Fund (the "Portland Harbor Source Control Account") The Portland Harbor Source Control Account shall be dedicated for use at DEQ's direction at the Site for (a) funding of a stormwater source control project manager for a minimum of six months, (b) funding of a stormwater technical assistance coordinator for a minimum of two years, (c) funding of a source control project manager for a minimum of six months, and (d) developing information and providing technical assistance on stormwater source control ("Earmarked Work") If any money remains or will foreseeably remain in the Portland Harbor Source Control Account at the time of completion of the Earmarked Work, DEQ may make any expenditure from the Portland Harbor Source Control Account authorized by law

4 Work to be Performed

A Remedial Investigation and Feasibility Study Defendants shall perform or fund the RI/FS as directed by EPA under the EPA Settlement Agreement ("RI/FS Work"), in accordance either with their respective status as signatories to the Settlement Agreement or their funding contribution to performance of the RI/FS Work All provisions of the EPA Settlement Agreement related to performance of the RI/FS, including but not limited to provisions regarding DEQ access to property, data, and records, DEQ receipt of reports and other deliverables, and DEQ review and comment on deliverables, shall apply to and govern performance of this RI/FS Work obligation under this Consent Judgment

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Comment: We would like to discuss what is covered by these categories and associated costs

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B Certification of Funding Contribution On *[date]*of each year that this Consent Judgment is in effect, Defendants' Project Managers identified in Section 5 A below shall certify in writing to DEQ that Defendants who are not signatories to the EPA Settlement Agreement are in compliance with their obligation to contribute to funding of performance of the RI/FS Work Defendants' Project Managers may also notify DEQ in writing at any time that any Defendant is not in compliance with its obligation to contribute to funding of performance of the RI/FS Work, and must provide any such notice to the applicable Defendant at the same time Within 30 days of receipt of any such notice, the applicable Defendant must either (a) cure its failure to contribute to funding of performance of the RI/FS Work, or (b) commence dispute resolution in accordance with Section 11 below

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5 Notices

A Project Managers All notices and other communications required under or relating to this Consent Judgment shall be directed to

DEQ Project Manager
Jim Anderson
Oregon Department of
Environmental Quality
2020 SW 4th Ave , Suite 400
Portland, OR 97201
Tel 503-229-6825
Fax 503-229-6945
jim anderson@deq state or us

Defendants ' Project Managers
Jim McKenna
Port of Portland
_____
_____
_____
_____
_____

Bob Wyatt
Northwest Natural Gas
_____
_____
_____
_____
_____

B Defendant Representatives All notices and other communications required under or relating to this Consent Judgment shall be directed to

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6 Records

A For 10 years after entry of this Consent Judgment, each Defendant shall preserve and retain all records now in its possession or control, or which come into its possession or control, that may relate in any way to liability of any person under federal or state law with respect to hazardous substance contamination at the Site Upon DEQ's request, Defendants shall provide such records to DEQ or make them available for copying by DEQ At the conclusion of the 10-year retention period, and for five years thereafter, Defendants shall provide DEQ with 60 days' notice before destruction or other disposal of such records, and, upon DEQ's request, provide such records to DEQ or make them available for copying by DEQ

B A Defendant may assert a claim of confidentiality regarding any of Defendant's records submitted to or copied by DEQ pursuant to this Consent Judgment DEQ shall treat records for which a claim of confidentiality has been made in accordance with ORS 192 410 through 192 505 If a Defendant does not make a claim of confidentiality at the time Defendant's records are submitted to or copied by DEQ, the records may be disclosed without notice to the Defendant

C Defendants reserve the right to claim the attorney-client privilege and/or attorney work product immunity, and DEQ reserves the right to challenge any such claim by Defendants

7 Effect of Settlement

A No Defendant admits any liability, violation of law, or factual or legal findings, conclusions, or determinations made by DEQ under this Consent Judgment

Comment: Why is this section different from record retention requirements of the EPA Settlement? Please delete or incorporate AOC requirement by reference

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B Nothing in this Consent Judgment is intended to create any rights or defenses or grant any cause of action in favor of any person who is not a party to this Consent Judgment

C If for any reason this Court declines to approve this Consent Judgment in the form presented, this settlement is voidable at the sole discretion of any party and the terms of the settlement may not be used in evidence in any litigation among or against the parties

Comment What is the intent of this provision? Might be preferable to allow individual parties to opt out in this circumstance without voiding the deal as to all parties

D The rights and obligations of this Consent Judgment apply to the parties and their respective officers, directors, shareholders, partners, owners, employees, successors, agents, and assigns, provided, the covenant not to sue and contribution provisions, respectively, of Sections 8 and 10 below shall not apply to successors or assigns who (a) are liable for DEQ's Past Remedial Action Costs; and (b) did not make payment for Past Remedial Action Costs under Section 3 A above

E Nothing in this Consent Judgment precludes DEQ or any Defendant from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any person who is not a signatory to this Consent Judgment

8 Covenant Not to Sue by State of Oregon

A Except as provided in Section 8 B below, the State of Oregon covenants not to sue or take any other action, including but not limited to judicial or administrative action, against Defendants with regard to the Site pursuant to ORS 465 200 to 465 255 or 465 900, or 42 USC § 9601, *et seq* , ORS Chapter 466, ORS Chapter 468 , or any other federal, state or common law, regarding

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(1) Past Remedial Action Costs, which covenant shall be effective upon satisfaction of payment(s) required under Section 3 A above,

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(2) Interim Remedial Action Costs, which covenant shall be effective upon satisfaction of the payment required under Section 3 B above,

(3) Oversight Costs, which covenant shall be effective upon entry of this Consent Judgment and thereafter be subject to satisfaction of all payments required under Section 3 C above, and

(4) RI/FS Work, which covenant shall be effective upon entry of this Consent Judgment and thereafter be subject to (a) satisfaction of Section 4 A or 4 B above for the performance or funding of the RI/FS Work, and (b) evaluation in the feasibility study of "applicable or relevant and appropriate" state requirements and a range of remedial action alternatives consistent with the NCP

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B The State of Oregon reserves all rights against each Defendant with respect to matters not expressly included within the covenant not to sue set forth in Section 8 A above, including but not limited to

(1) A Defendant's failure to meet a requirement of this Consent Judgment,

(2) A Defendant's criminal liability,

(3) A Defendant's liability under federal or state law for natural resources damages,

(4) A Defendant's acts or omissions causing, contributing to, or exacerbating a release of hazardous substances at the Site after the date of entry of this Consent Judgment,

(5) A Defendant's liability arising from disposal of hazardous substances removed from the Site,

(6) Any matter as to which the State of Oregon is owed indemnification under Section 12 below;

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(7) A Defendant's liability, or obligation under agreements or orders with DEQ, to perform investigations, source control, or other remedial activities at upland facilities at the Site, and

(8) Any regulatory or proprietary authorization, permission, or approval required from a state agency for performance of the RI/FS Work

9 Covenant Not to Sue by Defendants

Each Defendant covenants not to sue or assert any claim or cause of action, in any judicial or administrative forum, against the State of Oregon by and through DEQ with respect to the Site or this Consent Judgment for reimbursement pursuant to ORS 465 260(7) This covenant not to sue does not extend to any claim or cause of action against any agency of the State of Oregon other than DEQ Defendants expressly reserve all rights of cost recovery and contribution against the State of Oregon with respect to the Matters Addressed by this Consent Judgment

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10 Contribution Actions

A The Parties agree that this Consent Judgment is a judicial settlement within the meaning of ORS 465 325(6)(b) and 42 U S C § 9613(f)(2), pursuant to which Defendants have resolved their liability to the State of Oregon regarding the "Matters Addressed" As of the date of entry of this Consent Judgment and subject thereafter to satisfactory performance of this Consent Judgment, Defendants shall not be liable for claims for contribution regarding "Matters Addressed" in this Consent Judgment, in accordance with ORS 465 325(6)(b) and to the extent provided by 42 U S C § 9613(f)(2) The "Matters Addressed" in this Consent Judgment are Past Remedial Action Costs, Interim Remedial Action Costs, Oversight Costs, and RI/FS Work as defined in Sections 3 and 4 above

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B The Parties agree that this Consent Judgment is a judicial settlement within the meaning of ORS 465 325(6)(c)(B) and 42 U S C § 9613(f)(3)(B), pursuant to which Defendants have resolved their liability to the State of Oregon regarding the Matters Addressed

C Except as provided in Section 9 above, nothing in this Consent Judgment shall prevent a Defendant from exercising any right of contribution or indemnification the Defendant may have against any person relating to the Site or this Consent Judgment

11 Dispute Resolution

Within 30 days of a Defendant receiving (a) written notice in accordance with Section 4 B above that the Defendant is not in compliance with its obligation to contribute to funding of performance of RI/FS Work, or (b) written notice from DEQ that any condition to the covenant not to sue for RI/FS Work set forth in Section 8 A (4) has not been satisfied, the Defendant may commence dispute resolution by providing written notice to all Parties invoking dispute resolution regarding the disputed matter The Parties shall make a good faith effort to resolve the dispute within 30 days of the notice being provided If the dispute is not resolved within that 30-day period, any Party may refer the dispute to this Court

12 Indemnification

To the extent permitted by the Oregon Constitution and by the Oregon Tort Claims Act, the Defendants shall indemnify and hold harmless the State of Oregon and its commissions, agencies, officers, employees, contractors, and agents from and against any and all claims arising from acts or omissions related to the implementation of this Consent Judgment of the Defendants or its officers, employees, contractors, agents, receivers, trustees, or assigns The State of Oregon shall notify the Defendants of any such claims or actions as soon as practicable after receiving notice that such a claim or action is threatened or has been filed The Defendants shall

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have the right to participate fully at their own expense in the defense or settlement of such claims, including the right to promptly receive related correspondence with the claimant and the opportunity to participate in related meetings and telephone conferences with the claimant The State will confer with the Defendants regarding litigation and settlement strategy and, to the extent practicable, will afford the Defendants the opportunity to review and comment on all pleadings and settlement documents before they are filled with the court or sent to the claimant The Defendants shall have no obligations under this Section with respect to any claim settled or otherwise compromised without the Defendants having been provided the opportunity to participate in accordance with this Section DEQ shall not be considered a party to any contracts made by the Defendants or its agents in carrying out activities under this Consent Judgment or the EPA Settlement Agreement

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13 Signatories, Service

A The undersigned representative of each party certifies that he or she is fully authorized to execute this Consent Judgment and bind such party to this Consent Judgment

B Each party has identified, on its respective attached signature page, the name and address of the agent authorized to accept service of process by mail on behalf of that party with respect to any matter relating to this Consent Judgment Each party agrees to accept service in such manner, and waives any other service requirements set forth in the Oregon Rules of Civil Procedure or local rules of this Court The parties agree that Defendants need not file an answer to the complaint in this action unless or until the Court expressly declines to approve this Consent Judgment.

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14 Modification

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DEQ and Defendants may modify this Consent Judgment by mutual written agreement, subject to approval by this Court

15 Certification of Completion, Termination

A Subject to the jurisdiction of this Court under ORS 465 325(10)(c), this Consent Judgment shall be deemed satisfied and terminated upon filing of a certification of completion by DEQ Termination of this Consent Judgment shall not affect any continuing obligations of the Defendants or DEQ under this Consent Judgment, including but not limited to the obligations and rights with respect to covenants not to sue and contribution protection (Sections 8, 9 and 10), records preservation and confidentiality (Section 6) and indemnification (Section 12)

B Notwithstanding termination of this Consent Judgment, the Court retains jurisdiction over both the subject matter of this Consent Judgment and the Parties regarding continuing obligations under this Consent Judgment.

IT IS SO ORDERED this ____ day of _____, 2006

_____
Circuit Court Judge

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The parties agree, and this Court finds, that this Consent Judgment has been negotiated by the parties in good faith will avoid litigation among the parties, and will expedite remedial measures necessary to protect human health and the environment and therefore is fair reasonable, and in the public interest ¶

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THE UNDERSIGNED PARTIES enter into this Consent Judgment

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

By _____ Date _____
Dick Pedersen
Administrator of Northwest Region

ATTORNEY GENERAL
STATE OF OREGON

By _____ Date _____
Kurt Burkholder, OSB No 80465
Senior Assistant Attorney General
Oregon Department of Justice
1515 SW Fifth Ave , Suite 410
Portland, OR 97201
Of Attorneys for Oregon Department
of Environmental Quality

Agent Authorized to Accept Service on Behalf of Above-Signed Party

Kurt Burkholder
Oregon Department of Justice
1515 SW 5th Ave , Suite 410
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Source Control Evaluation
Time Oil Northwest Terminal
Portland, Oregon

June 21, 2006

Prepared for

Time Oil Co.
Seattle, Washington

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

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1.0 INTRODUCTION

This report presents the results of the source control evaluation conducted for the Time Oil Co. (Time Oil) Northwest Terminal (Terminal), located in Portland, Oregon (Figure 1). Activities at the Terminal are currently conducted in accordance with the State of Oregon's Hazardous Substance Remedial Action Rules (OAR 340-122), under the oversight of the Oregon Department of Environmental Quality (DEQ) and under the voluntary cleanup program (VCP) agreement between Time Oil and DEQ, dated September 9, 1996 (DEQ No. WMCVC-NWR-96-07; DEQ 1996). The source control evaluation was conducted in accordance with the Final Portland Harbor Joint Source Control Strategy (JSCS; EPA and DEQ 2005). The data included in the Phase III remedial investigation report (RI; Landau Associates 2005a) and data collected during subsequent groundwater monitoring events were used as a basis for the evaluation.

1.1 PURPOSE

Overall, the purpose of the source control evaluation was to determine whether or not the facility as a whole is an ongoing source of contaminants of interest (COIs) to the in-water portion of the Portland Harbor Superfund site at levels that may present risk to in-water receptors. Based upon data collected during completion of the Phase III RI, this source control evaluation considers all known potential contaminant migration pathways to the river. The evaluation identifies where complete physical transport pathways to the river exist and whether these pathways represent current complete contaminant migration pathways. The evaluation also includes how contaminant migration pathways are addressed through previous or currently ongoing source control actions. The source control evaluation also provides the screening results comparing groundwater concentrations in the shoreline wells against the screening level values (SLVs) from the Table 3-1 of the JSCS and our recommendations for any future actions related to source control at the Terminal. Based on groundwater concentrations observed to date in shoreline wells along the Willamette River, Time Oil has thus far demonstrated there is not a complete contaminant migration pathway to the river at concentrations that exceed the JSCS SLVs, as will be supported by the contents of this report. The lack of a current complete contaminant migration pathway to the river is due in part to the successful implementation of the groundwater interim action system and storm drain intercept system for groundwater contamination associated with the historical wood treatment product formulation operations.

A more specific objective of the source control evaluation was to evaluate the potential for an upland petroleum hydrocarbon source to impact the Willamette River. A portion of the source control evaluation focuses on the potential for natural attenuation to limit migration of light non-aqueous phase

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liquid (LNAPL) from the Main Terminal Tank Farm area to the river using monitored natural attenuation (MNA) parameter measurements and a fate and transport model that takes into account the effects of natural attenuation, including both LNAPL mobility and dissolved-phase mobility. A plan for the MNA evaluation was provided to DEQ on September 15, 2005 (Landau Associates 2005b) and approved by DEQ in a letter, dated October 11, 2005 (DEQ 2005a).

1.2 REPORT ORGANIZATION

This report is organized into the following sections:

- **Section 2.0 Background Information.** This section provides a description of the facility and its history, as well as potential onsite sources of contamination.

- **Section 3.0 Potential Migration Pathways.** This section provides a description of the physical transport pathways and potential contaminant migration pathways to the river from impacted media onsite.

- **Section 4.0 Summary of Source Control/Removal Activities.** This section provides a description of ongoing source control and source removal activities, as wells as completed source control and source removal activities conducted onsite to date.

- **Section 5.0 Preliminary Screening Evaluation for COIs.** This section provides the contaminant screening criteria used for comparison .to site-specific contaminant concentrations and the results of the screening process in accordance with the JSCS.

- **Section 6.0 Conclusions and Recommendations.** This section provides our conclusions on whether complete contaminant migration pathways exist for each of the potential migration pathways using the comparison to JSCS SLVs and other weight-of-evidence information.

- **Section 7.0 Use of This Report.**

- **Section 8.0 References.**

- **Appendix A: Monitored Natural Attenuation Evaluation.** This appendix provides a description of the monitored natural attenuation evaluation, including an evaluation of the MNA parameter measurements and the results of the fate and transport modeling.

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2.0 BACKGROUND

This section provides background information for the Terminal for use in making a source control decision under the JSCS. Specifically, this section provides a general description of the Terminal and its operational history, potential sources of contamination at the Terminal, and associated upland contaminants of interest.

2.1 SITE DESCRIPTION AND HISTORY

The Northwest Terminal is a former bulk petroleum storage and transfer facility currently owned by Time Oil. Time Oil ceased operations at the Terminal on October 31, 2001. From 1943 to 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. Historically, Time Oil leased tank space to Crosby & Overton for storage of waste oils, and the Koppers Company leased and owned tanks and equipment at the Terminal for the formulation and blending of pentachlorophenol (PCP)-containing wood treatment products.

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 property and Port of Portland undeveloped property, 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). The Terminal is enclosed by a terminal-wide chain link fence, and access is through the main gate at the termination of Time Oil Road. Significant site features are shown on Figure 2.

2.1.1 FORMER PCP MIXING AREA AND WAREHOUSE

In the former PCP mixing area and warehouse area, specialty wood treating products containing PCP in various formulations (typically with petroleum-based carriers) were blended and stored for offsite shipment from 1967 to 1984 under an agreement with the Koppers Company Inc., (n/k/a Beazer East, Inc). The former PCP mixing area was located in the approximate center of the Terminal, and included the former PCP warehouse and the area south of the warehouse (formerly occupied by various mixing and storage tanks that were removed by 1982; Figure 2). During September through November 2002, soil removal action activities were conducted within the former PCP mixing area and associated areas. These activities included the demolition of the former PCP warehouse and the excavation of approximately 6,400 yd^3 of PCP-impacted soil from the former PCP mixing area. The excavation area and remaining PCP concentrations in soil are shown on Figure 4. Also, as part of this removal action, approximately

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2,400 yd^3 of PCP-impacted soil, which was excavated from the former PCP mixing area in 1989 and stockpiled in the former stockpile area or was transferred from the East Property during interim removal actions in 1996-97, were also removed. Therefore, a total of approximately 8,800 yd^3 (9,700 tons) of PCP-impacted soil associated with this source area were removed for offsite incineration and disposal at the Swan Hills facility in Alberta, Canada. Removal activities are documented in the Removal Actions Completion Report, Phases I/II RI Areas (Landau Associates 2003a).

2.1.2 Former Main Tank Farm Area and Associated Petroleum Operations

Various petroleum products were stored and handled in the former Main Terminal Tank Farm area located on the western portion of the facility, adjacent to the Willamette River (Figure 2). The Main Terminal Tank Farm area includes 21 aboveground storage tanks (ASTs), ranging from approximately 3,000 to 80,000 barrels (i.e., 126,000 to 3,360,000 gallons) in capacity. In 1943 when the Terminal was first established, 12 of the original tanks were moved to the Main Terminal Tank Farm area from a location south of the current property. Between the mid to late 1950s and 1970s, additional tanks were added in the Main Terminal Tank Farm area bringing the area to the current configuration. Currently, all tanks are empty except for tank 16804 in the Main Terminal Tank Farm area, which temporarily stores recovered water from groundwater interim action wells RW-2 and HRW-1, and water collected from the groundwater intercept system in the east-west trending storm drain at SDM-1, prior to treatment at the onsite wastewater treatment system.

2.1.3 Former Bell Terminal Tank Farm Area and Associated Petroleum Operations

Various petroleum products were stored and handled in the Bell Terminal Tank Farm area located on the southern portion of the facility. The Bell Terminal Tank Farm area was first established in the late 1940s to early 1950s. Currently, the Bell Terminal includes 10 ASTs ranging from 3,000 to 80,000 barrels in capacity. All tanks are empty.

In September 2001, a 5,000-gallon fiberglass underground storage tank (UST) was removed from an area to the east of the office at the Bell Terminal Tank Farm area. Approximately 43 tons of diesel-impacted soil was removed from the tank excavation and treated and disposed at the TPS Technologies facility, formerly located in Portland. Analytical results for confirmation soil samples collected at the base and sides of the excavation indicate that petroleum constituents were not detected or were less than 500 mg/kg (the DEQ Level 2 Soil Matrix Cleanup Standard for diesel- and heavy oil-range hydrocarbons). Documentation of the UST removal is provided in the Report of UST Removal Site Assessment (GeoEngineers 2001). Also at the Bell Terminal Tank Farm area, historical aerial

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photographs indicate that a strip of land approximately 80 ft wide along the entire western property boundary and outside the wall surrounding the Bell Terminal Tank Farm area was apparently used by occupants of the adjacent property for storage of equipment and possibly other unknown activities for approximately 25 years, ending in about 2000. No specific spills or leaks in the Bell Terminal Tank Farm area or along the western property boundary of the Bell Terminal have been reported.

2.1.4 FORMER CROSBY & OVERTON TANK AREA

The former Crosby & Overton Tank area was located directly south of the former PCP mixing area where waste oils were previously stored in two ASTs from 1974 to 1989 through a lease to Crosby & Overton. The tanks have since been removed from this area. Another AST (Tank 38009), removed during the Phases I/II removal actions, was established in 1989 as a bioreactor during soil treatment activities for the former soil stockpile. Remedial action activities were conducted within the former Crosby & Overton tank areas in late 2002. Activities included the removal of 819 tons soil impacted by polychlorinated biphenyls (PCB) and carcinogenic polycyclic aromatic hydrocarbon (cPAH) for offsite thermal treatment and disposal. The excavation area and remaining PCB and PAH concentrations in soil are shown on Figures 5 and 6, respectively. Removal activities are documented in the Removal Actions Completion Report, Phases I/II RI Areas (Landau Associates 2003a).

2.1.5 EAST PROPERTY ROADWAYS

The East Property area, comprised of the easternmost 23 acres of the facility, is currently and historically an undeveloped area. During a 1996-1997 interim removal action on the East Property, approximately 100, 55-gallon drums and about 500 yd^3 of PCP-impacted debris and soil were removed for offsite disposal from the former drum area and former small stockpile and soil removal area (Figure 2; Landau Associates 1997; 1998). During an additional investigation conducted in 2000-01, the presence of cPAHs in surficial soils was identified and appeared to be related to historical road oiling, as documented in historical aerial photographs from the late 1960s through 1970s. Impacts to groundwater were not observed. A soil remedial action for the East Property was implemented during the fall of 2002. The remedial action for the East Property resulted in the removal and disposal of 1,732 tons of cPAH-impacted soil for offsite thermal treatment and disposal. The east property soil remedial action is documented in the Soil Remedial Action Completion Report, East Property (Landau Associates 2003b). A conditional No Further Action (NFA) determination was granted to Time Oil by DEQ for the East Property on November 24, 2003.

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2.2 PHYSICAL HYDROGEOLOGIC SETTING

Based on similar geologic soil types and hydrogeologic characteristics, four principal near-surface hydrogeologic units have been identified at the Terminal. In descending order from ground surface, these units include: 1) an upper zone, 2) a confining unit, 3) a lower zone, and 4) a deep sand unit. Depending on the continuity of the confining unit, the hydrogeologic units can act as distinct aquifer units with unconfined conditions in the upper zone and confined to semi-confined characteristics in the lower zone, or act as a single unconfined aquifer (beyond the western extent of the confining unit).

The upper zone at the Terminal consists of fine to medium sand and occurs in the surficial fill material and alluvial sands. The lower zone consists of a fine to medium sand to silty sand with multiple discontinuous interlayers of silt up to 6 ft thick, and occurs in interlayered river channel and overbank deposits. The upper and lower zones are separated by a silt confining unit across most of the Terminal. The silt unit consists of material that is characteristic of natural river overbank deposits and varies in thickness across the site from less than 1 ft to about 30 ft. The confining unit is thickest in the eastern portion of the Main Terminal Tank Farm area and the Bell Terminal Tank Farm area, and thins as it extends westward in the Main Terminal Tank Farm area toward the river where it eventually becomes discontinuous and no longer acts as a confining unit between the upper and lower zones.

Based on the hydrogeologic data for the Terminal, groundwater flow direction in the upper and lower zones is toward the Willamette River. Groundwater elevations measured during fourth quarter 2005 for the upper zone and lower zone are presented on Figures 7 and 8, respectively. Groundwater elevations at the Terminal in both the upper and lower zones vary seasonally, but the groundwater flow patterns presented for the fourth quarter 2005 event are representative of typical historical observations. During the fourth quarter 2005 and historically, groundwater elevations indicate that groundwater flow in the upper zone is generally to the west-southwest toward the Willamette River across the Main Terminal and Bell Terminal tank farm areas. A localized southward shift in groundwater flow in the upper zone, which has historically been apparent within and downgradient of the former PCP mixing area, appears to be due to the influence of the east-west trending storm drain located about 170 ft north of the southern property boundary. Groundwater elevations in the lower zone are influenced by diurnal river stage fluctuations and groundwater flow from the upper zone to the west across the confining unit boundary. In the area where the confining zone is absent toward the river, ground elevation contours indicate that pumping of recovery well RW-2 has modified groundwater flow in the lower zone in proximity to the pumping well, as described in Section 4.2.1. Groundwater flow in the lower zone outside the well RW-2 capture zone is generally west/southwest toward the Willamette River.

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2.3 LAND AND BENEFICIAL WATER USE EVALUATIONS

In accordance with OAR 340-122-080 (e) and (f), evaluations were conducted regarding current and reasonably anticipated future land use and regarding current and reasonably likely future beneficial water use at the Terminal and surrounding areas, as part of the RI. The information collected during these evaluations was reported in the Phase II RI report (Landau Associates 2001) and was updated in the Phase III RI report (Landau Associates 2005a).

Based on the evaluations, the current and historical land use for the Terminal and the adjacent properties is and was primarily industrial with some commercial use. The current zoning of the Terminal property is heavy industrial (IH), which is also the comprehensive plan designation for the site property. This designation indicates that the likely reasonable future land use at the Terminal and surrounding properties is and will remain as heavy industrial.

The evaluations also identified the current and likely future beneficial use of groundwater and surface water at the Terminal, at adjacent properties, and within a 1-mile radius of the Terminal as primarily industrial with some use for irrigation. Shallow groundwater at the Terminal is not considered suitable for beneficial use. For the upper zone, aquifer yield is low (less than 1 gpm) and the unit is discontinuous: therefore, the upper zone would not likely support long-term use for any purpose. For the lower zone, aquifer yield appears to be adequate for low production use (approximately 10 gpm based on sustainable yield from the groundwater interim action system); however, because of its interconnection with the upper zone and its heterogeneous nature, it is possible that this yield would not be sustained for long-term use. Additionally, groundwater used for water supply throughout the Portland area has been typically derived from the deeper Troutdale aquifers, probably because of their significantly higher yield. Therefore, based on the significantly more favorable hydrogeologic characteristics of the Troutdale aquifers and historical groundwater use in this area, as well as the readily available City of Portland water supply, it was determined unlikely that the shallow water-bearing units defined at the Terminal would be used in the future for water supply. DEQ concurred with this determination in its NFA letter for the East Property (DEQ 2003a).

Lower zone groundwater discharges to the Willamette River and may provide some recharge benefit to the river, although the flow volume would be minimal compared to in-stream Willamette flows.

2.4 SOURCE AREAS

Sources that have affected soil and groundwater quality at the Terminal were related to historical operations described above: 1) the wood treatment formulation operation in the former PCP mixing area and former PCP warehouse area; 2) petroleum handling and storage in the Main Terminal and the Bell

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Terminal Tank Farm areas and associated loading rack and petroleum handling areas; 3) storage of waste oils in tanks in the former Crosby & Overton area; 4) "oiling" of roads (likely for dust suppression) on the East Property; and 5) unknown sources along the western property boundary of the Bell Terminal Tank Farm area outside the tank farm wall and on the adjacent former Premier Edible Oils (PEO) property to the west. Contamination to soil on the East Property has been addressed through a soil remedial action and the soil to groundwater pathway has been effectively eliminated. Because DEQ has issued a conditional NFA determination for the East Property portion of the Terminal, further discussion is focused on the other areas of the Terminal.

Upland COIs discussed below were identified by consistent detections of constituents based on soil data collected during various investigations, quarterly groundwater monitoring results, and historical site operations and uses in upland areas of the terminal. The data summarized in the following sections were presented in the Phase III RI report (Landau Associates 2005a) and the most recent groundwater monitoring and groundwater interim action status reports (fourth quarter 2004 through fourth quarter 2005; Landau Associates 2005c,d,e,f; 2006a). Monitoring well locations are shown on Figure 3. A summary of the most recent quarterly results (fourth quarter 2005) is included in Table 2-1. For the purposes of the source control evaluation, upper and lower zone contaminant concentration maps for the fourth quarter 2005 event have been combined except for chromium and copper (Figures 9, and 11 through 14). Since groundwater from both zones combine beyond the extent of the confining zone into a single water-bearing zone, these maps represent the combined concentrations of contaminants that have the potential to migrate to the river.

2.4.1 Former PCP Mixing Area and Warehouse

Two source areas for PCP-related contamination (e.g., PCP by-products and dioxins/ furans) have been defined at the Terminal. These areas are the former PCP mixing area (including the area below the former PCP warehouse) and the northwestern portion of former Crosby & Overton tank area (Figure 2). The primary contaminant of concern resulting from the historical blending of specialty wood treating products is PCP. As discussed in the RI report, releases of PCP, carriers, additives, and PCP formulations to soil in the PCP mixing area appear to have occurred during the mixing operations. These releases resulted in the primary source of PCP contamination (and related constituents) to soil in this area with historical PCP soil concentrations exceeding 100,000 mg/kg. Based on historical upper and lower zone groundwater data, the former PCP mixing area was also identified as a significant or primary source of PCP contamination to groundwater with historical concentrations in the upper zone exceeding 60,000 µg/L. PCP concentrations detected in the lower zone have been as high as 18,000 µg/L. Based on the magnitude of PCP detections in the soil and groundwater in and downgradient of the PCP source area

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and information about the PCP formulations, there is the possibility that free-phase PCP (dense non-aqueous phase liquid (DNAPL)] with a carrier was used, providing a potential residual source of PCP. However, to date, there has been no direct observation or evidence of DNAPL at the Terminal.

Contaminated soil was removed from the former PCP mixing area and below the footprint of the former PCP warehouse during a soil removal action in the fall of 2002. Where possible, soil exceeding PCP concentrations of 5 mg/kg was removed from these source areas for offsite incineration and disposal. However, soil containing PCP concentrations above 5 mg/kg still remains in some areas, mainly at or below the water table (Figure 4). An interim remedial action using an *in situ* chemical oxidation (ISCO) remediation technique is currently being implemented to address PCP-impacted soil and groundwater both in and downgradient of these source areas, as discussed further in Section 4.2.3.

The most recent groundwater analytical data (fourth quarter 2005) indicate that six wells contained detected PCP concentrations ranging from 0.852 to 2,060 µg/L. The highest concentrations were detected in the samples from wells OX-7S and OX-8S [2,060 and 377 µg/L, respectively], located within and downgradient of the former PCP mixing area. OX-2S was not sampled during fourth quarter 2005 due to the presence of product in the well (0.07 ft thickness).

Dioxin and furan analyses were performed on groundwater samples from wells OX-1S, OX-6S, and RW-1, which are located within and downgradient of the former PCP mixing area during the fourth quarter 2005 event. Results from these analyses indicated concentrations, as total equivalency quotient (TEQ), ranged from 2.54×10^{-4} nanograms per liter (ng/L) (RW-1) to 1.95×10^{-2} ng/L (OX-6S).

2.4.2 TANK FARM AREAS

Three primary source areas for diesel-range and gasoline-range petroleum hydrocarbon contamination (and related constituents) have been identified on the Terminal property based on concentrations of these contaminants detected in soil and groundwater. These areas include the Main Terminal Tank Farm area, the central portion of the Bell Terminal Tank Farm area, and an area along the western boundary of the Bell Terminal Tank Farm area. Another source area appears to occur downgradient of the Bell Terminal Tank Farm area on the former PEO property where significant historical releases have been documented in the area of the former diesel ASTs.

Contaminants in soil and groundwater at the Terminal associated with petroleum storage and handling operations include mainly petroleum hydrocarbons, PAHs, and VOCs. The presence of these contaminants is consistent with the historical uses of the Terminal for bulk storage of petroleum products. The graphical results presented in this document focus on VOCs (benzene and ethylbenzene) because these constituents are related to former petroleum operations at the terminal, have been detected at

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concentrations deserving evaluation, and have JSCS screening level values. However, all detected constituents were evaluated using the JSCS SLVs, if available (see Section 5.0). Total petroleum hydrocarbons (diesel and gasoline-range) are not included in the source control evaluation because no published JSCS screening level values are currently available for assessment of these constituents in water or soil. Presentation of the TPH results are provided in the Phase III RI report and quarterly groundwater monitoring reports.

The most recent groundwater monitoring events for the Main Tank Farm area and Bell Terminal Tank Farm area were conducted in November and August 2005, respectively. (At DEQ's request for simultaneous sampling of wells at the Bell Terminal and at the PEO site, sampling of the Bell Terminal wells has been discontinued until additional data is scheduled to be collected at the Schnitzer property.) Figures 11 and 12 show concentrations of benzene and ethylbenzene during the most recent sampling event conducted in the tank farm areas.

2.4.2.1 Main Terminal Tank Farm Area

Past releases of petroleum products have been documented in the Main Terminal Tank Farm area. Specifically, a release of diesel occurred in 1975 when Tank 29508 split along a vertical weld. An unleaded gasoline spill in 1994 was also reported in the Main Terminal Tank Farm area. Such releases have provided a source for petroleum-related constituents (e.g., VOCs, PAHs, and diesel-range and gasoline-range petroleum hydrocarbons). Reported spills within the Main Terminal Tank Farm area are summarized in the following table:

Date	Material(s) Released	Volume Spilled (Gallons)	Spill Surface (Gravel, Asphalt, Sewer)	Action Taken (Yes /No)
1975	Diesel	Unknown	Soil in bermed area	Yes – free product recovery and soil removal
1990	Ethanol	~500 gallons	Soil in bermed area	Yes - Product and groundwater recovery
1994	Unleaded Gasoline	1300 gallons	Soil in bermed area	Yes – Product recovery and long-term groundwater monitoring
1999	Ethanol	2,479 gallons (suspected)	Subsurface soil	Yes - Installed recovery well and conducted groundwater monitoring; no product ever observed

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Unquantifiable leaks along pipelines conveying petroleum products may have also provided a source for the petroleum hydrocarbon contamination in soil and groundwater in this area. LNAPL has been observed at locations within the Main Terminal Tank Farm area in the area of the 1994 spill and more recently in the central portion of the Main Terminal Tank Farm area, which is likely related to periodic leaks along conveyance pipelines. To a lesser extent, inadvertent spills near the loading rack and entrance to the Terminal may have occurred during truck loading/unloading and may have provided a source of petroleum products to soil and groundwater in this area. LNAPL occurrence in the Main Terminal Tank Farm area is discussed in more detail in Section 3.3. The well locations where LNAPL has been observed historically and currently are shown on Figure 10.

As shown on Figures 11 and 12, the maximum concentrations of benzene and ethylbenzene were observed in wells P (2,470 µg/L) and N (131 µg/L), respectively during the November 2005 event. The most elevated benzene concentrations were observed in an area where the 1994 gasoline spill occurred and where LNAPL has historically been observed (Figure 10). Elevated ethylbenzene concentrations were also observed in this area and in two other areas. These two other areas, located within and near the southeast corner of the Main Terminal Tank Farm area, although adjacent, are likely associated with separate historic activities at the terminal (Figure 12). The plume to the west, including well LW-8S, is likely associated with spills related to former petroleum operations within the Main Terminal tank farm area. The plume to the east, including wells RW-1 and LW-11S is likely associated with carrier fluids used with PCP during wood treatment formulation activities within the former PCP mixing area. This interpretation is supported by the results for a product sample collected from well LW-11S in November 2000, which contained 3.2 percent PCP in addition to other petroleum constituents, versus the results for the product samples collected from wells LW-21S and LW-27S in April 2004, which contained only petroleum constituents (e.g., gasoline-, diesel-, and motor oil-range TPH). Also, the plume in the area around well LW-8S appears to be associated with the former petroleum operations in the Main Terminal tank farm area because upper zone groundwater flow in this area is to the south-southwest and constituents originating in the former PCP mixing area (e.g., PCP) have not been observed at well LW-8S.

2.4.2.2 Bell Terminal Tank Farm Area

No past releases in the Bell Terminal Tank Farm area or along the western property boundary of the Bell Terminal have been reported. Reported releases have occurred on the former PEO property located downgradient of the former Bell Terminal Tank Farm area. In the mid-1970s, the western portion of a conveyance pipeline that was used to convey petroleum products was demolished by Schnitzer during construction of the former PEO facility while still in use and containing product. This pipeline

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trends east-west from the northernmost dock on the former PEO property through the center of the Bell Terminal. The demolition resulted in a release to soil in an area near the dock; any impacts of the release to other areas are unknown. Additionally, petroleum releases on the former PEO property reportedly occurred near the locations of the former diesel ASTs, where product has consistently been observed in nearby well MW-4.

Soil and groundwater concentrations collected within the Bell Terminal Tank Farm area and on the former PEO property suggest the presence of three commingled petroleum hydrocarbon plumes within this area: 1) one originating in the central portion of the Bell Terminal Tank Farm area, near the east-west trending pipeline, 2) one originating along the western property boundary in an area outside the tank farm walls, and 3) one originating on the eastern portion of the former PEO property where significant petroleum releases are known to have occurred (e.g., where the former diesel ASTs were located). The source for soil and groundwater impacts in the central portion of the Terminal is likely related to minor, incidental releases associated with operations of the Terminal. The source of petroleum contamination outside the operational area of the Bell Terminal near the western property boundary is unknown. Even though it is likely that the plume originating from the central portion of the Bell Terminal commingles with the plume originating near the western property boundary, and that both of the plumes commingle with other contamination originating on the former PEO property in the area where former diesel ASTs were located, it is unlikely that the elevated concentrations observed near the western property boundary of the Bell Terminal or on the former PEO property originate from the Bell Terminal tank farm operations. This conclusion is based on the decreases in soil and groundwater concentrations between the central portion of the Bell Terminal and the western property boundary, and the significant increase in both the soil and groundwater concentrations for petroleum constituents across the western property boundary and on the former PEO property. Also, product was observed with thicknesses of up to 6 ft in wells on the east portion of the former PEO property between 2001 and 2003 (the most recent data available), but no product has ever been observed within wells or in soil within the Bell Terminal Tank Farm area at over 50 soil sample locations, 14 well locations, and 20 direct push groundwater sample locations. Because the confining unit boundary on the former PEO property is estimated within the likely source area where the former diesel ASTs were located on the eastern portion of the PEO property, the elevated groundwater concentrations in this area could reflect groundwater contamination resulting from direct releases to soil where the confining unit is not present or downgradient flow of contaminated groundwater from the upper zone across the confining unit boundary. However, in the latter case, concentrations would typically decrease instead of increase in the downgradient direction.

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Despite the differences in TPH concentrations, benzene and ethylbenzene have not been detected in the Bell Terminal Tank Farm area above laboratory reporting limits during the last five quarters of groundwater monitoring.

2.4.3 FORMER CROSBY & OVERTON TANK AREA

In the former Crosby & Overton area, PCBs and cPAHs are the primary contaminants of concern due to apparent releases to soil during storage and removal of the oil historically stored in tanks or cleaning of tanks in this area. Contaminated soil was removed from depths ranging from 0.5 to 2.5 ft below the ground surface (BGS) from this area as part of the removal actions for the East Property and former PCP mixing area in the fall of 2002. PCB and cPAH contamination appeared to be limited to surface soil in the former Crosby & Overton source area. No impacts to groundwater have been observed in this area. The residual concentrations of PCBs and cPAHs in soil are shown on Figures 5 and 6.

2.4.4 OTHER CONSTITUENTS

In addition to the COIs associated with operations at the Terminal, metals, including chromium, copper, nickel and zinc, have also been observed in groundwater. As shown on Figures 13 and 14, elevated concentrations of chromium and copper were observed in an area extending from the central portion of the Main Terminal tank farm area toward the north property boundary, at LW-11D and at LW-10D (for copper only), and at two locations in the Bell Terminal tank farm area. Based on knowledge of historical operations at the Terminal, the presence of metals is unlikely related to terminal operations. As described in more detail in Appendix A, reducing groundwater conditions likely exist over most of the upper and lower zones with more oxidizing conditions occurring during periods of river recharge at locations closer to the river and at locations outside the area where petroleum constituents are observed. Also, biodegradation is likely occurring or has historically occurred within the dissolved petroleum plumes within both groundwater zones. The presence of metals in lower zone groundwater does not appear to be directly related to the presence of petroleum constituents and reducing conditions resulting from their biodegradation, because a correlation can not be made between petroleum constituent and metals concentrations. For example, gasoline- and diesel- range hydrocarbons, benzene, toluene, ethylbenzene, and xylenes (BTEX) are not detected in the lower zone at the same locations where metals concentrations are greatest (e.g., LW-35D, LW-27D, LW-1D, etc.).

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3.0 POTENTIAL MIGRATION PATHWAYS TO RIVER FROM IMPACTED MEDIA

Releases of contaminants at the source areas have apparently occurred during operation of the Terminal. Contamination of soil at each of the source areas appears to be the result of releases of hazardous substances directly onto the soil and subsequent migration. At the former PCP mixing area, these releases occurred during PCP formulation activities. At the former Crosby & Overton area, the releases occurred during lease operations. In the Main Terminal Tank Farm area and loading racks, these releases occurred due to spills and possibly leaking along conveyance pipelines and/or from activities associated with bulk fuel storage. In the Bell Terminal Tank Farm area, these releases may have occurred due to activities associated with bulk fuel storage as well as unknown activities along the western property boundary. It appears that separate releases occurred on the adjacent former PEO property. A conceptual site model for the Terminal, which includes a schematic of the source areas, release mechanisms, and transport mechanisms is provided on Figure 15.

The predominant potential migration pathway for transport of contaminants to the river is via groundwater (i.e., dissolved phase). Other potential migration pathways addressed in this source control evaluation include a preferential migration pathway for contaminated groundwater via the storm drain, LNAPL migration, stormwater/upland surface water runoff, and soil erosion/catch basin sediment. Each potential migration pathway is discussed in detail below.

3.1 GROUNDWATER MIGRATION – DISSOLVED PHASE

In some areas of the Terminal, dissolved phase contamination in groundwater has resulted from contact between infiltrating water and contaminated soil in the unsaturated zone and/or subsurface water and NAPL, or downward vertical migration of shallow groundwater contamination to the lower groundwater zones through discontinuities in the confining unit or across the confining unit boundary. Based on the hydrogeologic data for the Terminal, groundwater flow direction in the upper and lower zones is toward the Willamette River. Groundwater elevations measured during fourth quarter 2005 for the upper zone and lower zone are presented on Figures 7 and 8, respectively. Groundwater seeps have not been observed along the riverbank adjacent to the Terminal, so groundwater likely discharges to the river below the water line. Consequently, there is a potential for dissolved chemicals in groundwater or LNAPL from the Main Terminal Tank Farm area to be transported to the river by groundwater flow. However, there does not appear to be a current complete migration pathway for groundwater contamination to the river at concentrations exceeding screening levels (see Section 5.0).

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3.1.1 PCP Mixing Area

The majority of the contaminated soil from the former PCP mixing area and former soil stockpile area has been excavated and disposed offsite. However, at the conclusion of soil removal activities, residual amounts of PCP at concentrations greater than 5 mg/kg still remained at depths typically at or greater than 13 ft BGS (the approximate water table elevation) within and directly adjacent to the mixing area. ISCO injections conducted within the former PCP mixing area are likely to have further decreased the residual concentrations (see Section 4.2.3.)

PCP formulations were likely introduced into the environment through spills of PCP-containing NAPL directly onto the ground surface and subsequent migration through the subsurface to groundwater. Historical information indicates that most of the PCP formulations were less dense than water (i.e., specific gravity of less than 1) and, therefore, would migrate through the environment as LNAPL; however, at least one formulation had a density greater than 1 and could move as DNAPL through the subsurface. LNAPL has been observed in wells LW-11S, OX-1S, OX-2S, and OX-3S, which are located downgradient from the PCP mixing area. DNAPL has never been observed.

Elevated levels of PCP in the upper zone 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. Historically, low PCP concentrations have also been detected within the deep sand unit near where well LW-12D2 was previously located 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 former PCP mixing area and subsequent advective migration from this area, or from partitioning of LNAPL that has migrated downgradient from the PCP mixing area along the water table surface. LNAPL in the downgradient wells has not been observed consistently or over a wide area and is typically associated with very low seasonal groundwater levels. This inconsistent occurrence suggests that the LNAPL exists most of the year in a residual phase within the subsurface adjacent to these wells, and then is released/mobilized to the wells when water levels are low. PCP break-down products (e.g., trichlorophenols, tetrachlorophenols, etc.) have typically not been detected in groundwater indicating that the PCP has not typically degraded. Dioxins/furans tend to bind to soil particles; however, dioxins/furans have been detected in groundwater within the PCP plume area, likely indicating partitioning from LNAPL within or downgradient of the source area.

PCP in the lower zone likely results from downward migration of dissolved PCP via groundwater from the upper to the lower zone where the silt layer separating the upper and lower zones is heterogeneous and/or discontinuous across the confining unit boundary. No DNAPL has been

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encountered during any of the investigations to date. Therefore, downward migration across the confining unit likely occurs under the natural downward groundwater gradient within the upper zone plume resulting in the elevated concentrations detected in the lower zone. 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. This distribution is reflected by the observation of the highest historic concentration of PCP in the lower zone at a downgradient location from the source areas in the upper zone. 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 area.

Historically and currently, the PCP in the upper zone is limited to a narrow plume that extends from the former PCP mixing area downgradient about 350 to 450 ft to between LW-4S and LW-13S. The PCP concentrations in the upper zone are highest within and just downgradient of the former PCP mixing area. PCP appears to have migrated in a downgradient direction toward the south-southwest. Upper zone PCP concentrations within the mixing area have decreased significantly since the first sampling in 1991. This decrease may reflect the removal of contaminant source material during the 1989 soil excavation within the former PCP mixing area, as well as natural attenuation of the PCP (through adsorption, biodegradation, etc.) or downgradient movement past these monitoring points. PCP has not migrated in the upper zone farther downgradient to the south than well LW-13S, as indicated by the lack of detected concentrations in upper zone wells near the south property boundary (LW-10S, when saturated). The reduction in PCP concentrations and plume extent in the upper zone since 2002 is likely related to the removal of the majority of the remaining contaminated soil during the soil removal in the former PCP mixing area and, within the last year, to implementation of the ISCO remediation technique.

The PCP contamination observed in the lower zone historically consisted of several discrete areas of contamination rather than a contiguous plume. The discrete areas were mainly located within and near the former PCP mixing area, in proximity to well LW-11D, and in an area including wells LW-4D and RW-2. The highest PCP concentrations in groundwater in the lower zone, which occurred at well LW-4D (18,000 ppb in October 1997), have decreased significantly at this location and since spring 1999, the PCP concentrations at this location have been mostly below the laboratory reporting limits.

PCP concentrations in groundwater from downgradient wells closest to the river are typically non-detect. Since November 2002, low level PCP concentrations (generally less than 1 µg/L) have been detected on an intermittent basis in wells LW-6D and LW-9D (located between LW-4D and the river), and well LW-10D (located at the southern property boundary). These detections have not been observed on a consistent basis, which may be related to dilution of groundwater by river water at the groundwater-

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surface water interface (particularly in the lower zone where the river stage influence is greatest); natural attenuation processes (e.g., adsorption, biodegradation, etc.); or seasonal variability.

Low concentrations of PCP (1 to 3 µg/L) were detected in the deep sand unit at LW-12D2 sporadically (three times) during quarterly monitoring between May 1999 and June 2002. This well was subsequently abandoned in advance of the soil removal action in the former PCP mixing area because it was located within the excavation area. The historical detections in this well were likely due to downward vertical migration of contaminants via groundwater flow between the upper and lower zone and between the lower zone and the deep sand unit. The source area for the impacts to the upper zone has been mitigated by the soil removal actions in 1989 and 2002, so the potential for ongoing groundwater impact in this area is considered to be low.

Beginning in October 2000, several source control methods have been used to contain PCP-impacted groundwater in the upper and lower groundwater zones. These source control methods are described in more detail in Section 4.2.

The concentrations of petroleum hydrocarbons and VOCs detected in wells downgradient of the former PCP mixing area are likely due to the presence of PCP carrier products (e.g., mineral spirits) that are present as LNAPL and the partitioning of these constituents into groundwater. The distribution of detected petroleum hydrocarbon concentrations in this area is consistent with the intermittent presence of LNAPL observed in well LW-11S, the recent occurrence of LNAPL at wells OX-1S, OX-2S, and LX-3S; and the presence of elevated PCP concentrations in groundwater. The intermittent nature of LNAPL occurrences at LW-11S appears to be related to seasonal groundwater fluctuations, such that residual LNAPL is observed in nearby monitoring wells under low water table conditions or to effects from the ISCO implementation events.

3.1.2 TANK FARMS

Soil contamination by petroleum-related constituents in the Main Terminal and Bell Terminal Tank Farm areas occurs primarily at depth within the capillary fringe. The elevated concentrations of contaminants within the capillary fringe in the Main Terminal and Bell Terminal Tank Farm areas indicate that releases of petroleum substances to the ground surface were historical and that NAPL has had sufficient time to migrate downward and spread laterally within the capillary fringe. The presence of the same contaminants both in groundwater and in soil indicate that these contaminants have partitioned from the soil and/or NAPL into the groundwater. Most of the shallow soil samples containing elevated petroleum hydrocarbon concentrations did not contain elevated benzene or ethylbenzene concentrations, indicating that the low molecular weight aromatics (e.g., BTEX) that may have once been present have undergone biodegradation or volatilization, or have been reduced by infiltrating precipitation.

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In the Main Terminal Tank Farm area, contaminants are present in the upper and lower zone groundwater. However, contamination of the lower zone groundwater is typically found only in the western portion of the Main Terminal Tank Farm area where the silt confining unit separating the upper and lower zones does not exist or is discontinuous. In this portion of the Main Terminal Tank Farm area, only a single unconfined groundwater zone exists. In the eastern portion of the Main Terminal Tank Farm area, where the silt layer separating the upper and lower groundwater zones is present, contaminant concentrations in the lower zone groundwater are typically low and are primarily detected near where the silt layer pinches out or becomes discontinuous. This suggests that the silt layer over much of the western portion of the Main Terminal Tank Farm area provides a natural geologic/hydrogeologic boundary between the upper zone groundwater and the lower zone groundwater, limiting the vertical migration of contaminants over this portion of the Main Terminal Tank Farm area, or that the characteristic of the contaminant does not lend itself to vertical migration.

In the Bell Terminal Tank Farm area, contaminants are present in the upper zone groundwater, but not in the lower zone groundwater. The lack of contaminants in the lower zone groundwater indicates that the silt confining unit between the upper and lower zones is acting as an impermeable boundary and the two groundwater zones are not interconnected in this area. Concentration contours for selected contaminants in upper zone and lower zone groundwater (Figures 9, and 11 through 14) indicate that lateral migration in the downgradient groundwater direction has occurred. The lateral migration is likely a combination of the individual contaminant properties (e.g., solubility) and the processes of advection, hydrodynamic dispersion, and adsorption. The lack of contaminants in groundwater upgradient of the source areas indicates that contaminant migration in groundwater is primarily due to advection (transport of constituents by groundwater movement). For contamination in the groundwater along the western property boundary of the Bell Terminal Tank Farm area or on the former PEO property, there is not enough information about the nature of the release to determine the mechanisms affecting migration. However, the downgradient extent of petroleum constituents in the Bell Terminal Tank Farm area suggests that lateral movement of the contaminants is slow, which may be due to a low rate of advection in this area; possible natural attenuation (through adsorption, biodegradation, etc.); and/or volatilization.

The distribution of petroleum constituent concentrations within and downgradient of the Bell Terminal Tank Farm area suggest the presence of three commingled groundwater plumes, as discussed earlier. Except for low level metals in lower zone wells at the Bell Terminal Tank Farm area (Figure 13 and 14), concentrations of petroleum constituents, such as benzene and ethylbenzene, have typically not been detected in groundwater. Groundwater from the Bell Terminal is expected to flow west toward the Willamette River; it is unknown whether a complete contaminant migration pathway via groundwater exists from the former PEO property.

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3.2 STORM DRAIN – PREFERENTIAL PATHWAY FOR GROUNDWATER

The storm drain (Figures 2 and 17) and backfill associated with its construction appear to affect groundwater flow and contaminant transport in the upper zone. The presence of the storm drain may partly explain the southerly components of upper zone groundwater flow in the Terminal area as groundwater flows toward the zone of higher hydraulic conductivity (i.e., the storm drain pipeline backfill). The storm drain pipeline does not appear to fully penetrate the confining unit (where present) and, therefore, is not considered to provide a vertical pathway for groundwater flow and contaminant transport to deeper aquifers. Groundwater samples collected from manholes in the storm drain and at the storm drain outfall in the river in 2001 and 2002 (Table 3) indicate that the storm drain was serving as a preferential pathway for upper zone groundwater to the river.

A stormwater intercept system was installed in 2002 to eliminate the potential for PCP-impacted upper zone groundwater to migrate through the storm drain to the river. A detailed description of the intercept system is provided in Section 4.2.2. Groundwater that may migrate within the pipeline fill outside the pipeline is likely not collected by the storm drain intercept system. However, PCP concentrations have not been detected in river outfall samples since implementation of the storm drain intercept system.

3.3 LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) MIGRATION

LNAPL has been observed both historically and currently in the area downgradient of the former PCP mixing area (in wells LW-8S, LW-11S, OX-1S, OX-2S, and OX-3S) and in the former Main Terminal Tank Farm area (in wells N, P, Q, LW-21S, and LW-27S), as shown on Figure 10 and in Table 2.

In the Main Terminal Tank Farm area, the maximum LNAPL thickness was observed in well N in July 1997 (1.20 ft); however, no LNAPL has been observed in well N since November 2002. The maximum LNAPL thickness observed in wells P and Q were 0.17 ft (July 1997) and 0.42 ft (November 2001), respectively. No LNAPL has been observed in wells P and Q since October 2003 and November 2004, respectively. The maximum thickness of LNAPL observed in wells LW-21S and LW-27S was observed in February 2004, at thicknesses of 1.03 ft and 0.69 ft, respectively. LNAPL has been observed at thicknesses of less than 0.16 ft in wells in the Main Tank Farm area during the last year. Also, LNAPL thicknesses have decreased over time at each of the wells where LNAPL was observed (Figure 20). This decrease is likely due to a combination of passive recovery techniques and natural attenuation processes. LNAPL has never been observed in wells located at the top of the riverbank or in the shoreline wells

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(Figure 18). The results of the MNA evaluation which included assessment of the migration potential of the LNAPL are discussed in Section 6.0.

In the area downgradient of the former PCP mixing area, LNAPL containing PCP was observed in wells LW-8S, OX-1S, and OX-3S in November 2004 only, at thicknesses of 0.04 ft, 0.03 ft, and 0.33 ft, respectively. LNAPL was observed in well LW-11S at a maximum thickness of 0.37 ft in November 2000, although no LNAPL has been observed in that well since November 2004. LNAPL is consistently detected in well OX-2S, with a maximum thickness of 0.31 ft observed in October 2003. During the four sampling events conducted in 2005, the maximum thickness observed in well OX-2S was 0.23 ft. As shown on Figure 19, LNAPL thicknesses in this area have decreased over time. This decrease is likely due to use of ISCO in proximity of the wells containing LNAPL downgradient of the former PCP mixing area.

As shown on Figure 19, LNAPL thicknesses appear to correlate with groundwater level fluctations such that LNAPL thicknesses increase at historically high groundwater conditions (LW-21S and LW-27S) and at historically low groundwater conditions (LW-11S). These increases are likely related to the release of residual LNAPL in the vadose zone as groundwater levels get shallower and closer to the ground surface where the source of the LNAPL originated (LW-21S, LW-27S), or due to the release of residual LNAPL bound up in previously saturated pore spaces as the water levels decrease (LW-11S).

3.4 STORMWATER/SURFACE WATER RUNOFF

Stormwater primarily infiltrates at the Terminal. In areas where stormwater runoff occurs, the stormwater is routed to an onsite stormwater treatment system (SWTS) or collected into the storm drain lines for discharge to the Willamette River. Stormwater from the former industrial areas of the terminal, including the loading rack along the rail spur, the truck loading rack, the valve pit on the vessel dock, and the other areas where valves exist is routed to the SWTS. The discharge from the SWTS to the stormwater drainage system, which ultimately discharges to the Willamette River following treatment, is regulated by the provisions of NPDES Permit 1200-Z.

Stormwater from the terminal entrance area and the low topographic area east of the rail spur and from the other areas of the Terminal during storm events is collected into the storm drain line for untreated discharge into the Willamette River. The stormwater flow route is shown on Figure 17.

The storm drain line runs east-west along the length of the Terminal about 160 ft north of the southern property boundary (Figures 2 and 17) to the river outfall. The storm drain was constructed before construction of the Terminal in 1943 and, therefore, backfill/construction details are not available. Internal inspection of a 600-ft section of the storm drain by remote video camera in April 2000 revealed

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that the line is a 15-inch diameter concrete pipe. The pipeline appeared to be in good condition with few internal leaks. Several lateral lines to the main line were also observed in the Main Terminal Tank Farm area. One of the lateral lines was damaged during drilling of the horizontal well installed as part of the groundwater interim action (see Section 4.2.1). The lateral lines were subsequently abandoned and isolated from the main line using internal patches.

Stormwater data collected between September 2001 and August 2002 at the catch basin closest to the river contained PCP concentrations ranging from 0.7 to 190 µg/L (Table 3). Except for diesel-range petroleum hydrocarbons, petroleum compounds (gasoline, mineral spirits, kerosene, and lube oil) were not detected. Diesel-range petroleum hydrocarbons were detected twice at concentrations of 0.261 mg/L and 0.3 mg/L. These data and the groundwater flow pattern in the upper zone indicated that upper zone groundwater was likely infiltrating into the storm drain pipeline. In October 2002, a groundwater intercept system was installed within the storm drain to capture groundwater between the two stormwater manholes closest to the river (see Section 4.2.2). Stormwater samples collected from the groundwater intercept system located in the catch basin closest to the river (SDM-1) continue to be analyzed as influent into the onsite WWTS on a quarterly basis (Table 3); however, these concentrations represent groundwater captured by the intercept system that do not reach the river outfall. Samples are also collected from the river outfall, when exposed during the quarterly sampling events.

In summary, stormwater runoff from the east property and from former operational areas of the terminal outside of the former PCP mixing area that does not infiltrate discharges to the Willamette River at the river outfall. Stormwater from former operational areas at the Terminal is collected and treated at the onsite SWTS, discharged to the storm sewer system under NPDES permit 1200Z, combined with the untreated stormwater from the east property (when present), and ultimately discharged to the Willamette River (Figure 17). Impacted media are not located within the area of stormwater runoff that discharges to the river; therefore, stormwater is not considered a current, potential contaminant migration pathway to the river. Potential historical releases to the river via the river outfall are being addressed by the Portland Harbor RI/FS.

No surface water body is present on or across the Terminal.

3.5 RIVERBANK SOIL EROSION AND CATCH BASIN SEDIMENT

Soil susceptible to potential erosion near the river embankment is outside of the bermed area that surrounds the Main Terminal Tank Farm area, to the west of where terminal operations were mainly located. Also, much of the river bank is either covered with vegetation or gravel fill and the beach is relatively wide, so the potential for riverbank erosion is limited. There are no records or evidence of spills from the pipelines along the dock where petroleum products were transferred from ships to the

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Main Terminal Tank Farm area. Soil samples collected from the wells drilled on the shoreline do not indicate contamination, and no seeps, staining or other visual evidence of contamination has been observed. Soil erosion is therefore considered an unlikely pathway for contaminant migration.

Impacted surface soils in non-operational areas of the property that drain to the river outfall have largely been removed and replaced with gravelly fill at the ground surface. As discussed above, contamination of soil within the former Crosby & Overton tank area is anticipated to be the result of waste oil spills from the tanks historically located within this area. Because cPAHs and PCBs tend to absorb or bind to soil, contamination in this area was limited to the upper few feet of surface soil. As part of the soil removal action conducted for the former PCP mixing area and soil stockpile, impacted soil was excavated from the Crosby & Overton tank area and disposed offsite. Remaining PCP and cPAH concentrations in soil at completion of the removal action are shown on Figures 5 and 6 and confirm that the areal and vertical extent of the contamination was limited. Because historical releases in this area resulted in contamination that was limited to surface soil and groundwater contamination has never been observed in this area, the concentrations remaining in soil are considered to be protective of groundwater and additional cleanup in this area is not necessary. The residual soil concentrations are not expected to provide a complete exposure pathway to ecological or human receptors or provide a source of erodible soil, because the soil is buried under approximately 1.5 ft of backfill and groundwater quality results in this area before the removal action showed nondetect PCB and cPAH concentrations over a year period from 1997 to 1998. Also, residual PCP-impacted soil resulting from the historical PCP mixing area operations only remains at depths more than 13 ft BGS and below the excavation backfill (Figure 4), and therefore would not provide a source of erodible soil to the storm drain system via stormwater.

Therefore, significant erosion and transport of impacted soil at the Terminal through the stormwater system is unlikely. Potential historical releases to the river via the river outfall are being addressed by the Portland Harbor RI/FS.

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4.0 SUMMARY OF COMPLETED OR ONGOING SOURCE CONTROL/REMOVAL ACTIVITIES

This section summarizes the source control and/or removal activities that have been conducted or are currently ongoing at the Terminal to address source area impacts.

4.1 PCP-IMPACTED SOIL

Approximately 9,700 tons of contaminated soil were removed from the former PCP mixing area, below the footprint of the former PCP warehouse, and from the former soil stockpile area during a soil removal action in the fall of 2002. Where possible, soil exceeding PCP concentrations of 5 mg/kg was removed from these source areas for offsite incineration and disposal. However, soil containing PCP concentrations above 5 mg/kg still remain in some areas, mainly at or below the water table (approximately 13 ft BGS) at conclusion of the soil removal activities (Figure 4). The ISCO remediation technique being used for upper zone groundwater (see Section 4.2.3) is expected to address some of the PCP contamination in soil within the zone of groundwater fluctuation. Because the remaining PCP-contaminated soil is buried under approximately 13 ft of backfill, the soil is not likely to be transported by stormwater to the storm drain system.

4.2 PCP-IMPACTED GROUNDWATER

Source control methods currently being used to capture and treat PCP-impacted groundwater consist of the following:

- Storm Drain Intercept System – captures PCP-impacted groundwater in the upper zone that infiltrates into the storm drain pipeline in the area of the PCP plume.
- Horizontal Recovery Well – captures upper zone groundwater near the downgradient extent of the PCP plume in the upper zone during periods of seasonal high water levels.
- ISCO – treats upper zone groundwater and soil within the zone of groundwater fluctuation. ISCO has been used during three full-scale injection events within the PCP plume area in February 2005, June 2005 and January 2006.
- Vertical Recovery Well – captures lower zone groundwater at downgradient locations where elevated concentrations of PCP were historically recorded.

These methods are described in detail in the following sections. Because of the source control systems in place, there is not a current, complete contaminant transport pathway to the river for PCP-impacted groundwater.

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4.2.1 GROUNDWATER RECOVERY AND ONSITE TREATMENT

To prevent further migration of PCP in upper zone and lower zone groundwater at the Terminal, a groundwater interim action was implemented. The system consists of two groundwater extraction wells, a horizontal well (HRW-1) in the upper zone and a vertical well (RW-2) in the lower zone, and a groundwater intercept system in the east-west trending storm drain at the manhole closest to the Willamette River (SDM-1; Section 4.2.2). These well locations and the location of SDM-1 are shown on Figure 3.

Pumping from recovery well RW-2 began in October 2000. Since startup of recovery well RW-2, with the exception of periodic shutdowns for system maintenance, groundwater has been extracted continuously from the lower zone. Through December 2005, approximately 19.5 million gallons of water have been removed from the lower zone at RW-2 and transferred to the onsite wastewater treatment system (WWTS) for subsequent treatment and discharge to the sanitary sewer under a publicly owned treatment works (POTW) permit with the City of Portland.

The horizontal well (HRW-1) was installed in the upper zone during April 2000 across the approximate downgradient edge of the PCP plume in the upper zone. Four piezometers (PZ-1 through PZ-4) were installed, and water level monitoring was performed in February through May 2002 in the area of the east-west trending storm drain and HRW-1 to assess why the desired pumping rate could not be achieved in HRW-1 (Figure 3). The water level monitoring indicated that the water level in HRW-1 was lower than in the surrounding upper zone monitoring wells. From the water level data collected to date, information collected regarding the storm drain line, and the nature of the confining unit, it is believed that there is a hydraulic interconnection between the upper and lower zones in the area of the horizontal well. Based on this information and observed conditions, pumping of HRW-1 is limited to the wetter months of the year (i.e., December through May). Approximately 332,000 gallons of groundwater have been removed from HRW-1 since startup and transferred to the onsite WWTS for subsequent treatment and discharge to the sanitary sewer under a POTW permit with the City of Portland.

4.2.2 STORM DRAIN INTERCEPT SYSTEM

During installation activities for HRW-1, a lateral from the main storm drain was penetrated. A subsequent investigation was conducted to assess the impact of the east-west trending storm drain, located approximately 15 to 20 ft south (downgradient) of HRW-1, on upper zone groundwater. Samples were collected from two manhole locations (SDM-1 and SDM-2) and from the storm drain outfall at the discharge point into the Willamette River and analyzed for PCP. Results indicated that groundwater from the upper zone was infiltrating into the concrete stormwater drain (Table 3).

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Due to the inability to operate HRW-1 during the drier months from June through November and the potential for upper zone groundwater to infiltrate into the storm drain line, a groundwater intercept system was installed in the storm drain line on October 8, 2002, at the manhole (SDM-1) located closest to the point of discharge to the Willamette River. The system consists of an 8-inch diameter polyethylene pipe routed through the 15-inch storm drain line from manhole SDM-1A through manhole SDM-1 (Figure 17). Stormwater from the East Property and Terminal office area, as well as treated stormwater from the SWTS, is routed through the 8-inch liner pipe and discharged to the Willamette River. Potentially impacted groundwater entering the storm drain pipe between manholes SDM-1A and SDM-1 is routed through the annulus between the pipes and is collected in manhole SDM-1. The intercepted water is pumped from the manhole to Tank 16804 for processing by the onsite WWTS. Approximately 3 million gallons of water have been removed from SDM-1 since startup.

4.2.3 ISCO INJECTIONS

To further facilitate the remediation of PCP contamination in the groundwater and soil at the Terminal within the upper zone, ISCO injections have been implemented. The primary objectives of the ISCO injections are to reduce the concentration of PCP present in upper zone groundwater within the PCP source area, to reduce the extent of the PCP plume in the upper zone groundwater, and to reduce the concentration of PCP in the soil located within the zone of groundwater fluctuation (i.e., smear zone). The specific type of chemical oxidation that has been implemented for the interim action is based on Fenton's Reagent oxidation technology. The Fenton's Reagent chemical oxidation reaction is created by the combination of soluble iron with low concentrations of hydrogen peroxide to produce hydroxyl radicals (•OH). The hydroxyl radical is a short-lived oxidizer that cleaves the carbon double bonds of chlorinated hydrocarbons (e.g., PCP).

To date, three full-scale injection events have been conducted in February 2005, June 2005, and January-February 2006. The results are of the first two events were provided in the RI report and the first quarter 2005 groundwater monitoring and groundwater interim action status report (Landau Associates 2005d), respectively. The results for the February 2006 event are currently being evaluated. The injection points for all three events were primarily focused within the PCP plume area within the upper zone within and downgradient of the former PCP mixing area, as shown on Figure 22. The results from the first two events indicate that PCP concentrations were effectively reduced within the plume area. Figure 22 shows baseline PCP concentrations in the upper zone prior to the first ISCO injection in June 2004. Figures 22 and 23 show PCP concentrations following the first and second ISCO injections in August 2004 and February 2005, respectively. Figure 9 shows the most recent PCP concentrations. After the first ISCO event, PCP concentrations in upper zone monitoring wells within the PCP plume area were

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reduced by 63 percent (OX-8S) to 92 percent (OX-3S) and following the second event, PCP concentrations were reduced by 3 percent (LW-11S) to 80 percent (OX-6S). Based on mass calculations of PCP before and after the two injection events, the ISCO injections appear to have caused a mass reduction of PCP of approximately 0.85 lbs, or 76 percent over a one year period. The results of the 2006 event will be provided in the First Quarter 2006 Groundwater Monitoring and Groundwater Interim Action Status Report (Landau Associates 2006b - in preparation).

4.3 PAH AND PCB-IMPACTED SURFACE SOIL REMOVAL

In the former Crosby & Overton area, PCB- and cPAH-impacted soil was removed as part of the removal actions for the East Property and former PCP mixing area in the fall of 2002. The removal action consisted of the removal and offsite treatment and disposal of 819 tons of soil from depths ranging from 0.5 to 2.5 ft BGS. Residual soil concentrations remaining within the soil removal area are shown on Figures 5 and 6. PCB and cPAH contamination appeared to be limited to surface soil in the former Crosby & Overton source area and has not been detected in groundwater. These residual concentrations are not expected to provide a complete exposure pathway to ecological or human receptors or provide a source of erodible soil, because the soil is buried under approximately 1.5 ft of backfill and groundwater quality results in this area before the removal action showed nondetect PCB and cPAH concentrations.

4.4 PASSIVE LNAPL RECOVERY

In the Main Terminal Tank Farm area, LNAPL has been observed since the first quarter 2004 in wells LW-21S and LW-27S (Table 2). Keck® passive product recovery bailers were installed at LW-21S and LW-27S in March 2004. The recovered LNAPL is removed during quarterly groundwater sampling events and temporarily contained in a 55-gallon drum onsite pending appropriate offsite disposal. Through December 2005, less than 5 gallons of LNAPL have been removed from these wells.

Also, LNAPL has been observed intermittently in wells L, P, and Q in the Main Terminal Tank Farm area (Table 2). Product socks have been placed in these wells when product has been observed and removed and replaced on a quarterly basis, as needed. Currently, there is no measurable product in these wells. The potential for LNAPL migration from the Main Terminal Tank Farm area is discussed in Section 6.0.

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5.0 COMPARISON OF DETECTED GROUNDWATER CONCENTRATIONS AT TO JSCS SCREENING LEVEL VALUES

This section presents the results of a comparison of detected groundwater concentrations in nearshore wells to the JSCS screening level values (SLVs). Only groundwater results were compared to the JSCS SLV, because, as discussed in Section 3 and below, groundwater is the only potentially complete contaminant migration pathway to the Willamette River at the Terminal.

To assess the potential for a complete contaminant migration pathway from the source areas, concentrations of groundwater from wells in the following areas were compared to the JSCS SLVs:

- Shoreline (beach) wells on the Willamette River – represent groundwater concentrations downgradient of the Main Terminal Tank Farm area and near the point of groundwater discharge to the Willamette River.

- Bell Terminal Tank Farm well – represent groundwater concentrations at the downgradient edge of the Bell Terminal property, but upgradient from other potential sources on the former PEO property.

- Downgradient wells from the PCP groundwater plume – represent groundwater concentrations downgradient of the PCP plume area in the upper zone at wells located on the river bank less than 200ft from the river

The analytical results were compared to the SLVs presented in Table 3-1 of the JSCS. Any constituent detected during the five quarterly events between November 2004 and November 2005 was compared to the screening levels identified in Table 3-1 of the JSCS, as shown on Tables 4, 5, and 6.

5.1 SHORELINE WELLS

The Willamette River shoreline wells (LW-36D, LW-37D, LW-38D, and LW-39D; shown on Figure 3) were used for the comparison because the analytical results from these wells are representative of groundwater concentrations downgradient of the Main Terminal Tank Farm area and near the area of groundwater discharge to the river. The results of the comparison to the JSCS levels indicate that except for certain metals, no other constituents exceed the SLVs in groundwater at the shoreline wells. The TPH, BTEX, and selected metals (e.g., chromium, copper, and arsenic) results for these wells for the November 2005 event as wells as the results for wells located along the riverbank are shown on Figure 16. As shown on Table 4, arsenic exceeded the SLVs regularly at wells LW-38D and LW-39D and during one event each at wells LW-37D and LW-38D. A site-specific background concentration established for arsenic (1.5 mg/L) in groundwater based on concentrations collected at wells on the East Property was not exceeded in any sampling event. Because these East Property wells were located outside of the terminal operation areas, the site-specific background concentration is representative of a

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naturally occurring background level. Consideration of site-specific background concentrations is allowed for the weight-of-evidence approach under the JSCS. Other metals, including copper, lead, nickel, and zinc were detected intermittently at concentrations exceeding the JSCS SLVs. One sample collected at well LW-37D in November 2005 contained concentrations of arsenic, copper, lead and zinc that exceeded the SLVs. The overall higher turbidity measurement at this well during this event could be indicative of suspended material in this sample and could have biased the results high. Groundwater results for later events at this location, including both total and dissolved metals concentrations, showed concentrations less than the SLVs. The only other exceedances of the SLVs included total lead at well LW-37D in February 2005 (the three most recent events have been nondetect or less than the SLV) and a single occurrence (August 2005) for total and dissolved nickel at well LW-39D (all other nickel results were nondetect or less than the SLV).

The presence of metals concentrations in groundwater are not likely related to historical operations at the Terminal because the materials handled at the Terminal did not contain these constituents. This is further demonstrated by the fact that concentrations of all other constituents originating from Terminal operations are typically higher in the upper zone than in the lower zone, which is not the case for the metals concentrations. An evaluation of whether metals concentrations could be influenced by redox conditions in the lower zone was conducted as part of the MNA evaluation through the measurement of MNA parameters (including oxidation-reduction potential). The results of the MNA evaluation are included in Section 6.1. Further discussion of the metals concentrations are provided in Section 2.3.4. Under the groundwater screening procedures specified in the JSCS, a weight-of-evidence approach is allowed where concentrations exceed the SLVs. For these metals concentrations, considering the site-specific background concentration for arsenic (a regional background groundwater value is not available, but arsenic and other metals are ubiquitous throughout the area), the sporadic and low level nature of the other metals detections, and the lack of use of these constituents during terminal operations, source control should not be required for the metals constituents.

5.2 BELL TERMINAL TANK FARM WELLS

Groundwater concentrations from ten wells (seven upper zone, three lower zone) located within the Bell Terminal Tank Farm area were screened against the JSCS SLVs. These groundwater results represent groundwater concentrations within and at the downgradient edge of the Bell Terminal property, but upgradient from other potential sources on the former PEO property. Groundwater concentrations on the former PEO property at locations between the Bell Terminal and the river have not been monitored since 1998.

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The results of the comparison to the JSCS levels indicate that except for certain metals, no other constituents exceed the SLVs in groundwater at the Bell Terminal. As shown on Table 6, arsenic exceeded the SLVs regularly at most of the wells, but did not exceed the site-specific background concentration. Other metals concentrations that sporadically exceeded the JSCS SLVs included copper, lead, nickel and zinc in the lower zone wells (LW-29D, LW-30D, and LW-32D). The presence of metals concentrations in the lower zone may be related to the presence of reducing conditions, but does not appear to be exacerbated by the presence of petroleum constituents. Petroleum constituents are typically nondetect in the Bell Terminal in the lower zone. For the reasons stated in Section 5.1 above, source control should not be required for metals in groundwater within the Bell Terminal.

5.3 PCP PLUME – DOWNGRADIENT WELLS

Two wells (LW-6D and LW-9D) are located on the riverbank within approximately 200 ft of the river shoreline. Groundwater concentrations from these wells were screened against the JSCS SLVs because the groundwater is representative of concentrations downgradient of the PCP plume, as shown on Table 5. PCP concentrations at these wells have typically been nondetect during the period of monitoring between 1997 to present. Between November 2004 and November 2005, PCP was detected at LW-6D on one occasion at a concentration less than 3.0 µg/L, the National Recommended Water Quality Criteria (organism only, consumption rate = 17.5 g/day; EPA 2002) and DEQ's Ambient Water Quality Criteria (AWQC) (organism only, consumption rate = 17.5 g/day; DEQ 2004;Figure 9), but slightly greater than the minimum JSCS SLV (0.3 µg/L; based on the 175 g/day consumption rate for the same criteria) The source control methods currently in place, as described in Section 4, have been effective in containing the migration of PCP to the river; and therefore, there is not a current complete contaminant migration pathway for PCP-impacted groundwater to the river.

Arsenic is the only other constituent detected in groundwater from these wells that routinely exceeds the minimum JSCS SLV (0.014 µg/L). However, none of the arsenic concentrations exceed the site-specific background concentration (1,500 µg/L). Other metals, copper and lead, also sporadically are observed at concentrations slightly exceeding the minimum JSCS SLVs (copper: 2.7 µg/L; lead: 0.54 µg/L). For the reasons stated in Section 5.1 above, source control should not be required for these low detections of metals in groundwater within or downgradient of the PCP plume area.

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6.0 CONCLUSIONS AND PLANNED ACTIVITIES

Five potential migration pathways between impacted media within source areas at the Terminal and the Willamette River were identified during the source control evaluation. Based on information presented herein and the comparison of groundwater concentrations with the JSCS SLVs, we conclude that no pathway that transports contaminated media to the river at concentrations consistently greater than the JSCS SLVs or site-specific background levels currently exists at the Terminal. We justify this conclusion for each potential pathway defined in Section 3 below.

6.1 GROUNDWATER MIGRATION - DISSOLVED PHASE

Three source areas for potential groundwater migration of dissolved phase contaminants were identified at the Terminal. These source areas consist of the former Main Terminal Tank Farm area and Bell Terminal Tank Farm areas for dissolved phase petroleum hydrocarbon constituents, and the former PCP mixing area and warehouse for dissolved phase PCP.

- **Former Main Terminal Tank Farm Area**: Groundwater analytical data collected over the past year from the shoreline (beach) wells located downgradient of the Main Terminal Tank Farm area indicate that none of the constituents exceed the JSCS SLVs, with the exception of some metals. Concentrations of arsenic routinely exceed the SLVs but do not exceed the site-specific groundwater background concentration established for arsenic. The JSCS SLVs are exceeded for other metals (including copper, lead, nickel and zinc), but none on a consistent basis (Table 4). The presence of metals at these concentrations does not appear to be related to terminal operations because metals of this type were not used historically for site activities. The presence of metals at these concentrations is explained in Section 2.4.4. The monitored natural attenuation evaluation results (Appendix A) support these data and indicate that dissolved petroleum constituent concentrations are likely naturally attenuated between the source area and the river. Therefore, these data support the conclusion that even though there is a complete physical groundwater transport pathway to the river, there is not a current complete contaminant migration pathway via groundwater to the river from the Main Terminal Tank Farm area.

- **Former Bell Terminal Tank Farm Area**: The Bell Terminal Tank Farm area boundary is located more than 600 ft from the river shoreline. Groundwater concentrations for all petroleum-related constituents from the operational area of the Bell Terminal Tank Farm area do not exceed the JSCS SLVs (Table 5). Similar to the Main Terminal, arsenic concentrations routinely exceed the SLVs, but do not exceed the site-specific background concentrations. Other metals (including copper, lead, nickel, zinc) occasionally exceed the SLVs, but only in lower zone groundwater. Elevated groundwater concentrations along the downgradient western property boundary and on the former PEO property do not appear to be related to Time Oil operations; however, petroleum-related constituents do not exceed the JSCS SLVs along the western property boundary (where SLVs are available). Groundwater sampling has not been conducted on the PEO property since 1998. These data indicate that dissolved groundwater concentrations leaving the Bell Terminal property do not consistently exceed the JSCS SLVs; therefore, a contaminant migration pathway for groundwater concentrations exceeding the JSCS SLVs does not occur from the Bell Terminal.

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- **Former PCP Mixing Area and Warehouse.** Groundwater concentrations between the defined PCP plume and river are typically nondetect for PCP-related constituents (Table 6). Similar to the tank farms, arsenic and other metals exceed the JSCS SLVs, but arsenic concentrations do not exceed the site-specific background concentration and the other metals are only observed sporadically at concentrations slightly above the JSCS SLVs. Groundwater downgradient of the former PCP mixing area and warehouse is currently being captured using the storm drain intercept system, the horizontal recovery well, the vertical recovery well, and ISCO techniques and recovered groundwater is treated by the onsite WWTS. These source control activities interrupt any potential migration pathways of the PCP-impacted groundwater to the river.

6.2 STORM DRAIN – PREFERENTIAL PATHWAY FOR GROUNDWATER

PCP-impacted groundwater that infiltrates into the storm drain is currently being intercepted and transferred to the onsite WWTS. Therefore, direct discharge of impacted groundwater through the storm drain to the river does not represent a current complete contaminant migration pathway. Potential historical impacts to the river via the storm drain are being addressed as part of the Portland Harbor RI/FS.

6.3 LNAPL MIGRATION

The migration potential of PCP from the former PCP-operation area is being addressed using ISCO techniques. The migration potential of LNAPL from the Main Terminal Tank Farm area was unknown, and therefore modeled as part of the source control evaluation (Appendix A). The MNA measurements and fate and transport modeling efforts indicated that LNAPL and associated contaminants were likely being attenuated before reaching downgradient locations near the point of groundwater discharge, and no reduction in concentration of contaminants in Main Terminal Tank Farm area wells was required to meet the JSCS SLVs in river bank wells in the future. Therefore, migration of LNAPL does not represent a complete current or future contaminant migration pathway to the river.

6.4 STORMWATER/SURFACE WATER RUNOFF

Stormwater runoff from former operational areas associated with the former industrial areas of the site is collected and treated at the onsite SWTS. Stormwater typically infiltrates on the East Property or in other non-operational areas of the Terminal. Any stormwater runoff from the East Property and other non-operational areas originates from non-impacted areas, and therefore is not a potential migration pathway for contaminants to the river.

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6.5 RIVERBANK SOIL EROSION AND CATCH BASIN SEDIMENT

Soils susceptible to potential erosion near the river embankment are located outside the bermed areas that surround the tank farms (i.e., operational areas) and no records or evidence of spills have occurred near the river embankment. In addition, impacted surface soils in non-operational areas of the property have been removed and/or covered with fill; therefore, no erosion and transport of impacted soil to catch basins from these areas will occur.

6.6 PLANNED SOURCE CONTROL ACTIVITIES

Time Oil will continue to operate the groundwater interim action system for recovery of PCP-impacted groundwater in the upper and lower zones. Because of the minimum area impacted currently in the lower zone, Time Oil will continue to assess the need to maintain groundwater recovery efforts at RW-2. Also, an assessment of the overall success of the ISCO injections for treatment of PCP-impacted groundwater in the upper zone is currently being evaluated, based on the most recent event conducted in February 2006. The results of the ISCO event and any future recommendations will be provided in the upcoming First Quarter 2006 Groundwater Monitoring and Groundwater Interim Action Status Report (Landau Associates 2006b, in progress).

The results of the MNA parameter measurements and the fate and transport modeling indicate that anaerobic biodegradation is likely occurring within impacted groundwater in the Main Terminal Tank Farm area under natural aquifer conditions to attenuate LNAPL and dissolved contaminants from reaching the river, and a more aggressive method for remediation of the LNAPL is not necessary under current conditions. However, based on the current concentrations of sulfate and nitrate, continued biodegradation of these constituents may be limited. Other anaerobic biodegradation indicators (e.g., ferrous iron and methane) haven't been fully characterized; these indicators, as well as confirmation of the nitrate and sulfate results, may provide additional information on biodegradation capacities. Time Oil will continue to use passive recovery methods to remove measurable product from wells within the Main Tank Farm area, as necessary.

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7.0 USE OF THIS REPORT

This source control evaluation 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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OREGON
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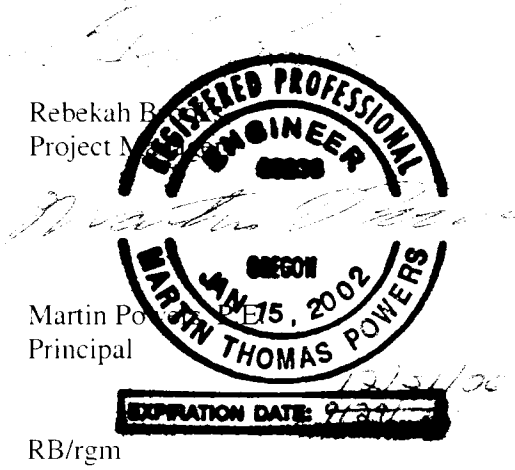
EXPIRATION DATE: 9/30/[illegible]



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RB/rgm

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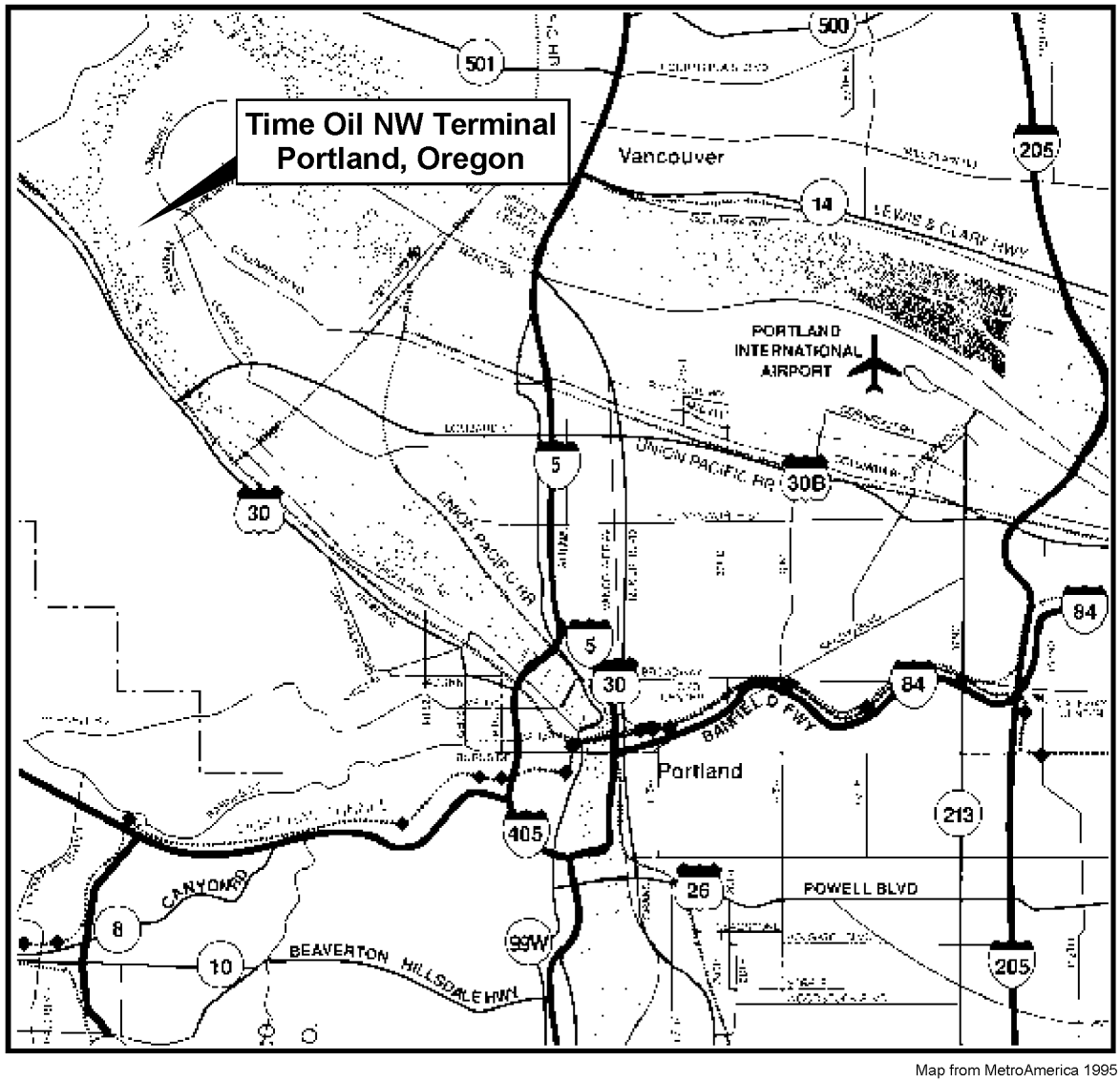
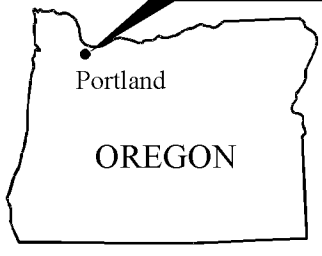


Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



0 2 4
Approximate Scale in Miles

Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

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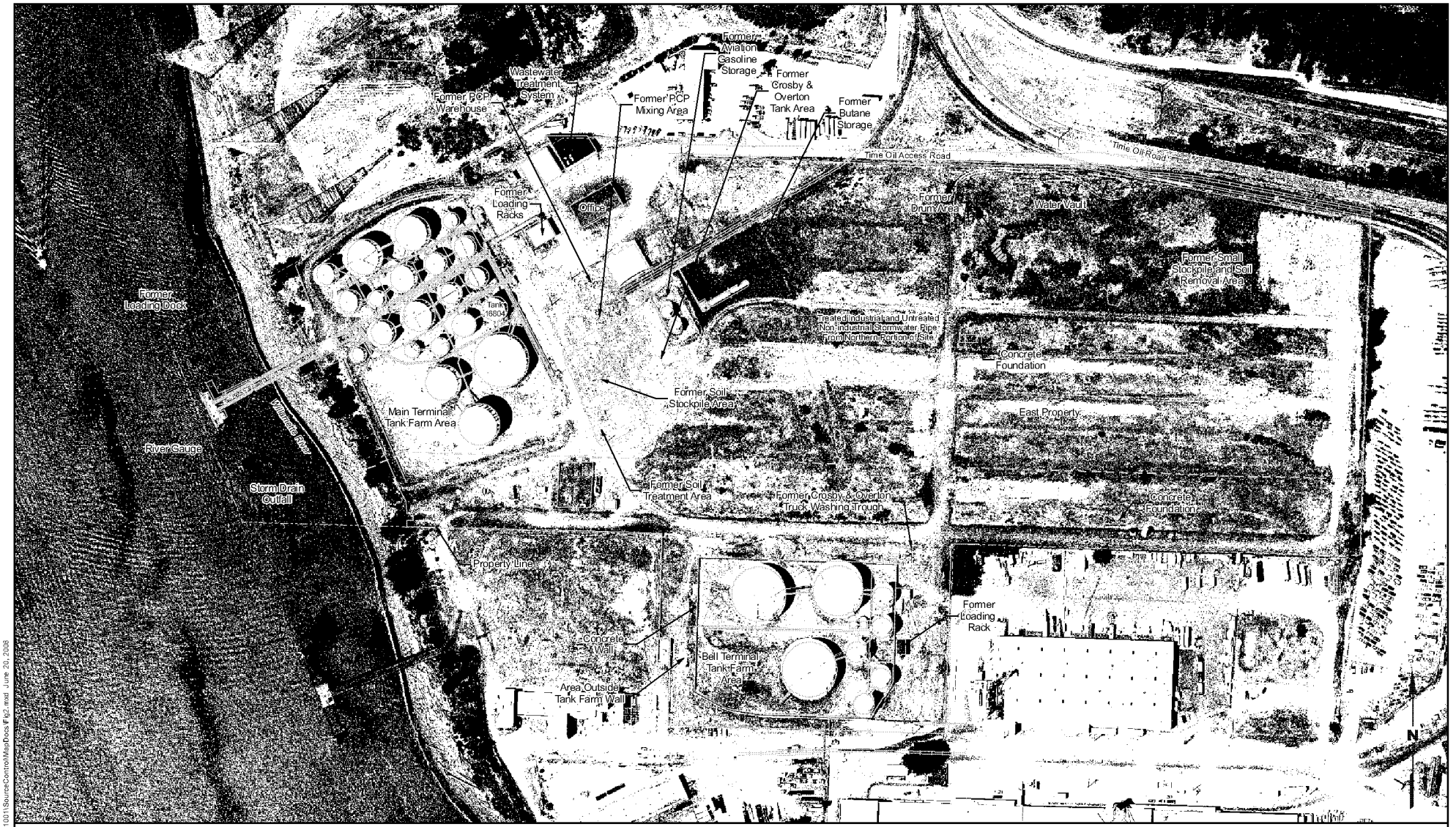
Time Oil | T:\231\001\Vicinity Map.cdr (C) 6/20/2003



Y:\Projects\231001\SourceControl\MapDocs\Fig2.mxd June 20, 2008

Legend

- Manhole
- Storm Drain
- Fence

0 200 400

Scale in Feet

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Terminal Map**	Figure 2

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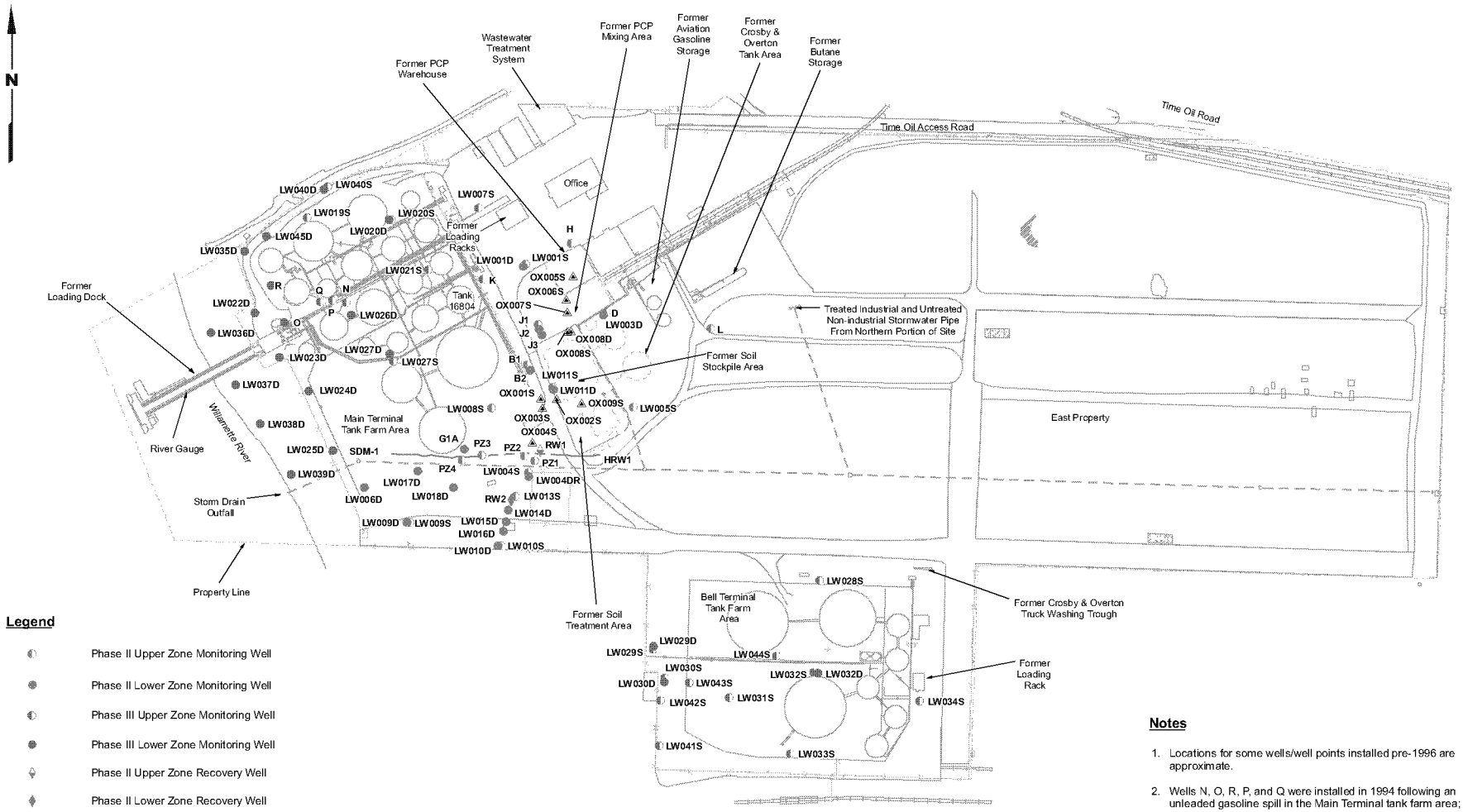

Legend

- Phase II Upper Zone Monitoring Well
- Phase II Lower Zone Monitoring Well
- Phase III Upper Zone Monitoring Well
- Phase III Lower Zone Monitoring Well
- Phase II Upper Zone Recovery Well
- Phase II Lower Zone Recovery Well
- Phase II ISCO Observation Well
- HRW1 — Phase II Upper Zone Horizontal Recovery Well (Dashes Denote Screened Interval)
- Phase III Study Area Boundary
- Storm Drain
- Manhole

0 200 400
Scale in Feet

Notes

1. Locations for some wells/well points installed pre-1996 are approximate.
2. Wells N, O, R, P, and Q were installed in 1994 following an unleaded gasoline spill in the Main Terminal tank farm area; wells are designated as Phase III because of location.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Well Locations**	Figure 3

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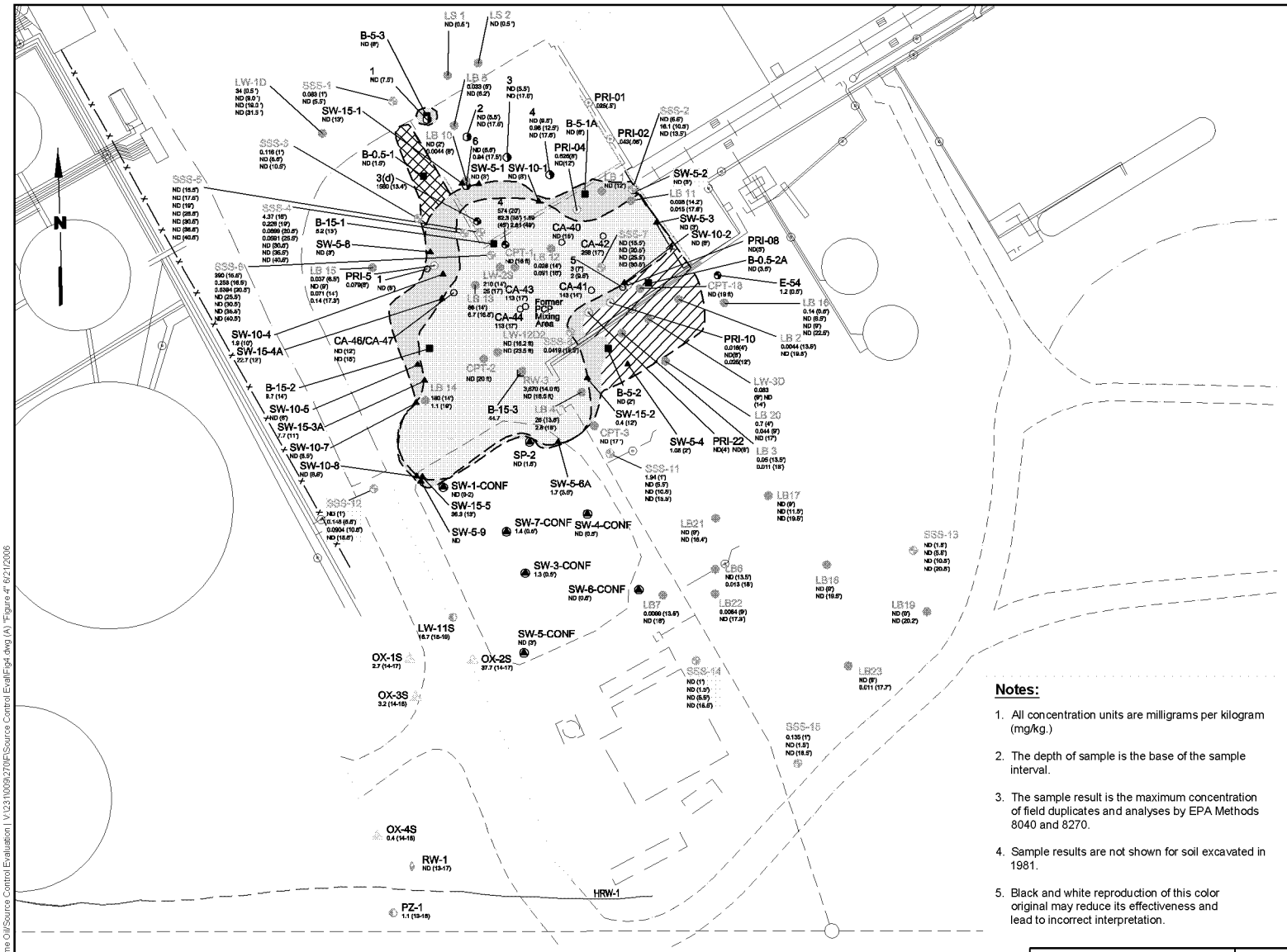

Legend:

- 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
- Approximate Extent of Excavation from 0 - 0.5 ft BGS
- Approximate Extent of Excavation from 0 - 2 ft BGS
- HRW-1 — Horizontal Recovery Well - Upper Zone (Dashes Denote Screened Interval)
- 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
- Upper Zone Monitoring Well
- Upper Zone Recovery Well
- ISCO Pilot Test Monitoring Well
- Verification Sample Location (2002)
- Verification Soil Sample Location Base of Excavation (2002)
- Verification Soil Sample Location Side Wall of Excavation (2002)

Location Identifier → LB 10

PCP Concentration (mg/kg): ND (2') / 0.0044 (8') — Depths Below Ground Surface in ft

Notes:

1. All concentration units are milligrams per kilogram (mg/kg.)
2. The depth of sample is the base of the sample interval.
3. The sample result is the maximum concentration of field duplicates and analyses by EPA Methods 8040 and 8270.
4. Sample results are not shown for soil excavated in 1981.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**PCP Mixing Area Excavation Boundaries and Summary of PCP Concentrations Remaining in Soil**	Figure **4**

Time Oil\Source Control Evaluation | V:\231009\270\ESource Control Eval\Fig4.dwg (A) "Figure 4" 6/21/2006

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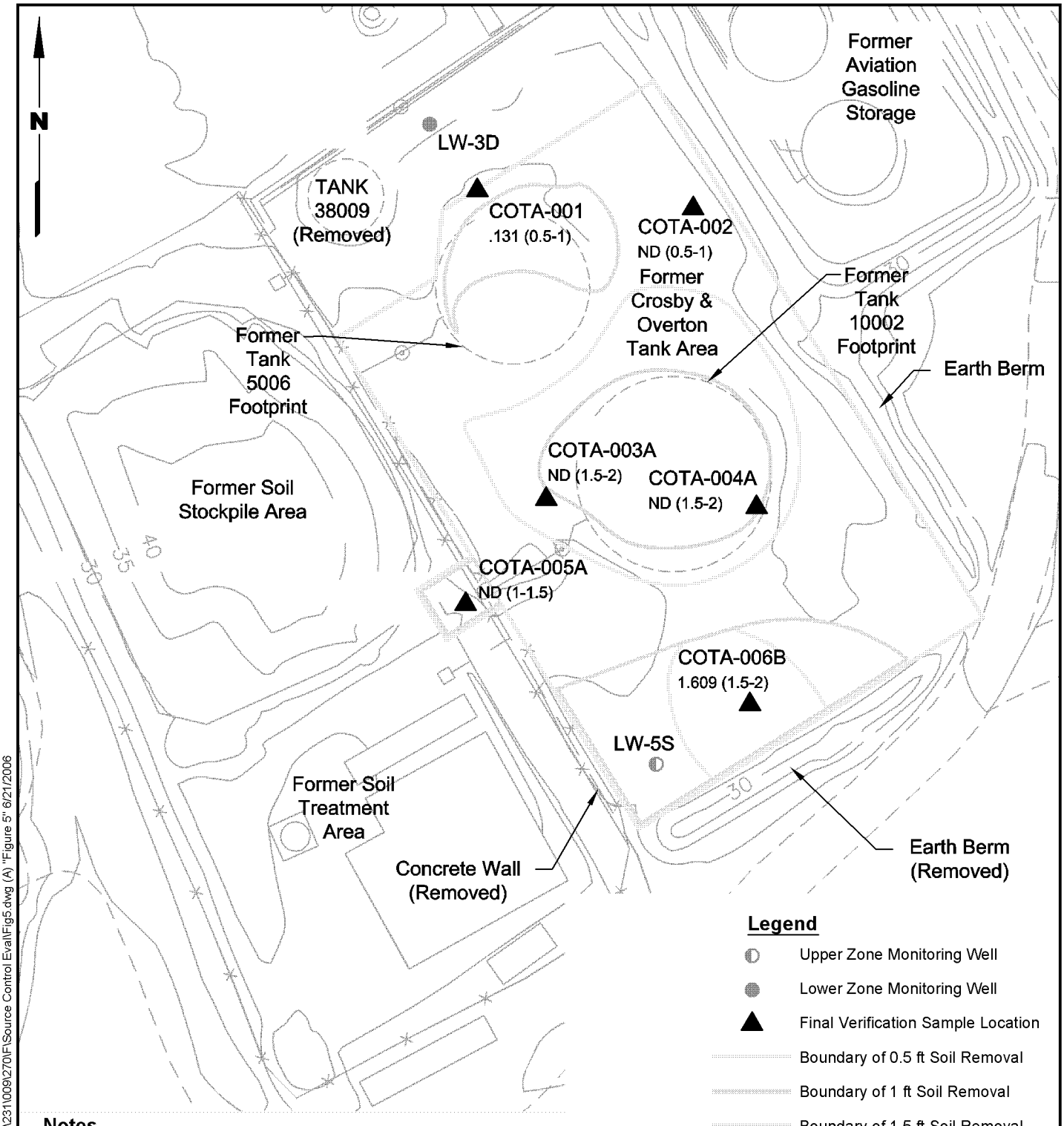

Legend

- 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

Notes

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/Source Control Evaluation | V:\23110091270\F\Source Control Eval\Fig5.dwg (A) "Figure 5" 6/21/2006

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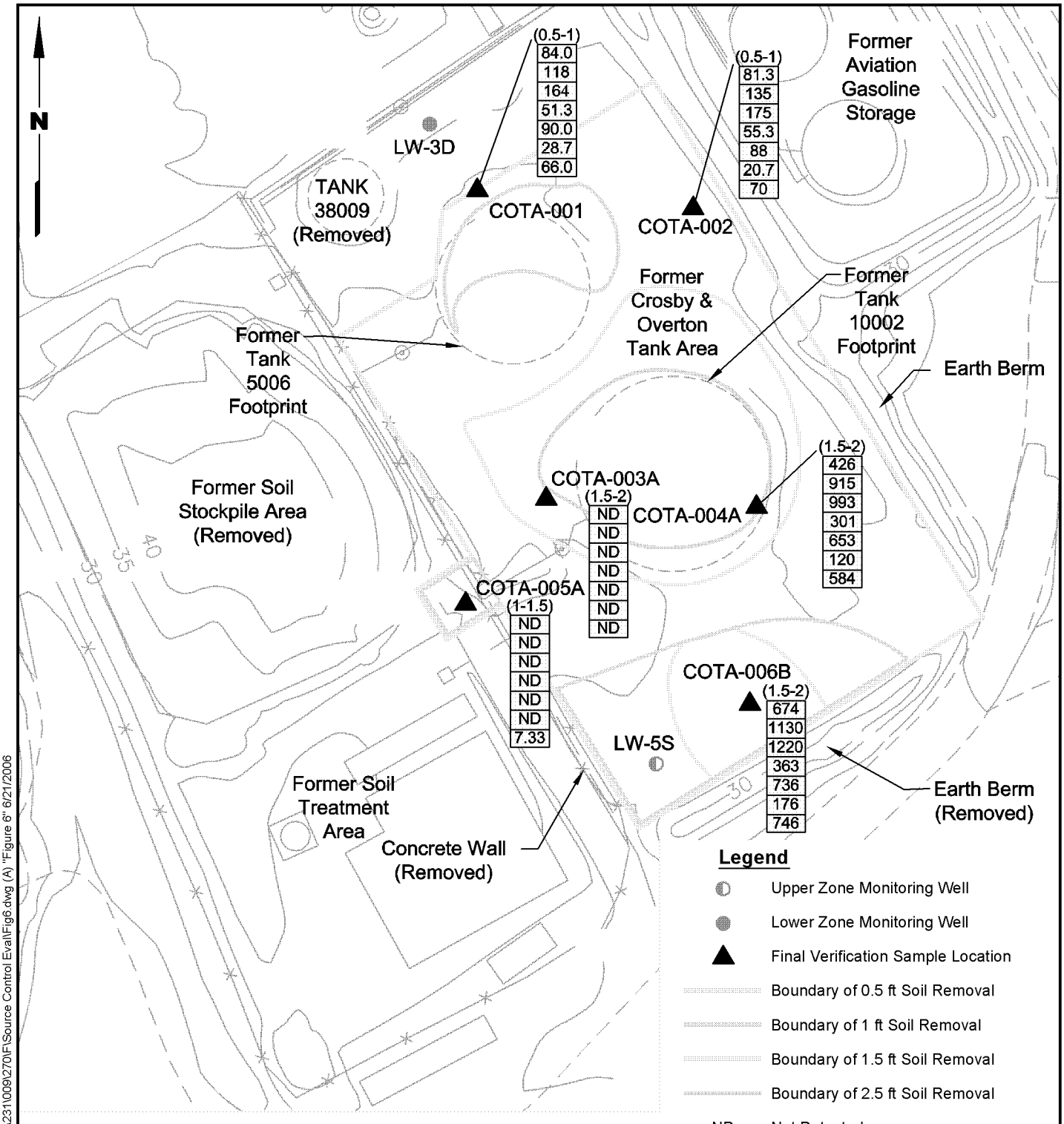
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Removal Boundaries and Verification Soil Sample PCB Results Former Crosby & Overton Tank Area**	Figure 5



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/Source Control Evaluation | V:\231\0009\270\F\Source Control Eval\Fig6.dwg (A) "Figure 6" 6/21/2006

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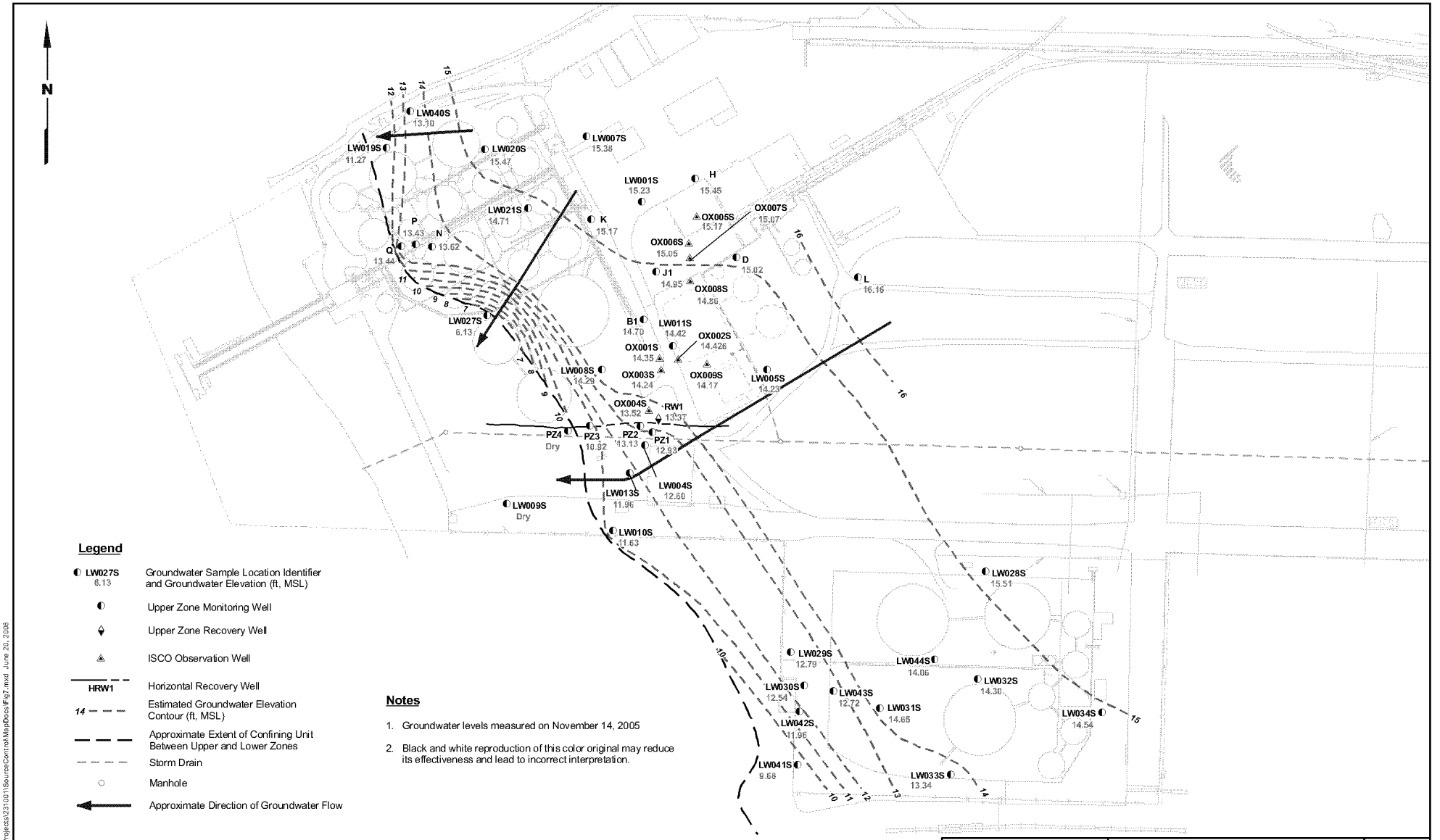
Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

Removal Boundaries and Verification Soil Sample cPAH Results Former Crosby & Overton Tank Area

Figure 6



Legend

- LW027S 6.13 — Groundwater Sample Location Identifier and Groundwater Elevation (ft, MSL)
- Upper Zone Monitoring Well
- Upper Zone Recovery Well
- ISCO Observation Well
- HRW1 — Horizontal Recovery Well
- 14 — Estimated Groundwater Elevation Contour (ft, MSL)
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Storm Drain
- Manhole
- Approximate Direction of Groundwater Flow

Notes

1. Groundwater levels measured on November 14, 2005
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours
Upper Zone - November 2005

Figure 7

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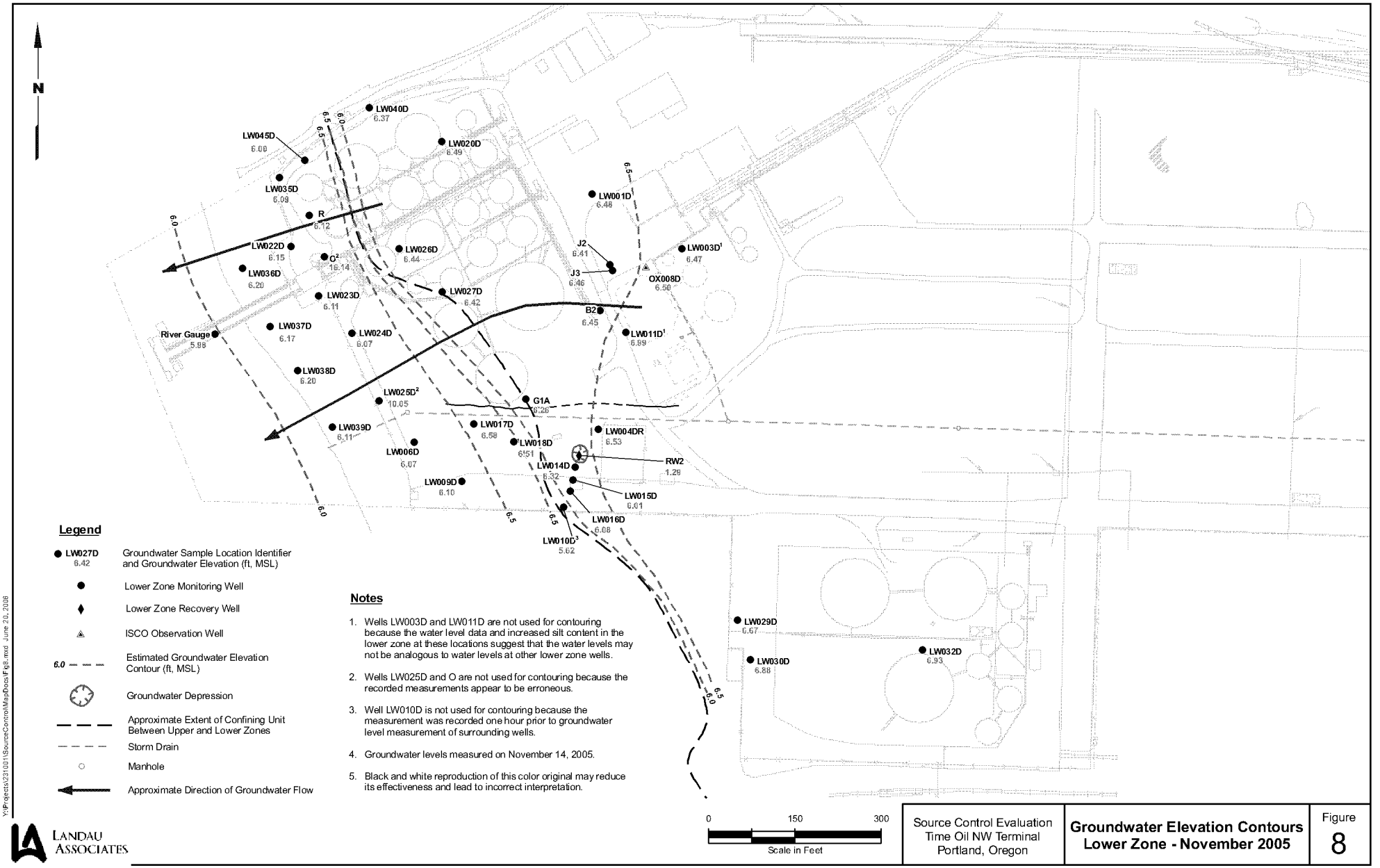

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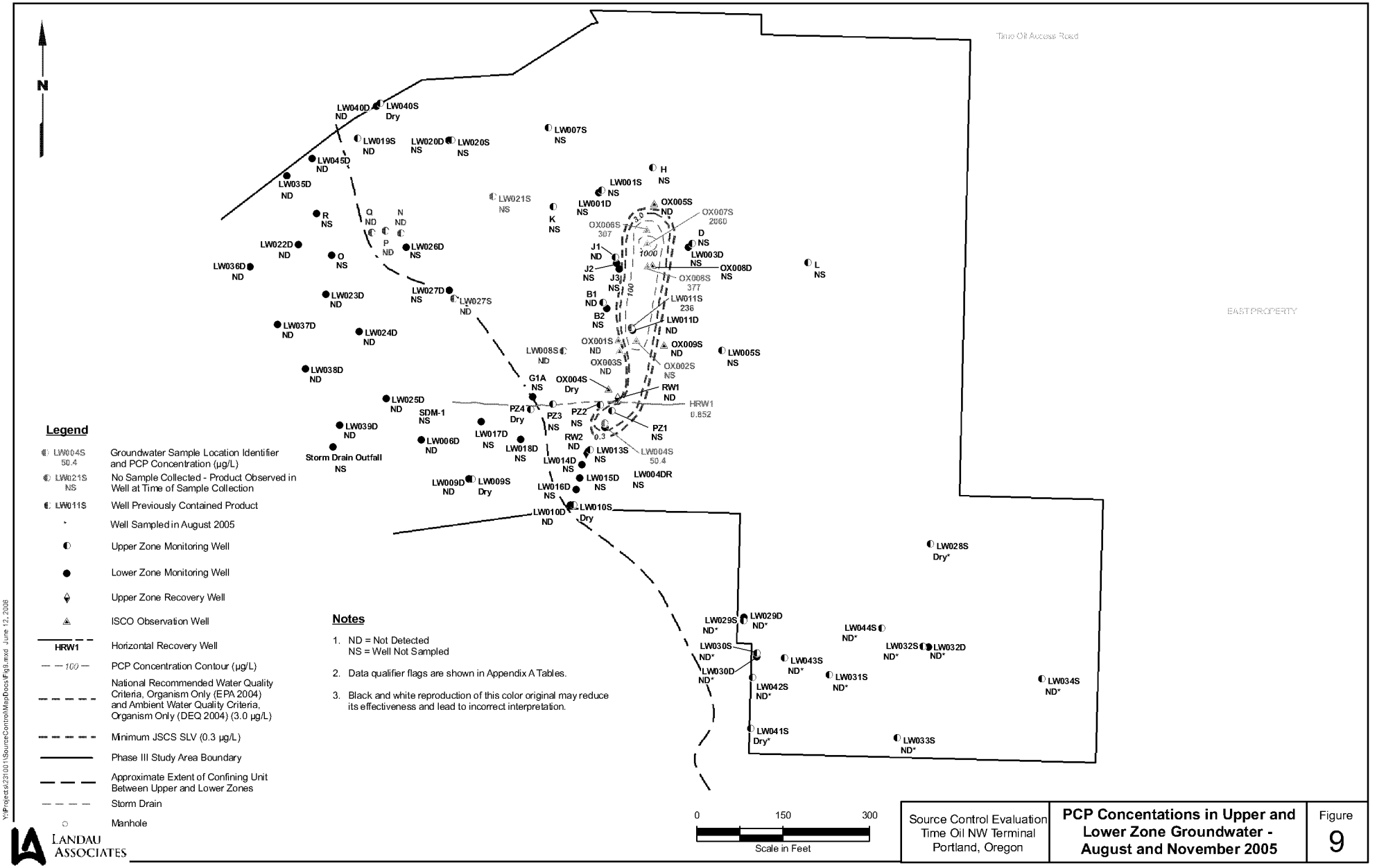

Legend

- LW004S 50.4 — Groundwater Sample Location Identifier and PCP Concentration (µg/L)
- LW021S NS — No Sample Collected - Product Observed in Well at Time of Sample Collection
- LW011S — Well Previously Contained Product
- * — Well Sampled in August 2005
- Upper Zone Monitoring Well
- Lower Zone Monitoring Well
- Upper Zone Recovery Well
- ISCO Observation Well
- HRW1 — Horizontal Recovery Well
- 100 — PCP Concentration Contour (µg/L)
- National Recommended Water Quality Criteria, Organism Only (EPA 2004) and Ambient Water Quality Criteria, Organism Only (DEQ 2004) (3.0 µg/L)
- Minimum JSCS SLV (0.3 µg/L)
- Phase III Study Area Boundary
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Storm Drain
- Manhole

Notes

1. ND = Not Detected
   NS = Well Not Sampled
2. Data qualifier flags are shown in Appendix A Tables.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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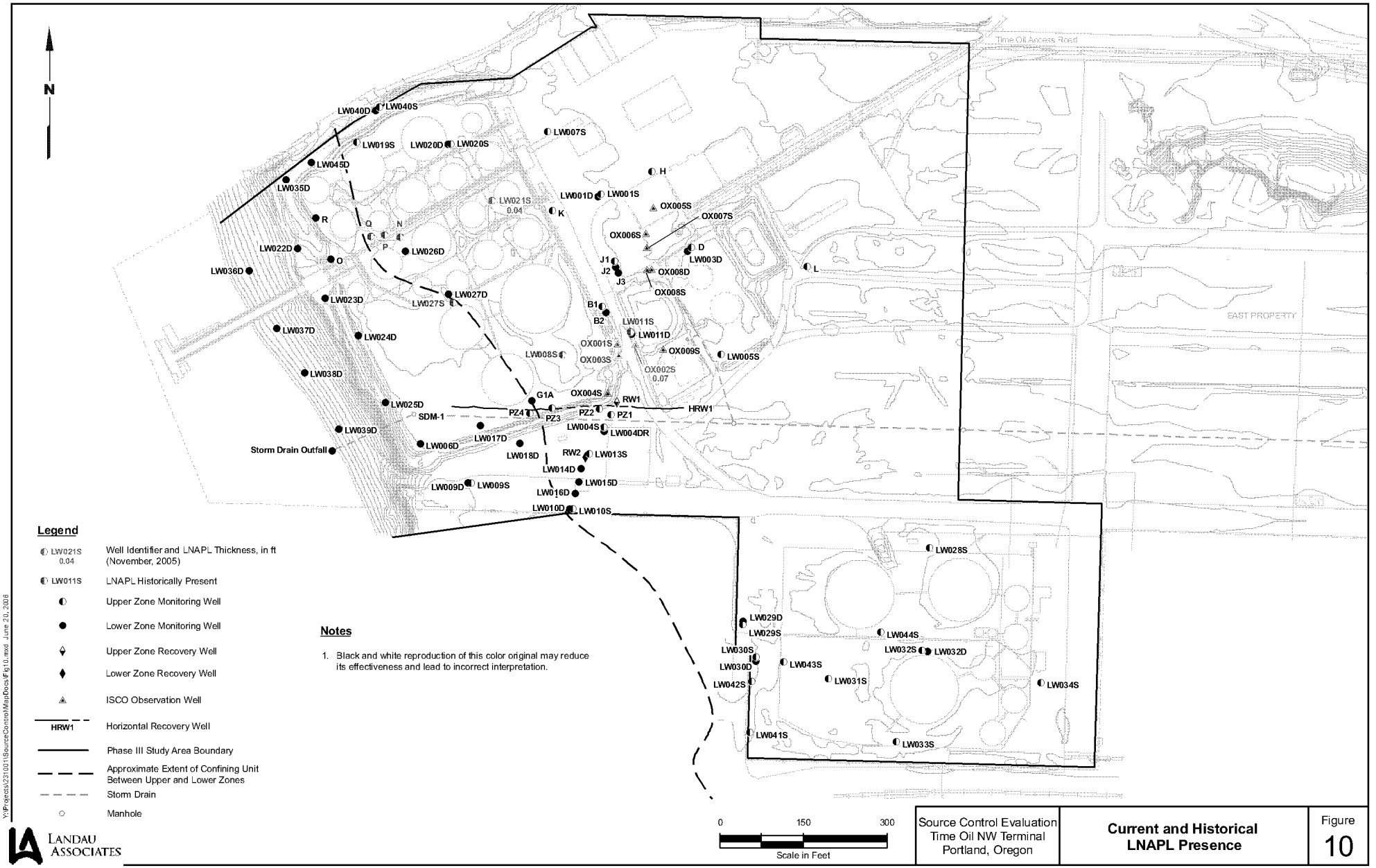
Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

PCP Concentations in Upper and Lower Zone Groundwater - August and November 2005

Figure 9

Y:\Projects\231001\SourceControl\MapDocs\Fig9.mxd June 12, 2006

BZTO104(e)015635



Legend

LW021S 0.04	Well Identifier and LNAPL Thickness, in ft (November, 2005)
LW011S	LNAPL Historically Present
	Upper Zone Monitoring Well
	Lower Zone Monitoring Well
	Upper Zone Recovery Well
	Lower Zone Recovery Well
	ISCO Observation Well
HRW1	Horizontal Recovery Well
	Phase III Study Area Boundary
	Approximate Extent of Confining Unit Between Upper and Lower Zones
	Storm Drain
	Manhole

Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

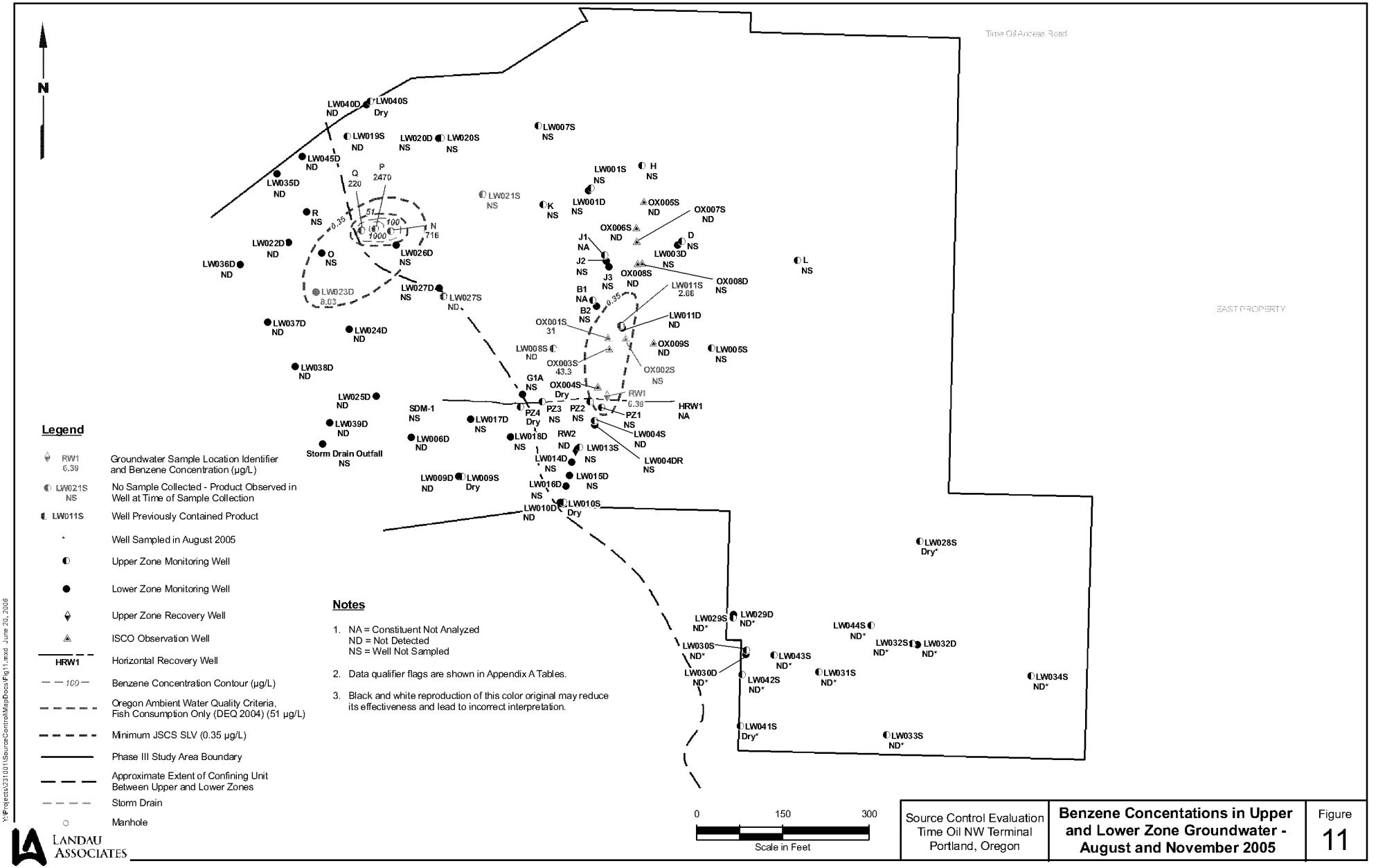
0 150 300
Scale in Feet

LANDAU ASSOCIATES

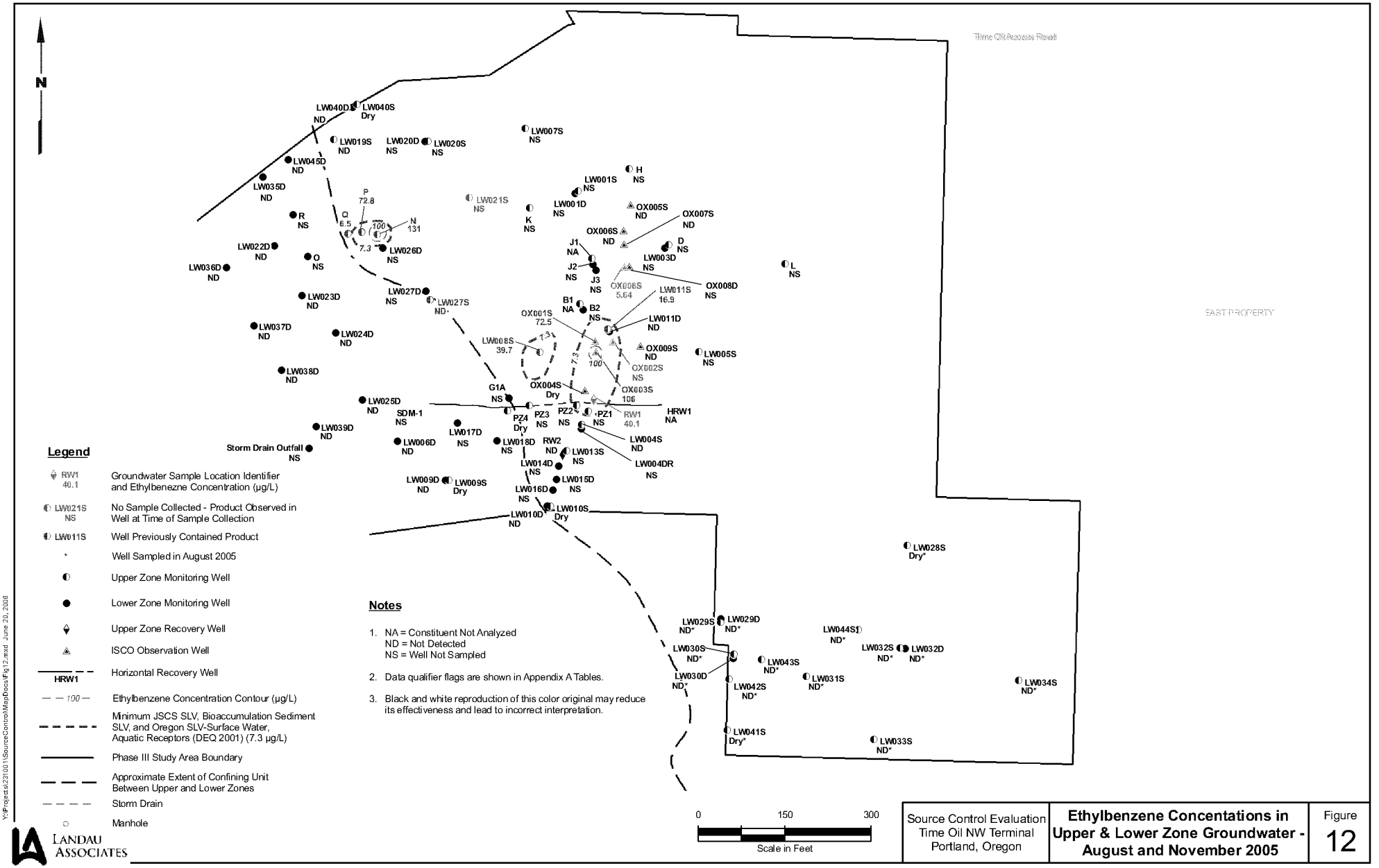
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Current and Historical LNAPL Presence**	Figure 10

Y:\Projects\231001\SourceControl\MapDocs\Fig10.mxd June 20, 2006

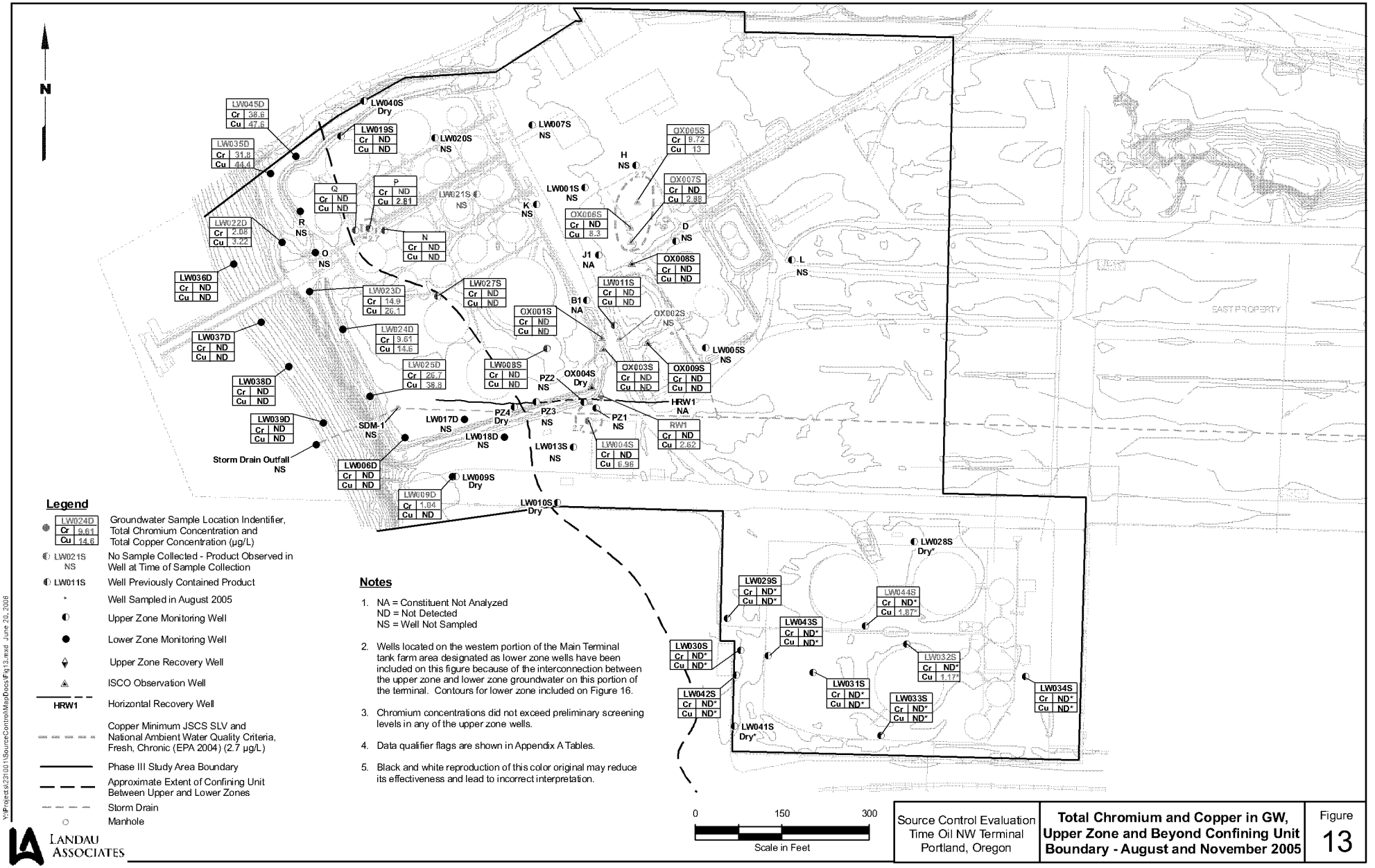
BZTO104(e)015636



BZTO104(e)015637



BZT0104(e)015638



Legend

- LW024D Cr 9.61 Cu 14.6 — Groundwater Sample Location Indentifier, Total Chromium Concentration and Total Copper Concentration (µg/L)
- LW021S NS — No Sample Collected - Product Observed in Well at Time of Sample Collection
- LW011S — Well Previously Contained Product
- * — Well Sampled in August 2005
- Upper Zone Monitoring Well
- Lower Zone Monitoring Well
- Upper Zone Recovery Well
- ISCO Observation Well
- HRW1 — Horizontal Recovery Well
- Copper Minimum JSCS SLV and National Ambient Water Quality Criteria, Fresh, Chronic (EPA 2004) (2.7 µg/L)
- Phase III Study Area Boundary
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Storm Drain
- Manhole

Notes

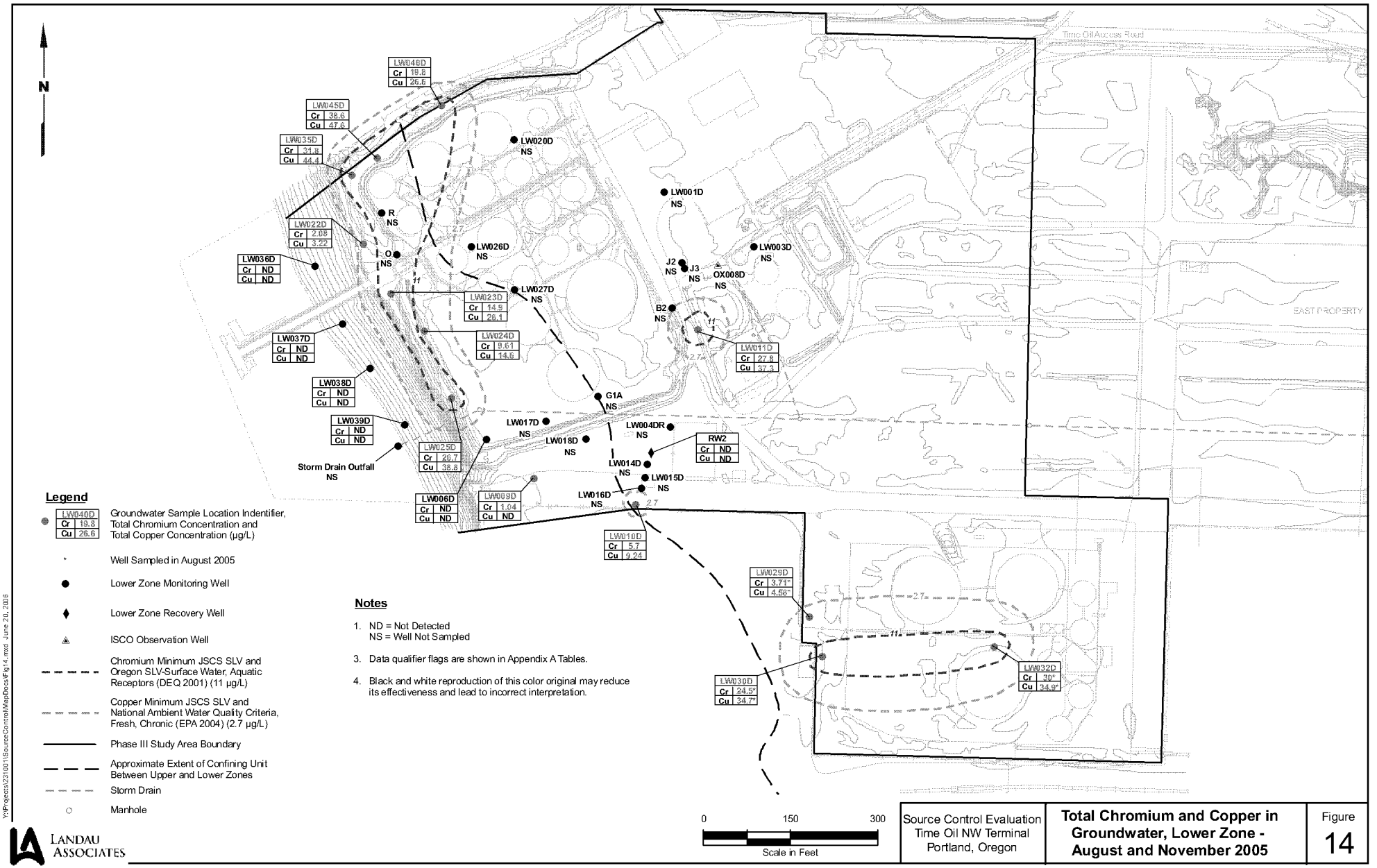
1. NA = Constituent Not Analyzed
   ND = Not Detected
   NS = Well Not Sampled
2. Wells located on the western portion of the Main Terminal tank farm area designated as lower zone wells have been included on this figure because of the interconnection between the upper zone and lower zone groundwater on this portion of the terminal. Contours for lower zone included on Figure 16.
3. Chromium concentrations did not exceed preliminary screening levels in any of the upper zone wells.
4. Data qualifier flags are shown in Appendix A Tables.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

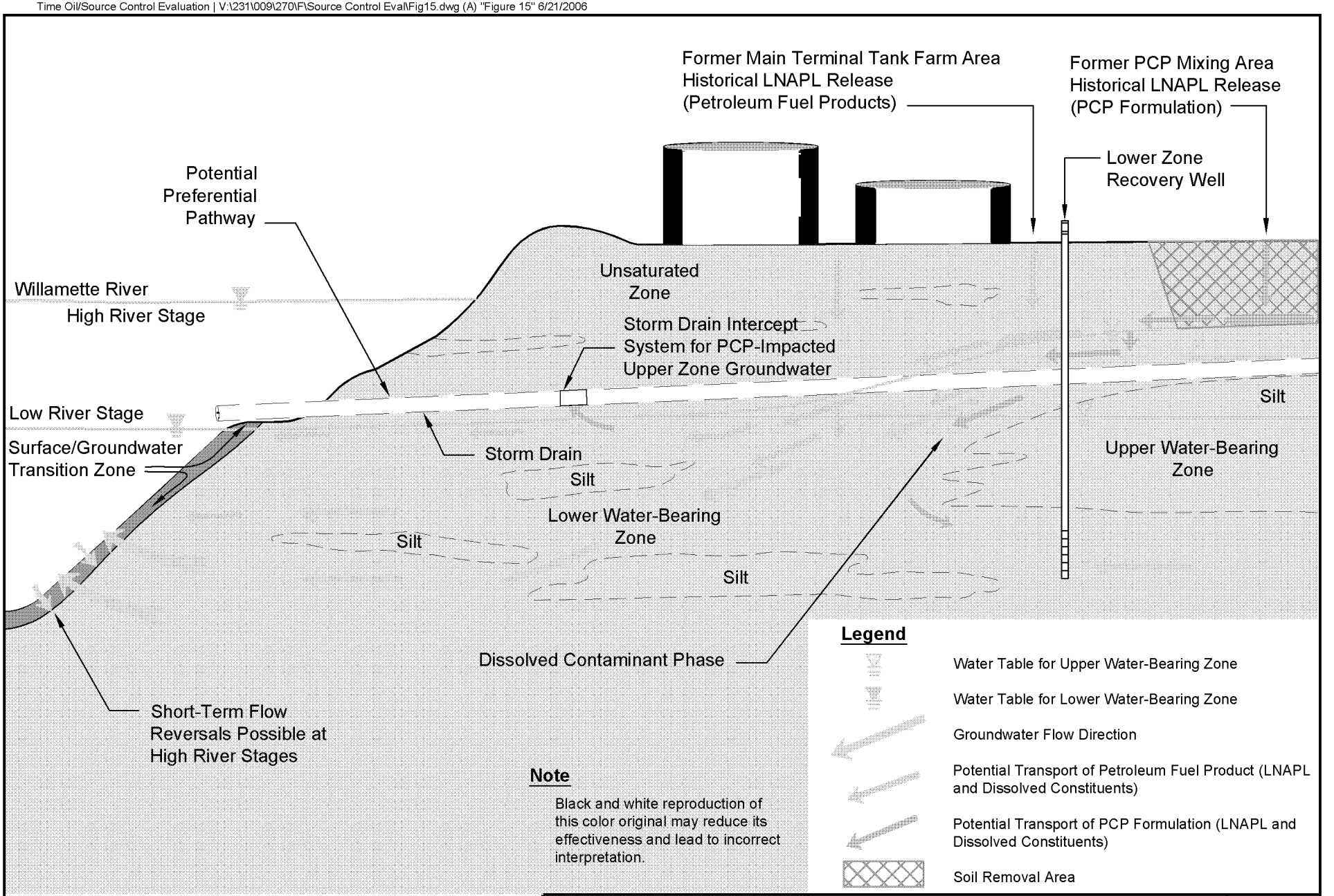
Y:\Projects\231001\SourceControl\MapDocs\Fig13.mxd June 20, 2006

Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Total Chromium and Copper in GW, Upper Zone and Beyond Confining Unit Boundary - August and November 2005**	Figure 13

BZTO104(e)015639



BZTO104(e)015640



LANDAU ASSOCIATES

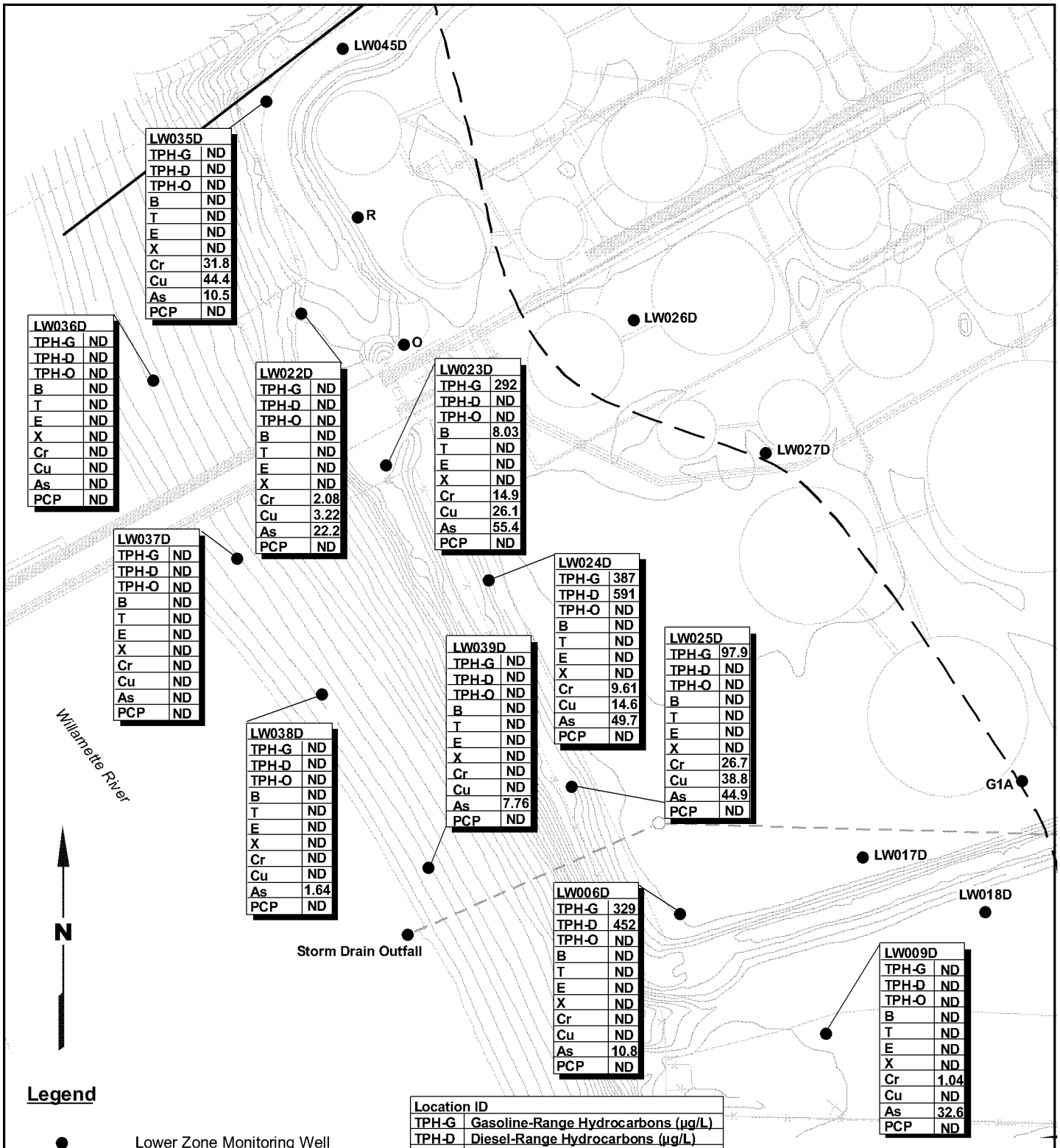
Not to Scale

Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

Conceptual Site Model

Figure
15

BZTO104(e)015641



Y:\Projects\231001\SourceControl\MapDocs\Fg16.mxd June 20, 2006

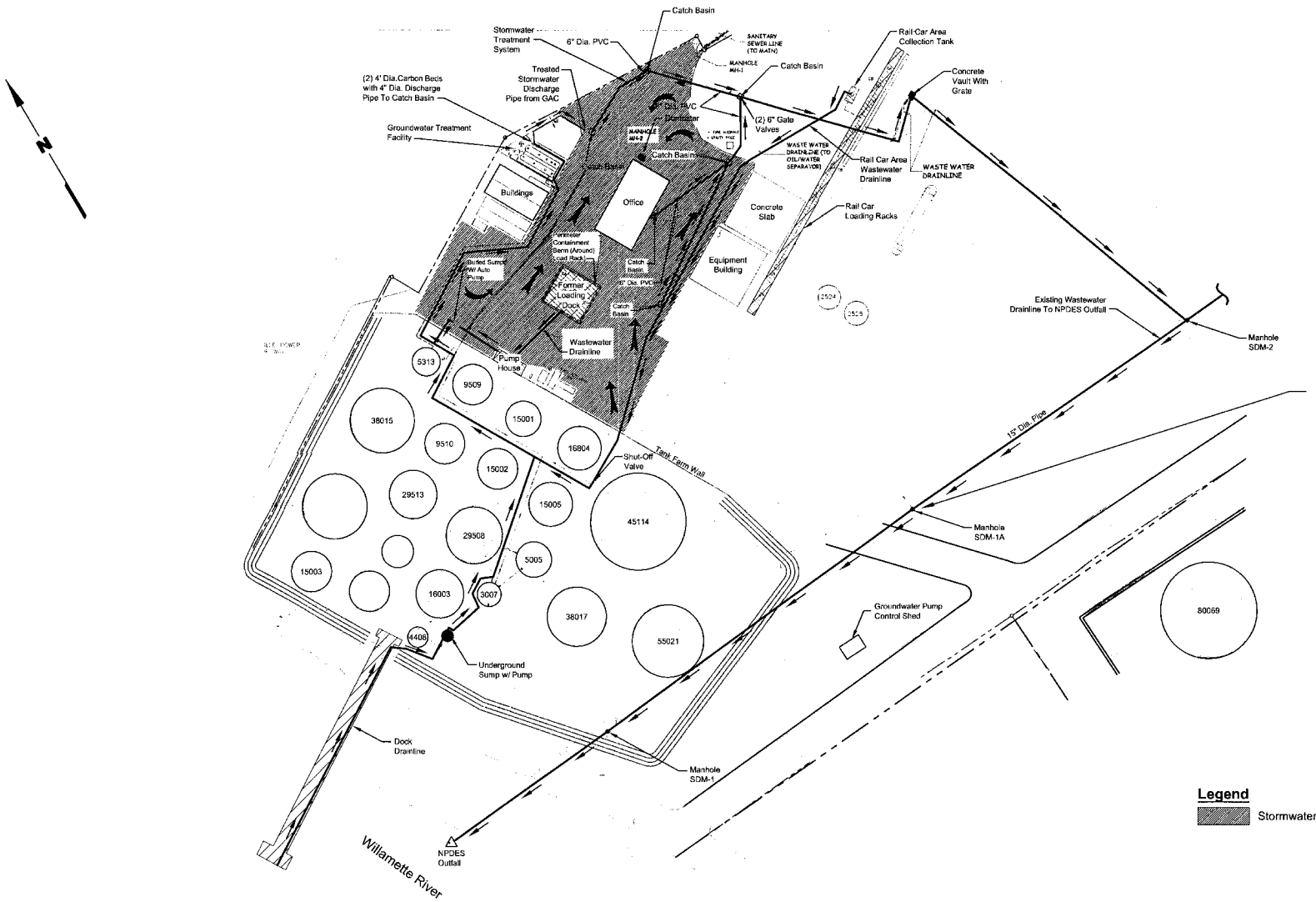
LANDAU ASSOCIATES

Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

Groundwater Concentrations, Nearshore Wells, Selected Analytes November 2005

Figure 16

BZTO104(e)015642



Note

Stormwater Conveyance Pipe is a 'Tight-Lined' HDPE Pipe inside of the standard stormwater pipe between this manhole and SDM-1. The groundwater that infiltrates into the standard stormwater pipe between this manhole and SDM-1 is pumped to a groundwater treatment system for discharge to the sanitary sewer.

Legend

Stormwater Collection Area for Treatment

0 120 240

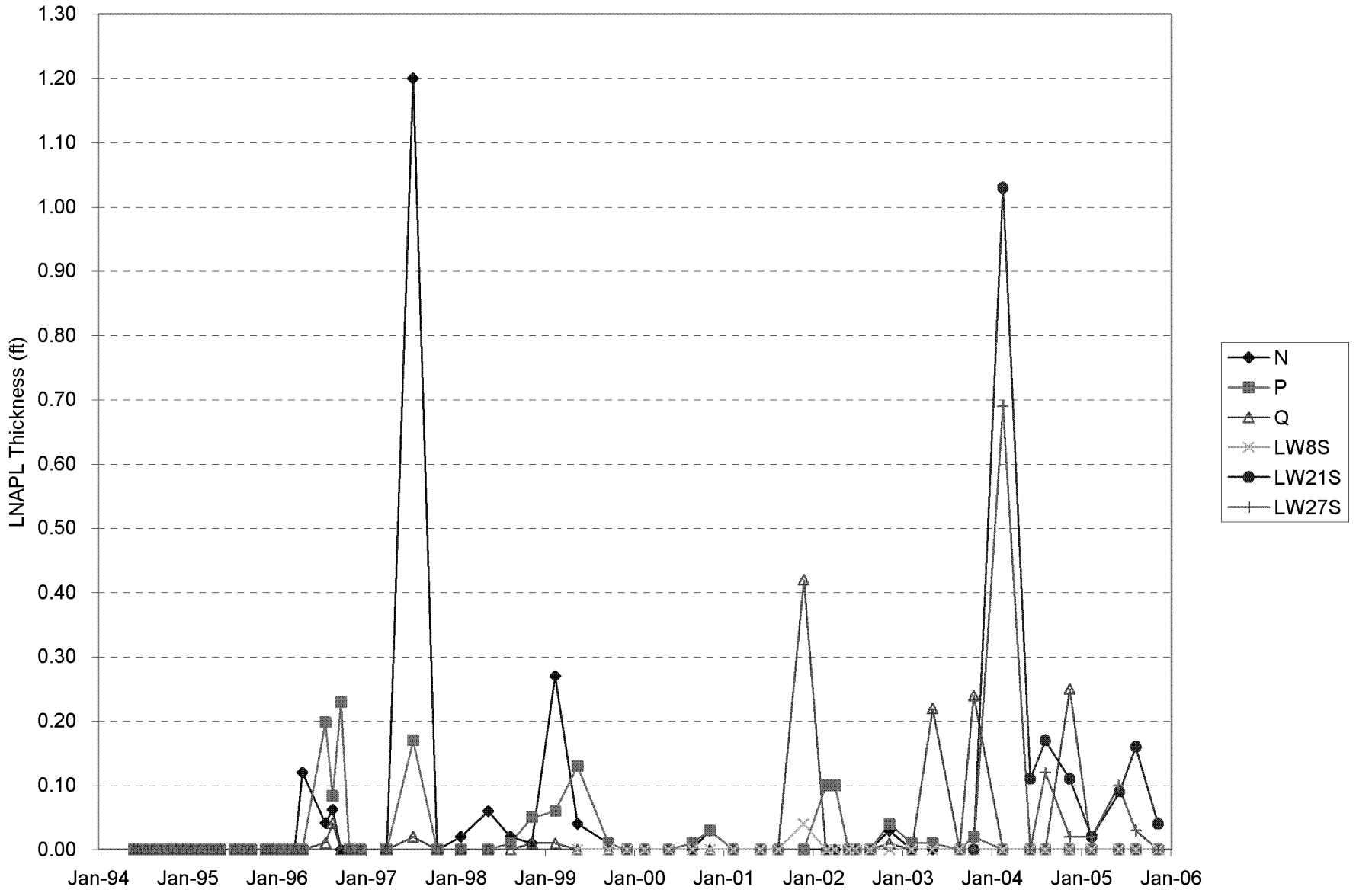
Approximate Scale in Feet

LANDAU ASSOCIATES

Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Stormwater Sewer System Flow Route**	Figure 17

Time Oil/Source Control Evaluation | V:\231\009\270\F\Source Control Eval\Fig17.dwg (A) "Figure 17" 6/21/2006

BZTO104(e)015643

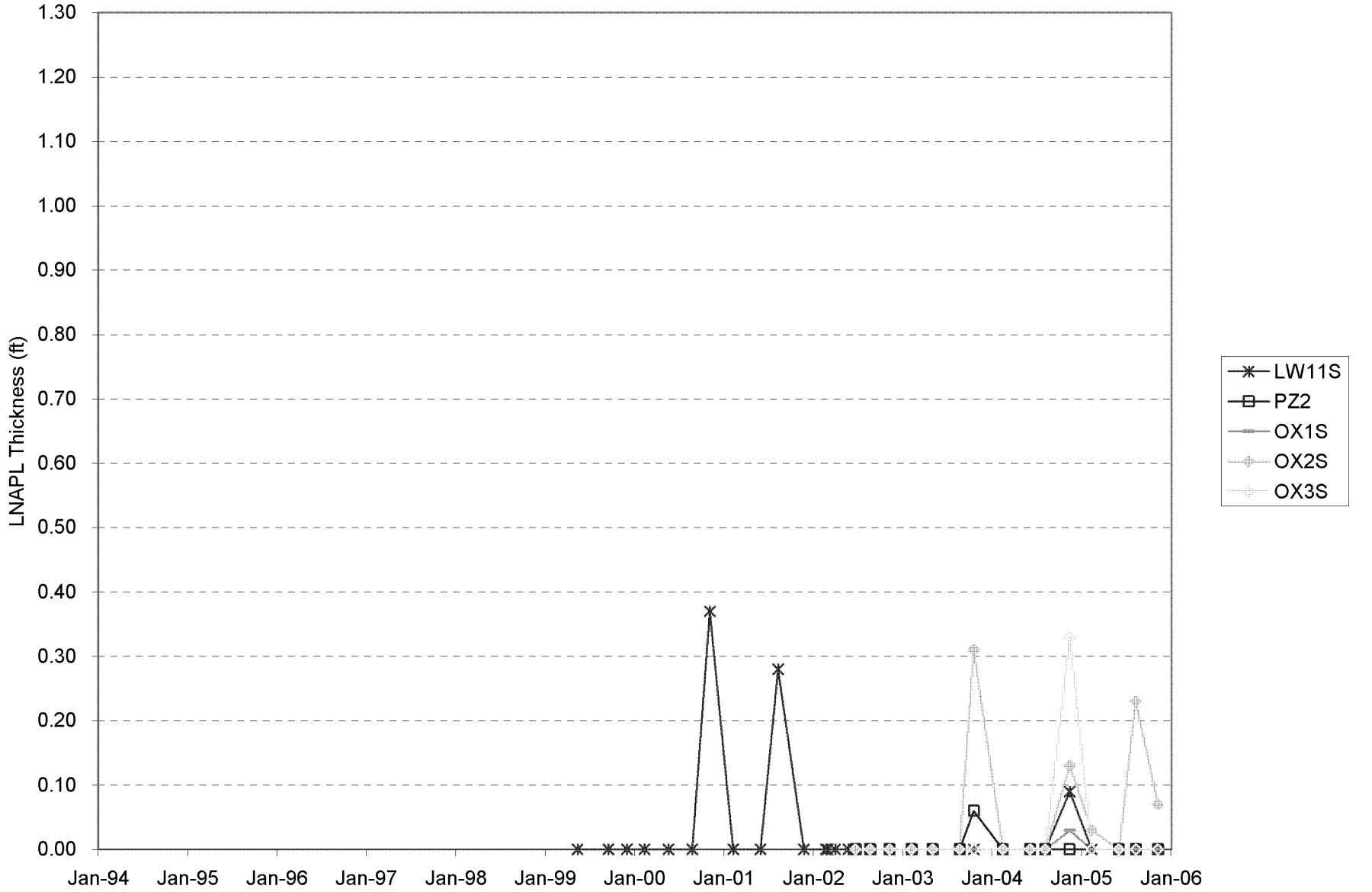


LANDAU ASSOCIATES

Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

LNAPL Thickness vs. Time
Main Terminal Tank Farm Area

Figure
18



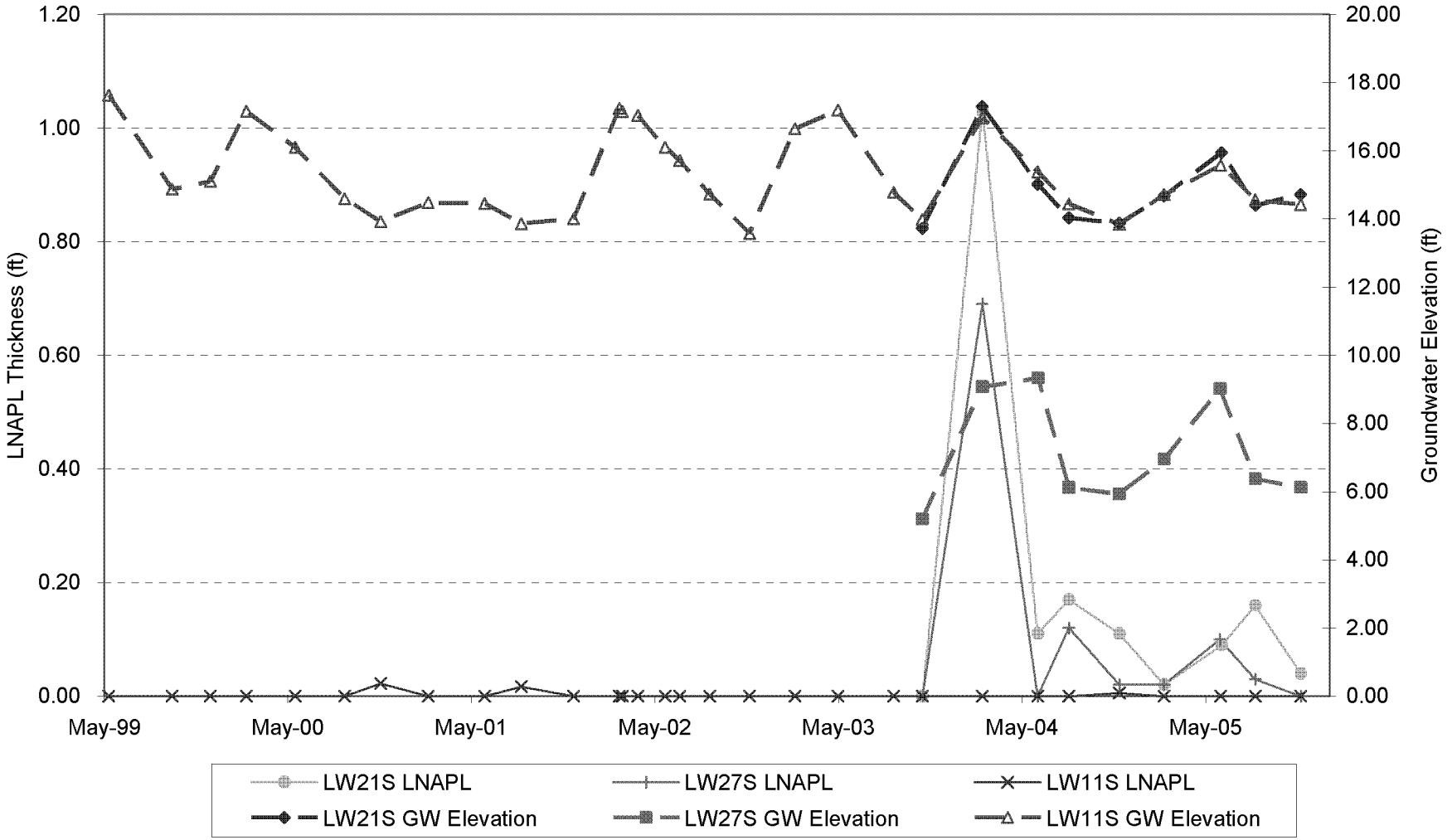
LANDAU ASSOCIATES

Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

LNAPL Thickness vs. Time
Former PCP Mixing Area

Figure
19

BZTO104(e)015645



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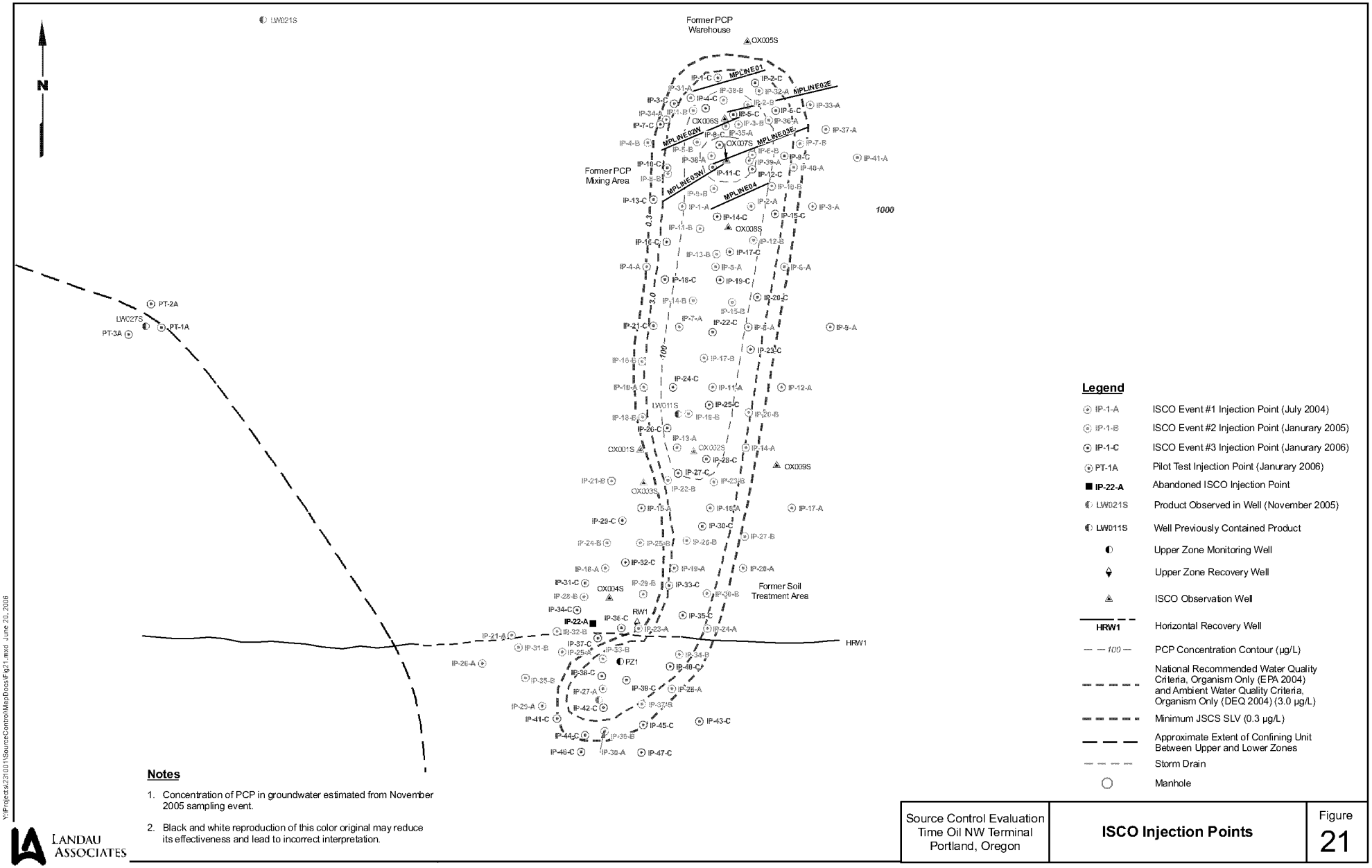
Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

LNAPL Thickness vs. Time and Groundwater Elevations

Figure
20

BZTO104(e)015646



Y:\Projects\231001\SourceControl\MapDocs\Fig21.mxd June 20, 2006

LANDAU ASSOCIATES

Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**ISCO Injection Points**	Figure 21

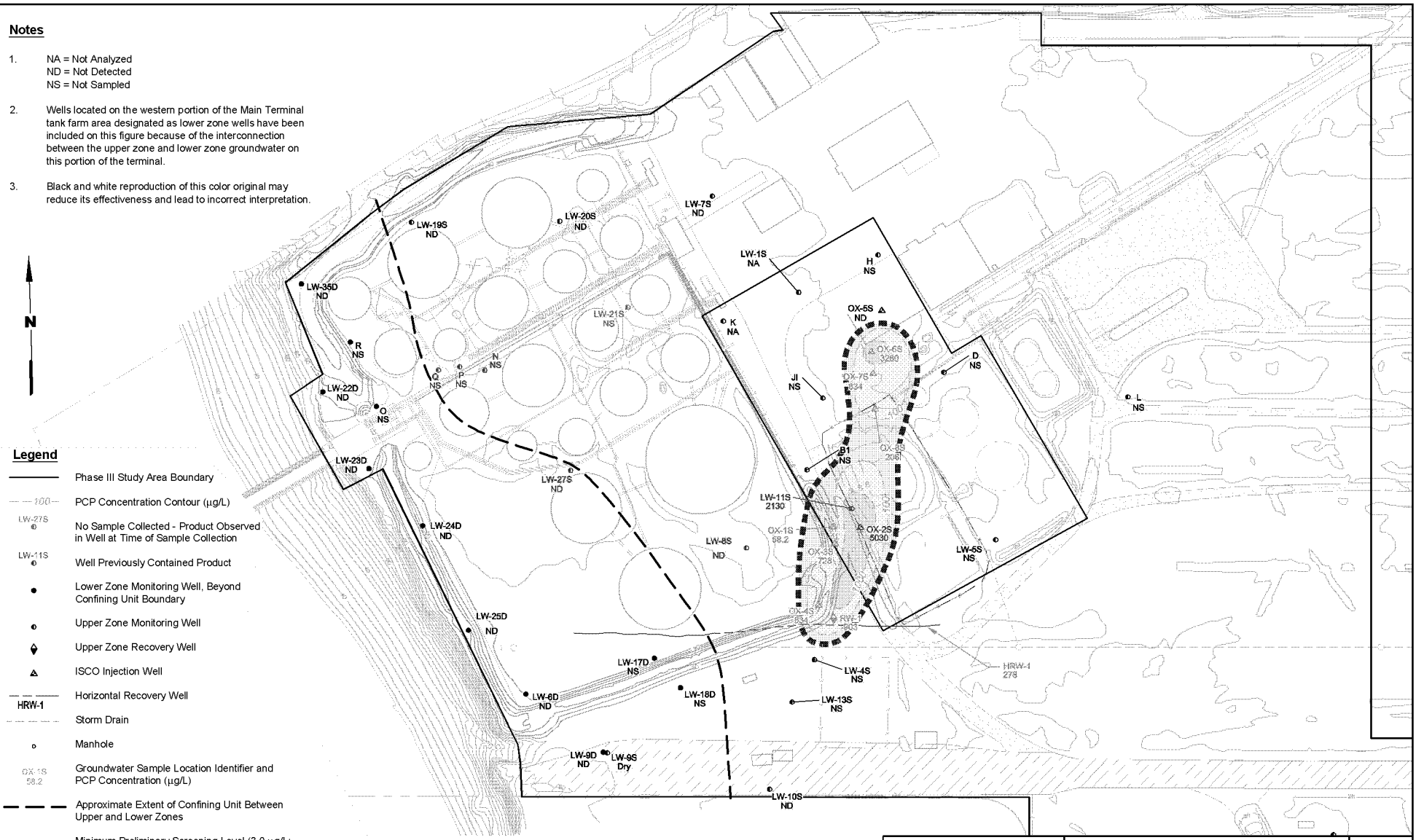
BZT0104(e)015647

Notes

1. NA = Not Analyzed
   ND = Not Detected
   NS = Not Sampled

2. Wells located on the western portion of the Main Terminal tank farm area designated as lower zone wells have been included on this figure because of the interconnection between the upper zone and lower zone groundwater on this portion of the terminal.

3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Legend

- Phase III Study Area Boundary
- 100 — PCP Concentration Contour (µg/L)
- LW-27S — No Sample Collected - Product Observed in Well at Time of Sample Collection
- LW-11S — Well Previously Contained Product
- Lower Zone Monitoring Well, Beyond Confining Unit Boundary
- Upper Zone Monitoring Well
- Upper Zone Recovery Well
- ISCO Injection Well
- HRW-1 — Horizontal Recovery Well
- Storm Drain
- Manhole
- OX-1S 58.2 — Groundwater Sample Location Identifier and PCP Concentration (µg/L)
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Minimum Preliminary Screening Level (3.0 µg/L; National Recommended Water Quality Criteria, Organism Only)

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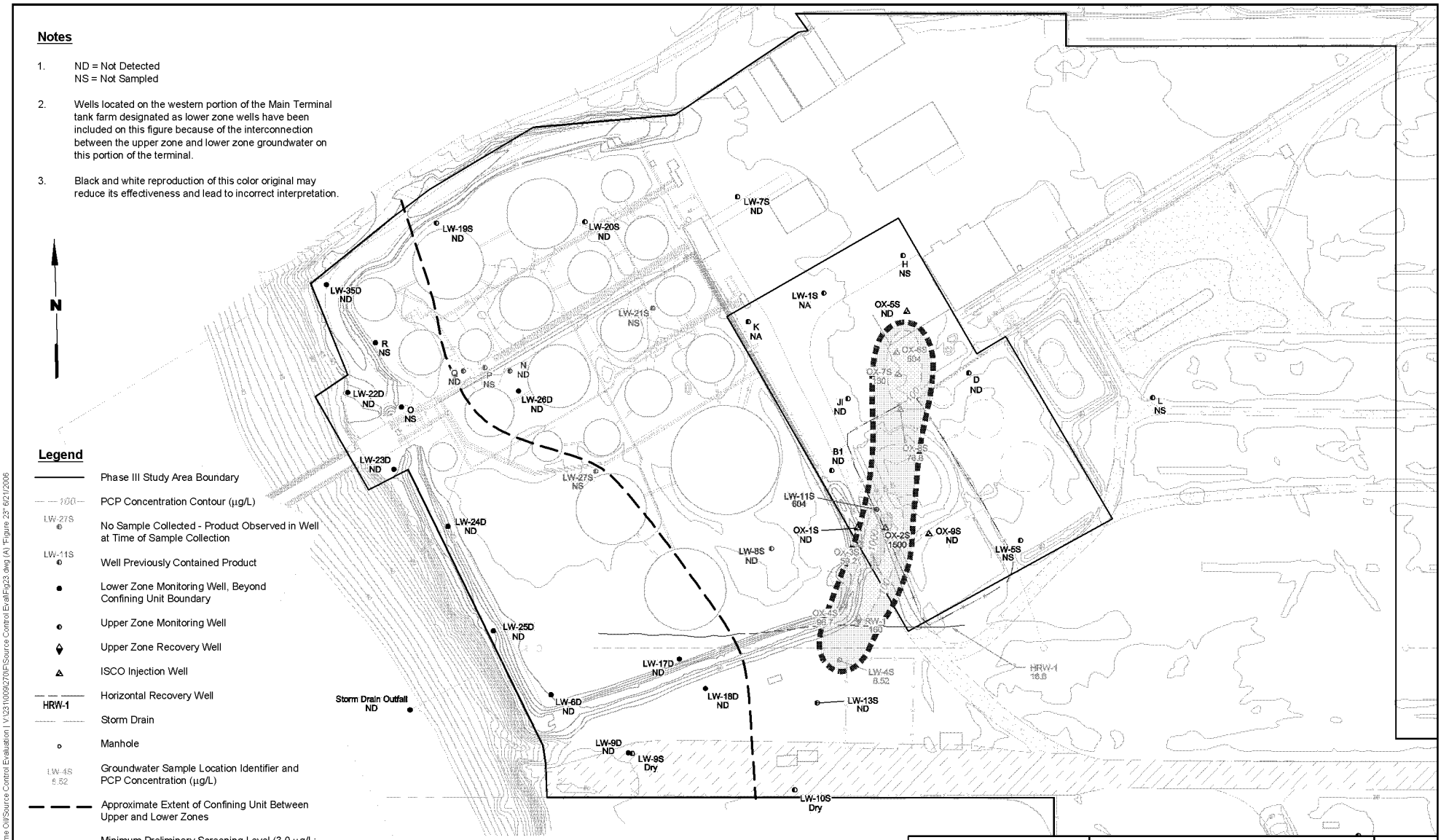
Source Control Evaluation
Time Oil NW Terminal
Portland, Oregon

Upper Zone PCP Concentrations in ISCO Injection Area June 2004

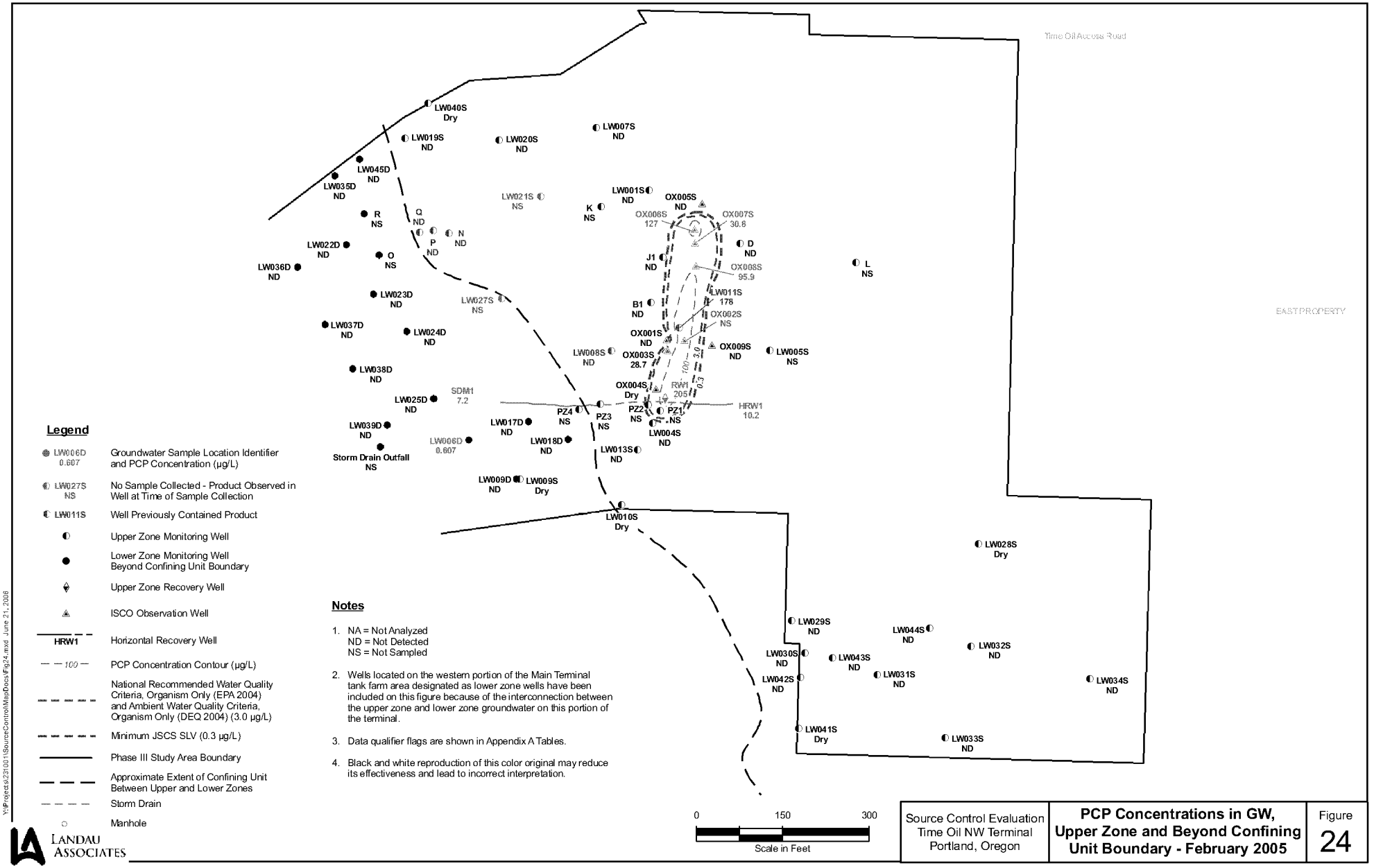
Figure **22**

Time Oil/Source Control Evaluation | V:\231\009\270\ES\Source Control Eval\Fig22.dwg (A) \Figure 22* 6/21/2006

BZT0104(e)015648



BZT0104(e)015649



Legend

- LW006D 0.607 — Groundwater Sample Location Identifier and PCP Concentration (µg/L)
- LW027S NS — No Sample Collected - Product Observed in Well at Time of Sample Collection
- LW011S — Well Previously Contained Product
- Upper Zone Monitoring Well
- Lower Zone Monitoring Well Beyond Confining Unit Boundary
- Upper Zone Recovery Well
- ISCO Observation Well
- HRW1 — Horizontal Recovery Well
- 100 — PCP Concentration Contour (µg/L)
- National Recommended Water Quality Criteria, Organism Only (EPA 2004) and Ambient Water Quality Criteria, Organism Only (DEQ 2004) (3.0 µg/L)
- Minimum JSCS SLV (0.3 µg/L)
- Phase III Study Area Boundary
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Storm Drain
- Manhole

Notes

1. NA = Not Analyzed
   ND = Not Detected
   NS = Not Sampled
2. Wells located on the western portion of the Main Terminal tank farm area designated as lower zone wells have been included on this figure because of the interconnection between the upper zone and lower zone groundwater on this portion of the terminal.
3. Data qualifier flags are shown in Appendix A Tables.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 150 300
Scale in Feet

LANDAU ASSOCIATES

Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**PCP Concentrations in GW, Upper Zone and Beyond Confining Unit Boundary - February 2005**	Figure 24

Y:\Projects\231001\SourceControl\MapDocs\Fig24.mxd June 21, 2006

BZTO104(e)015650

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	B1 P5K0699-02 11/15/2005	J1 P5K0699-06 11/15/2005	LW004S P5K0699-03 11/15/2005	LW008S P5K0699-04 11/15/2005	LW011S P5K0820-03 11/17/2005	OX001S P5K0699-10 11/16/2005	OX003S P5K0699-09 11/16/2005	OX005S P5K0699-07 11/15/2005	OX006S P5K0699-12 11/16/2005	OX007S P5K0699-13 11/16/2005	OX008S P5K0699-11 11/16/2005	OX009S P5K0699-08 11/15/2005
PENTACHLOROPHENOL (µg/L)												
EPA 8270SIM												
Pentachlorophenol (8270SIM)	0.495 U	0.481 U		2.43 U								
SEMIVOLATILES (µg/L)												
EPA 8270C												
2,3,4,6-Tetrachlorophenol			24.8 U	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	38.8	100 U	5.00 U
Acenaphthene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Acenaphthylene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Anthracene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzo(a)anthracene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzo(a)pyrene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzo(b)fluoranthene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzo(g,h,i)perylene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzo(k)fluoranthene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Benzoic Acid			248 U	250 U	1250 U	101 U	204 U	50.5 U	2500 U	253 U	50.0 U	50.0 U
Benzyl alcohol			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
4-Bromophenyl-phenylether			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Butyl benzyl phthalate			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
4-Chloro-3-methylphenol			9.90 U	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
4-Chloroaniline			14.9 UJ	15.0 U	75.0 U	6.06 U	12.2 U	3.03 U	150 U	15.2 U	3.00 U	3.00 U
Bis(2-chloroethoxy)methane			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Bis(2-chloroethyl)ether			9.90 UJ	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
Bis(2-chloroisopropyl)ether			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2-Chloronaphthalene			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2-Chlorophenol			4.95 U	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
4-Chlorophenylphenyl ether			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Chrysene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Di-n-butyl phthalate			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Di-n-octyl phthalate			9.90 UJ	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
Dibenzo(a,h)anthracene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Dibenzofuran (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
1,2-Dichlorobenzene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
1,3-Dichlorobenzene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
1,4-Dichlorobenzene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
3,3-Dichlorobenzidine			49.5 UJ	50.0 U	250 U	20.2 U	40.8 U	10.1 U	500 U	50.5 U	10.0 U	10.0 U
2,4-Dichlorophenol			14.9 U	15.0 U	75.0 U	6.06 U	12.2 U	3.03 U	150 U	15.2 U	3.00 U	3.00 U
Diethyl phthalate			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2,4-Dimethylphenol			14.9 U	15.0 U	75.0 U	6.06 U	12.2 U	3.03 U	150 U	15.2 U	3.00 U	3.00 U
Dimethyl phthalate			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
4,6-Dinitro-2-methylphenol			74.3 U	75.0 U	375 U	30.3 U	61.2 U	15.2 U	750 U	75.8 U	15.0 U	15.0 U
2,4-Dinitrophenol			124 U	125 U	625 U	50.5 U	102 U	25.3 U	1250 U	126 U	25.0 U	25.0 U
2,4-Dinitrotoluene			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U

BZTO104(e)015651

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	B1 P5K0699-02 11/15/2005	J1 P5K0699-06 11/15/2005	LW004S P5K0699-03 11/15/2005	LW008S P5K0699-04 11/15/2005	LW011S P5K0820-03 11/17/2005	OX001S P5K0699-10 11/16/2005	OX003S P5K0699-09 11/16/2005	OX005S P5K0699-07 11/15/2005	OX006S P5K0699-12 11/16/2005	OX007S P5K0699-13 11/16/2005	OX008S P5K0699-11 11/16/2005	OX009S P5K0699-08 11/15/2005
2,6-Dinitrotoluene			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
Bis(2-ethylhexyl)phthalate			49.5 UJ	50.0 U	250 U	20.2 U	40.8 U	10.1 U	500 U	50.5 U	10.0 U	10.0 U
Fluoranthene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Fluorene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Hexachlorobenzene			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Hexachlorobutadiene (8270)			9.90 UJ	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
Hexachlorocyclopentadiene			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
Hexachloroethane			9.90 UJ	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
Indeno(1,2,3-cd)pyrene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Isophorone			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2-Methylnaphthalene (8270)			4.95 UJ	**10.8**	25.0 U	**4.14**	**5.27**	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2-Methylphenol			4.95 U	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
3- & 4-Methylphenol			4.95 U	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Naphthalene (8270)			4.95 UJ	**24.6**	25.0 U	**8.32**	**11.7**	1.01 U	50.0 U	5.05 U	**1.27**	1.00 U
2-Nitroaniline			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
3-Nitroaniline			29.7 UJ	30.0 U	150 U	12.1 U	24.5 U	6.06 U	300 U	30.3 U	6.00 U	6.00 U
4-Nitroaniline			24.8 UJ	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
Nitrobenzene			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2-Nitrophenol			24.8 U	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
4-Nitrophenol			24.8 U	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
N-Nitroso-Di-N-Propylamine			9.90 UJ	10.0 U	50.0 U	4.04 U	8.16 U	2.02 U	100 U	10.1 U	2.00 U	2.00 U
N-Nitrosodiphenylamine			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Pentachlorophenol (8270)			**50.4**	25.0 U	**236**	10.1 U	20.4 U	5.05 U	**307**	**2060**	**377**	5.00 U
Phenanthrene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
Phenol			9.90 U	10.0 U	50.0 UJ	4.04 U	8.16 UJ	2.02 U	100 UJ	10.1 UJ	2.00 UJ	2.00 U
Pyrene (8270)			4.95 UJ	5.00 UJ	25.0 U	2.02 UJ	4.08 U	1.01 UJ	50.0 U	5.05 U	1.00 U	1.00 UJ
1,2,4-Trichlorobenzene (8270)			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
2,4,5-Trichlorophenol			24.8 U	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
2,4,6-Trichlorophenol			24.8 U	25.0 U	125 U	10.1 U	20.4 U	5.05 U	250 U	25.3 U	5.00 U	5.00 U
Carbazole			4.95 UJ	5.00 U	25.0 U	2.02 U	4.08 U	1.01 U	50.0 U	5.05 U	1.00 U	1.00 U
PAHs (µg/L)												
EPA 8270SIM												
Acenaphthene (8270SIM)												
Acenaphthylene (8270SIM)												
Anthracene (8270SIM)												
Benzo(a)anthracene (8270SIM)												
Benzo(a)pyrene (8270SIM)												
Benzo(b)fluoranthene (8270SIM)												
Benzo(g,h,i)perylene (8270SIM)												
Benzo(k)fluoranthene (8270SIM)												
Chrysene (8270SIM)												
Dibenzo(a,h)anthracene (8270SIM)												

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	B1 P5K0699-02 11/15/2005	J1 P5K0699-06 11/15/2005	LW004S P5K0699-03 11/15/2005	LW008S P5K0699-04 11/15/2005	LW011S P5K0820-03 11/17/2005	OX001S P5K0699-10 11/16/2005	OX003S P5K0699-09 11/16/2005	OX005S P5K0699-07 11/15/2005	OX006S P5K0699-12 11/16/2005	OX007S P5K0699-13 11/16/2005	OX008S P5K0699-11 11/16/2005	OX009S P5K0699-08 11/15/2005
Fluoranthene (8270SIM)												
Fluorene (8270SIM)												
Indeno(1,2,3-cd)pyrene (8270SIM)												
Naphthalene (8270SIM)												
Phenanthrene (8270SIM)												
Pyrene (8270SIM)												
VOLATILES (µg/L)												
EPA 8260B												
Acetone			25.0 U	50.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U
Benzene			1.00 U	2.00 U	**2.66**	**31**	**43.3**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromobenzene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromochloromethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromodichloromethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromoform			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromomethane			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Butanone			10.0 U	20.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
n-Butylbenzene			5.00 U	**10.3**	5.00 U	5.00 U	**7.31**	5.00 U	5.00 U	5.00 U	**9.01**	5.00 U
sec-Butylbenzene			1.00 U	**23.5**	**3.69**	**6.31**	**7.18**	1.00 U	**1.81**	**3.51**	**17.7**	1.00 U
tert-Butylbenzene			1.00 U	**10.1**	1.00 U	**1.56**	**1.78**	1.00 U	1.00 U	1.00 U	**3.01**	1.00 U
Carbon disulfide			10.0 U	20.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon tetrachloride			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chlorobenzene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroform			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloromethane			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Chlorotoluene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Chlorotoluene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromo-3-chloropropane			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Dibromochloromethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromoethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibromomethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichlorobenzene (8260)			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene (8260)			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,4-Dichlorobenzene (8260)			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dichlorodifluoromethane			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloroethene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichloropropane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

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FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	B1 P5K0699-02 11/15/2005	J1 P5K0699-06 11/15/2005	LW004S P5K0699-03 11/15/2005	LW008S P5K0699-04 11/15/2005	LW011S P5K0820-03 11/17/2005	OX001S P5K0699-10 11/16/2005	OX003S P5K0699-09 11/16/2005	OX005S P5K0699-07 11/15/2005	OX006S P5K0699-12 11/16/2005	OX007S P5K0699-13 11/16/2005	OX008S P5K0699-11 11/16/2005	OX009S P5K0699-08 11/15/2005
2,2-Dichloropropane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloropropene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,3-Dichloropropene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,3-Dichloropropene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Ethylbenzene			1.00 U	**39.7**	**16.9**	**72.5**	**106**	1.00 U	1.00 U	1.00 U	**5.64**	1.00 U
Hexachlorobutadiene (8260)			4.00 U	8.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
2-Hexanone			10.0 U	20.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Isopropylbenzene			2.00 U	**267**	**8.79**	**27.6**	**33.8**	2.00 U	2.00 U	**2.19**	**17.3**	2.00 U
4-Isopropyltoluene			2.00 U	4.00 U	**2.34**	**4.19**	**5.68**	2.00 U	2.00 U	2.00 U	**6.02**	2.00 U
4-Methyl-2-Pentanone (MIBK)			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Methyl tert-butyl ether			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Methylene chloride			5.00 U	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Naphthalene (8260)			2.00 U	**42.1**	**7.05**	**17.8**	**20.4**	2.00 U	2.00 U	2.00 U	**4.64**	2.00 U
n-Propylbenzene			1.00 U	**196**	**11.9**	**33.8**	**42.5**	1.00 U	1.00 U	**2.14**	**23.2**	1.00 U
Styrene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1,2-Tetrachloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2,2-Tetrachloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Tetrachloroethene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Toluene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichlorobenzene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trichlorobenzene (8260)			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1-Trichloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2-Trichloroethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichlorofluoromethane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichloropropane			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trimethylbenzene			1.00 U	2.00 U	**37.1**	**136**	**173**	1.00 U	1.00 U	**9.1**	**146**	1.00 U
1,3,5-Trimethylbenzene			1.00 U	2.00 U	**4.02**	**33**	**44.8**	1.00 U	1.00 U	1.00 U	**22.2**	1.00 U
Vinyl chloride			1.00 U	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
o-Xylene			1.00 U	2.00 U	**20.4**	**9.61**	**83.7**	1.00 U	1.00 U	**1.52**	**20.1**	1.00 U
m,p-Xylene			2.00 U	4.00 U	**15.4**	**96.3**	**104**	2.00 U	2.00 U	2.00 U	**4.65**	2.00 U
NWTPH-G (µg/L)												
Gasoline Range Hydrocarbons			80.0 U	**2860**	**739 J**							
NWTPH-Dx (µg/L)												

BZTO104(e)015654

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Diesel Range Hydrocarbons			250 U	**1390**	**396**							
Heavy Oil Range Hydrocarbons			500 U	495 U	481 U							
TOTAL METALS (µg/L)												
EPA 6020/7470A												
Antimony			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arsenic			1.00 U	**30.4**	**3.16**	**18.1**	**14.1**	**15.7**	**5.98**	**2.94**	**27**	**2.35**
Beryllium			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**9.72**	1.00 U	1.00 U	1.00 U	1.00 U
Copper			**6.96**	2.00 U	2.00 U	2.00 U	2.00 U	**13**	**8.3**	**2.88**	2.00 U	2.00 U
Lead			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**4.78**	1.00 U	1.00 U	1.00 U	1.00 U
Mercury			0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	**0.355**	0.200 U	0.200 U	0.200 U	0.200 U
Nickel			**18.9**	**8.77**	**44.8**	**27.8**	**23.8**	**12.3**	**41.5**	**80.6**	**154**	**14.5**
Selenium			2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Thallium			1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Zinc			5.00 U	**9.34**	5.00 U	5.00 U	5.00 U	**37.8**	**11.3**	**7.88**	**12.2**	5.00 U
DISSOLVED METALS (µg/L)												
EPA 6020												
Antimony (Dissolved)												
Arsenic (Dissolved)												
Beryllium (Dissolved)												
Cadmium (Dissolved)												
Chromium (Dissolved)												
Copper (Dissolved)												
Lead (Dissolved)												
Nickel (Dissolved)												
Selenium (Dissolved)												
Silver (Dissolved)												
Thallium (Dissolved)												
Zinc (Dissolved)												
DIOXINS AND FURANS (ng/L)												
EPA 1613B												
2,3,7,8-TCDF						0.00992 U			0.00986 U			
Total TCDF						0.00992 U			0.00986 U			
2,3,7,8-TCDD						0.00992 U			0.00986 U			
Total TCDD						0.00992 U			0.00986 U			
1,2,3,7,8-PeCDF						0.0496 U			0.0493 U			
2,3,4,7,8-PeCDF						0.0496 U			0.0493 U			
Total PeCDF						0.0496 U			0.0493 U			

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1,2,3,7,8-PeCDD						0.0496 U			0.0493 U			
Total PeCDD						0.0496 U			0.0493 U			
1,2,3,4,7,8-HxCDF						0.0496 U			0.0493 U			
1,2,3,6,7,8-HxCDF						0.0496 U			0.0493 U			
2,3,4,6,7,8-HxCDF						0.0496 U			0.0493 U			
1,2,3,7,8,9-HxCDF						0.0496 U			0.0493 U			
Total HxCDF						0.0496 U			**0.214**			
1,2,3,4,7,8-HxCDD						0.0496 U			0.0493 U			
1,2,3,6,7,8-HxCDD						0.0496 U			0.0493 U			
1,2,3,7,8,9-HxCDD						0.0496 U			0.0493 U			
Total HxCDD						0.0496 U			0.0493 U			
1,2,3,4,6,7,8-HpCDF						**0.204**			**0.434**			
1,2,3,4,7,8,9-HpCDF						0.0496 U			0.0493 U			
Total HpCDF						**0.525**			**1.04**			
1,2,3,4,6,7,8-HpCDD						**0.567**			**0.949**			
Total HpCDD						**0.851**			**1.42**			
OCDF						**0.354**			**0.551**			
OCDD						**4.29**			**5.1**			
Total TEQ						**0.012354**			**0.019481**			
FIELD PARAMETERS												
pH	**6.56**	**6.66**	**6.78**	**7.10**	**7.30**	**5.95**	**7.21**	**6.73**	**6.10**	**7.03**	**7.20**	**6.91**
Temperature (deg C)	**15.4**	**15.8**	**15.0**	**15.0**	**15.5**	**14.9**	**14.8**	**15.6**	**15.6**	**16.0**	**1.6**	**15.7**
Conductivity (uS/cm)	**230**	**219**	**17.4**	**377**	**363**	**238**	**371**	**193**	**216**	**334**	**530**	**411**
Dissolved oxygen (mg/l)	**2.93**	**1.16**	**4.06**	**2.95**	**2.19**		**2.96**	**1.42**		**3.65**	**2.97**	**3.27**
Turbidity (NTU)	**5**	**6**	**0**	**1**		**0**	**0**	**3**	**0**	**0**	**0**	**0**
Ferrous Iron (mg/L)					**2.4**	**5.4**	**2.7**	**6.5**	**4.0**	**2.5**	**4.0**	**2.1**

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TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
PENTACHLOROPHENOL (µg/L)												
EPA 8270SIM												
Pentachlorophenol (8270SIM)	0.481 U	**0.524**						0.485 U	0.505 U	0.485 U	0.490 U	0.476 U
SEMIVOLATILES (µg/L)												
EPA 8270C												
2,3,4,6-Tetrachlorophenol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Acenaphthene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	**6.17**	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Acenaphthylene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Anthracene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzo(a)anthracene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzo(a)pyrene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzo(b)fluoranthene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzo(g,h,i)perylene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzo(k)fluoranthene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Benzoic Acid	243 U	240 U	1000 U	240 U	250 U	500 U	194 U	198 U	99.0 U	48.5 U	49.5 U	47.6 U
Benzyl alcohol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
4-Bromophenyl-phenylether	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Butyl benzyl phthalate	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
4-Chloro-3-methylphenol	9.71 U	9.62 U	40.0 U	9.62 U	10.0 U	20.0 U	7.77 U	7.92 U	3.96 U	1.94 U	1.98 U	1.90 U
4-Chloroaniline	14.6 U	14.4 U	60.0 U	14.4 U	15.0 U	30.0 U	11.7 U	11.9 U	5.94 U	2.91 U	2.97 U	2.86 U
Bis(2-chloroethoxy)methane	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Bis(2-chloroethyl)ether	9.71 U	9.62 U	40.0 U	9.62 U	10.0 U	20.0 U	7.77 U	39.6 U	3.96 U	1.94 U	1.98 U	1.90 U
Bis(2-chloroisopropyl)ether	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2-Chloronaphthalene	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2-Chlorophenol	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
4-Chlorophenylphenyl ether	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Chrysene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Di-n-butyl phthalate	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Di-n-octyl phthalate	9.71 U	9.62 U	40.0 U	19.2 U	10.0 U	20.0 U	7.77 U	7.92 U	3.96 U	1.94 U	1.98 U	1.90 U
Dibenzo(a,h)anthracene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Dibenzofuran (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	**4.19**	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
1,2-Dichlorobenzene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
1,3-Dichlorobenzene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
1,4-Dichlorobenzene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
3,3-Dichlorobenzidine	48.5 U	48.1 U	200 U	48.1 U	50.0 U	100 U	38.8 U	39.6 U	19.8 U	9.71 U	9.90 U	9.52 U
2,4-Dichlorophenol	14.6 U	14.4 U	60.0 U	14.4 U	15.0 U	30.0 U	11.7 U	11.9 U	5.94 U	2.91 U	2.97 U	2.86 U
Diethyl phthalate	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	5.83 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2,4-Dimethylphenol	14.6 U	14.4 U	60.0 U	14.4 U	15.0 U	30.0 U	11.7 U	11.9 U	5.94 U	2.91 U	2.97 U	2.86 U
Dimethyl phthalate	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
4,6-Dinitro-2-methylphenol	72.8 U	72.1 U	300 U	72.1 U	75.0 U	150 U	58.3 U	59.4 U	29.7 U	14.6 U	14.9 U	14.3 U
2,4-Dinitrophenol	121 U	120 U	500 U	120 U	125 U	250 U	97.1 U	99.0 U	49.5 U	24.3 U	24.8 U	23.8 U
2,4-Dinitrotoluene	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U

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TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
2,6-Dinitrotoluene	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Bis(2-ethylhexyl)phthalate	48.5 U	48.1 U	200 U	48.1 U	50.0 U	100 U	38.8 U	39.6 U	19.8 U	**13.6**	9.90 U	9.52 U
Fluoranthene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Fluorene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	**5.48**	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Hexachlorobenzene	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Hexachlorobutadiene (8270)	9.71 U	9.62 U	40.0 U	9.62 U	10.0 U	20.0 U	7.77 U	7.92 U	3.96 U	1.94 U	1.98 U	1.90 U
Hexachlorocyclopentadiene	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Hexachloroethane	9.71 U	9.62 U	40.0 U	9.62 U	10.0 U	20.0 U	7.77 U	7.92 U	3.96 U	1.94 U	1.98 U	1.90 U
Indeno(1,2,3-cd)pyrene (8270)	4.85 U	4.81 U	20.0 U	9.62 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Isophorone	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2-Methylnaphthalene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	**37.2**	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	**2.02**
2-Methylphenol	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
3- & 4-Methylphenol	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	**48.9**	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Naphthalene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	**17.6**	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2-Nitroaniline	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
3-Nitroaniline	29.1 U	28.8 U	120 U	28.8 U	30.0 U	60.0 U	23.3 U	23.8 U	11.9 U	5.83 U	5.94 U	5.71 U
4-Nitroaniline	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Nitrobenzene	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2-Nitrophenol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
4-Nitrophenol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
N-Nitroso-Di-N-Propylamine	9.71 U	9.62 U	40.0 U	9.62 U	10.0 U	20.0 U	7.77 U	7.92 U	3.96 U	1.94 U	1.98 U	1.90 U
N-Nitrosodiphenylamine	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Pentachlorophenol (8270)	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Phenanthrene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
Phenol	9.71 UJ	9.62 UJ	40.0 U	9.62 UJ	**17.3 J**	**80.5 J**	7.77 UJ	7.92 UJ	3.96 UJ	1.94 U	1.98 UJ	1.90 U
Pyrene (8270)	4.85 U	4.81 U	20.0 UJ	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 UJ	0.990 U	0.952 UJ
1,2,4-Trichlorobenzene (8270)	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
2,4,5-Trichlorophenol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
2,4,6-Trichlorophenol	24.3 U	24.0 U	100 U	24.0 U	25.0 U	50.0 U	19.4 U	19.8 U	9.90 U	4.85 U	4.95 U	4.76 U
Carbazole	4.85 U	4.81 U	20.0 U	4.81 U	5.00 U	10.0 U	3.88 U	3.96 U	1.98 U	0.971 U	0.990 U	0.952 U
PAHs (µg/L)												
EPA 8270SIM												
Acenaphthene (8270SIM)			**0.905**	0.594 U	**0.902**	**5.55**	**3.88**					
Acenaphthylene (8270SIM)			0.500 U	0.396 U	0.408 U	0.990 U	0.297 U					
Anthracene (8270SIM)			0.500 U	0.396 U	0.408 U	**0.786**	0.198 U					
Benzo(a)anthracene (8270SIM)			0.500 U	0.396 U	0.408 U	**0.454**	0.198 U					
Benzo(a)pyrene (8270SIM)			0.500 U	0.396 U	0.408 U	0.198 U	0.198 U					
Benzo(b)fluoranthene (8270SIM)			0.500 U	0.396 U	0.408 U	**0.231**	0.198 U					
Benzo(g,h,i)perylene (8270SIM)			0.500 U	0.396 U	0.408 U	0.198 U	0.198 U					
Benzo(k)fluoranthene (8270SIM)			0.500 U	0.396 U	0.408 U	0.198 U	0.198 U					
Chrysene (8270SIM)			0.500 U	0.396 U	0.408 U	**0.447**	0.198 U					
Dibenzo(a,h)anthracene (8270SIM)			1.00 U	0.792 U	0.816 U	0.396 U	0.396 U					

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
Fluoranthene (8270SIM)			0.500 U	0.396 U	0.408 U	**2.03**	**0.236**					
Fluorene (8270SIM)			**2.62**	0.396 U	**2.13**	**6.44**	**3.49**					
Indeno(1,2,3-cd)pyrene (8270SIM)			0.500 U	0.396 U	0.408 U	0.198 U	0.198 U					
Naphthalene (8270SIM)			1.75 U	0.990 U	**15.7**	7.43 U	1.29 U					
Phenanthrene (8270SIM)			**0.891**	0.396 U	**1.06**	**3.45**	**1.96**					
Pyrene (8270SIM)			0.500 U	0.396 U	0.408 U	**1.71**	0.198 U					
VOLATILES (µg/L)												
EPA 8260B												
Acetone	25.0 U	25.0 U	25.0 U	25.0 U	250 U	500 U	125 U	**47.5**	25.0 U	25.0 U	25.0 U	25.0 U
Benzene	**6.39**	**6.43**	1.00 U	1.00 U	**716**	**2470**	**220**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromobenzene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromochloromethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromodichloromethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromoform	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromomethane	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Butanone	10.0 U	10.0 U	10.0 U	10.0 U	100 U	200 U	50.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
n-Butylbenzene	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
sec-Butylbenzene	**4.37**	**4.35**	**5.25**	1.00 U	**201**	20.0 U	**5.8**	**1.06**	1.00 U	1.00 U	1.00 U	**5.92**
tert-Butylbenzene	**1.5**	**1.59**	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	**3.15**	1.00 U	1.00 U	1.00 U	**1.85**
Carbon disulfide	10.0 U	10.0 U	10.0 U	10.0 U	100 U	200 U	50.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon tetrachloride	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroform	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloromethane	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Chlorotoluene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Chlorotoluene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromo-3-chloropropane	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Dibromochloromethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromoethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibromomethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,4-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dichlorodifluoromethane	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
2,2-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,3-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,3-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Ethylbenzene	**40.1**	**41**	1.00 U	1.00 U	**131**	**72.8**	**6.5**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorobutadiene (8260)	4.00 U	4.00 U	4.00 U	4.00 U	40.0 U	80.0 U	20.0 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
2-Hexanone	10.0 U	10.0 U	10.0 U	10.0 U	100 U	200 U	50.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Isopropylbenzene	**27.5**	**27.7**	**7.05**	2.00 U	**51.6**	40.0 U	**52.5**	2.00 U	2.00 U	2.00 U	2.00 U	**37.3**
4-Isopropyltoluene	**2.13**	**2.13**	2.00 U	2.00 U	20.0 U	40.0 U	10.0 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
4-Methyl-2-Pentanone (MIBK)	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Methyl tert-butyl ether	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Methylene chloride	5.00 U	5.00 U	5.00 U	5.00 U	50.0 U	100 U	25.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Naphthalene (8260)	**10.4**	**10.2**	2.00 U	2.00 U	**38.9**	40.0 U	10.0 U	2.00 U	2.00 U	2.00 U	2.00 U	**2.48**
n-Propylbenzene	**26.4**	**26.7**	**10.3**	1.00 U	**77.5**	20.0 U	**96.6**	1.00 U	1.00 U	1.00 U	1.00 U	**34.3**
Styrene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1,2-Tetrachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2,2-Tetrachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Tetrachloroethene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Toluene	1.00 U	1.00 U	1.00 U	1.00 U	**19**	**64.2**	**12.6**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1-Trichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2-Trichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichlorofluoromethane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trimethylbenzene	**87.1**	**90.2**	1.00 U	1.00 U	**244**	**96.2**	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3,5-Trimethylbenzene	**7.16**	**7.62**	1.00 U	1.00 U	**70.4**	**67.4**	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl chloride	1.00 U	1.00 U	1.00 U	1.00 U	10.0 U	20.0 U	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
o-Xylene	**18.6**	**19.1**	1.00 U	1.00 U	**62.2**	**221**	5.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
m,p-Xylene	**39.5**	**41.5**	2.00 U	2.00 U	**314**	**412**	**12.1**	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
NWTPH-G (µg/L)												
Gasoline Range Hydrocarbons	**826 J**	**880 J**	**315**	**240**	**5100 J**	**8560**	**1530 J**	**329**	80.0 U	80.0 UJ	80.0 U	**371**
NWTPH-Dx (µg/L)												

BZTO104(e)015660

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
Diesel Range Hydrocarbons	**483**	**516**	**1020**	**2090**	**3410**	**2720**	**1480**	**452 J**	248 U	245 U	250 U	245 U
Heavy Oil Range Hydrocarbons	481 U	481 U	495 U	500 U	500 U	500 U	500 U	495 U	495 U	490 U	500 U	490 U
TOTAL METALS (µg/L)												
EPA 6020/7470A												
Antimony	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arsenic	**3.66**	**3.76**	**46**	**59.6**	**38.3**	**35.9**	**41.1**	**10.8**	**32.6**	**15.3**	**6.96**	**22**
Beryllium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**1.04**	**5.7**	**27.8**	1.00 U
Copper	**2.62**	**2.51**	2.00 U	2.00 U	2.00 U	**2.81**	2.00 U	2.00 U	2.00 U	**9.24**	**37.3**	2.00 U
Lead	1.00 U	1.00 U	1.00 U	1.00 U	**6.83**	**26**	**12.4**	1.00 U	1.00 U	**2.15**	**15.1**	1.00 U
Mercury	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Nickel	**87.6**	**88.2**	2.00 U	**5.35**	**2.26**	**3.98**	**2.11**	**15.5**	2.00 U	**5.26**	**70.6**	**23.5**
Selenium	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Thallium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Zinc	5.00 U	5.00 U	**6.17**	5.00 U	5.00 U	5.00 U	5.00 U	**8.29**	5.00 U	**16.6**	**85.1**	**8.11**
DISSOLVED METALS (µg/L)												
EPA 6020												
Antimony (Dissolved)												
Arsenic (Dissolved)												
Beryllium (Dissolved)												
Cadmium (Dissolved)												
Chromium (Dissolved)												
Copper (Dissolved)												
Lead (Dissolved)												
Nickel (Dissolved)												
Selenium (Dissolved)												
Silver (Dissolved)												
Thallium (Dissolved)												
Zinc (Dissolved)												
DIOXINS AND FURANS (ng/L)												
EPA 1613B												
2,3,7,8-TCDF	0.00988 U											
Total TCDF	0.00988 U											
2,3,7,8-TCDD	0.00988 U											
Total TCDD	0.00988 U											
1,2,3,7,8-PeCDF	0.0494 U											
2,3,4,7,8-PeCDF	0.0494 U											
Total PeCDF	0.0494 U											

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FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	RW1 P5K0820-02 11/17/2005	Dup of RW1 W P5K0820-01 11/17/2005	LW019S P5K0698-06 11/16/2005	LW027S P5K0819-04 11/17/2005	N P5K0819-03 11/17/2005	P P5K0819-02 11/17/2005	Q P5K0819-01 11/17/2005	LW006D P5K0820-06 11/17/2005	LW009D P5K0820-05 11/17/2005	LW010D P5K0699-01 11/14/2005	LW011D P5K0820-04 11/17/2005	RW2 P5K0699-05 11/15/2005
1,2,3,7,8-PeCDD	0.0494 U											
Total PeCDD	0.0494 U											
1,2,3,4,7,8-HxCDF	0.0494 U											
1,2,3,6,7,8-HxCDF	0.0494 U											
2,3,4,6,7,8-HxCDF	0.0494 U											
1,2,3,7,8,9-HxCDF	0.0494 U											
Total HxCDF	0.0494 U											
1,2,3,4,7,8-HxCDD	0.0494 U											
1,2,3,6,7,8-HxCDD	0.0494 U											
1,2,3,7,8,9-HxCDD	0.0494 U											
Total HxCDD	0.0494 U											
1,2,3,4,6,7,8-HpCDF	0.0494 U											
1,2,3,4,7,8,9-HpCDF	0.0494 U											
Total HpCDF	0.0494 U											
1,2,3,4,6,7,8-HpCDD	0.0494 U											
Total HpCDD	0.0494 U											
OCDF	0.0988 U											
OCDD	**0.254**											
Total TEQ	**0.000254**											
FIELD PARAMETERS												
pH	**6.61**	**6.59**	**7.40**	**7.10**	**6.57**	**6.64**	**7.47**	**6.66**	**7.49**	**6.27**	**6.76**	**7.55**
Temperature (deg C)	**15.9**	**15.9**	**13.9**	**14.9**	**14.0**	**12.8**	**14.7**	**14.6**	**15.7**	**14.0**	**14.9**	**13.6**
Conductivity (uS/cm)	**234**	**233**	**654**	**358**	**198**	**253**	**632**	**196**	**312**	**128**	**299**	**385**
Dissolved oxygen (mg/l)	**1.88**	**1.07**	**3.23**	**3.10**		**0.71**	**2.43**	**1.19**	**3.64**	**7.77**	**1.55**	**3.79**
Turbidity (NTU)	**8**	**10**	**0**	**0**	**0**	**6**	**0**	**0**	**14**	**102**	**373**	**0**
Ferrous Iron (mg/L)	**10**	**10**										

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
PENTACHLOROPHENOL (µg/L)												
EPA 8270SIM												
Pentachlorophenol (8270SIM)												
SEMIVOLATILES (µg/L)												
EPA 8270C												
2,3,4,6-Tetrachlorophenol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Acenaphthene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Acenaphthylene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Anthracene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Benzo(a)anthracene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Benzo(a)pyrene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Benzo(b)fluoranthene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Benzo(g,h,i)perylene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Benzo(k)fluoranthene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Benzoic Acid	49.0 U	49.5 U	990 U	50.0 U	50.0 U	49.5 U	48.5 U	49.5 U	49.5 U	50.0 U	49.0 U	51.0 U
Benzyl alcohol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
4-Bromophenyl-phenylether	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Butyl benzyl phthalate	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
4-Chloro-3-methylphenol	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
4-Chloroaniline	2.94 U	2.97 U	59.4 U	3.00 U	3.00 U	2.97 U	2.91 U	2.97 U	2.97 U	3.00 U	2.94 U	3.06 U
Bis(2-chloroethoxy)methane	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Bis(2-chloroethyl)ether	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
Bis(2-chloroisopropyl)ether	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Chloronaphthalene	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Chlorophenol	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
4-Chlorophenylphenyl ether	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Chrysene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Di-n-butyl phthalate	0.980 U	0.990 U	19.8 U	**1.24**	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Di-n-octyl phthalate	19.6 U	19.8 U	39.6 U	20.0 U	20.0 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	20.4 U
Dibenzo(a,h)anthracene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Dibenzofuran (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
1,2-Dichlorobenzene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
1,3-Dichlorobenzene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
1,4-Dichlorobenzene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
3,3-Dichlorobenzidine	9.80 U	9.90 U	198 U	10.0 U	10.0 U	9.90 U	9.71 U	9.90 U	9.90 U	10.0 U	9.80 U	10.2 U
2,4-Dichlorophenol	2.94 U	2.97 U	59.4 U	3.00 U	3.00 U	2.97 U	2.91 U	2.97 U	2.97 U	3.00 U	2.94 U	3.06 U
Diethyl phthalate	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2,4-Dimethylphenol	2.94 U	2.97 U	59.4 U	3.00 U	3.00 U	2.97 U	2.91 U	2.97 U	2.97 U	3.00 U	2.94 U	3.06 U
Dimethyl phthalate	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
4,6-Dinitro-2-methylphenol	14.7 U	14.9 U	297 U	15.0 U	15.0 U	14.9 U	14.6 U	14.9 U	14.9 U	15.0 U	14.7 U	15.3 U
2,4-Dinitrophenol	24.5 U	24.8 U	495 U	25.0 U	25.0 U	24.8 U	24.3 U	24.8 U	24.8 U	25.0 U	24.5 U	25.5 U
2,4-Dinitrotoluene	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U

BZTO104(e)015663

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
2,6-Dinitrotoluene	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Bis(2-ethylhexyl)phthalate	9.80 U	9.90 U	198 U	10.0 U	10.0 U	9.90 U	9.71 U	9.90 U	9.90 U	10.0 U	9.80 U	10.2 U
Fluoranthene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Fluorene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Hexachlorobenzene	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Hexachlorobutadiene (8270)	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
Hexachlorocyclopentadiene	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Hexachloroethane	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
Indeno(1,2,3-cd)pyrene (8270)	9.80 U	9.90 U	19.8 U	10.0 U	10.0 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	10.2 U
Isophorone	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Methylnaphthalene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Methylphenol	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
3- & 4-Methylphenol	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Naphthalene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Nitroaniline	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
3-Nitroaniline	5.88 U	5.94 U	119 U	6.00 U	6.00 U	5.94 U	5.83 U	5.94 U	5.94 U	6.00 U	5.88 U	6.12 U
4-Nitroaniline	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Nitrobenzene	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2-Nitrophenol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
4-Nitrophenol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
N-Nitroso-Di-N-Propylamine	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
N-Nitrosodiphenylamine	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Pentachlorophenol (8270)	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Phenanthrene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
Phenol	1.96 U	1.98 U	39.6 U	2.00 U	2.00 U	1.98 U	1.94 U	1.98 U	1.98 U	2.00 U	1.96 U	2.04 U
Pyrene (8270)	0.980 UJ	0.990 UJ	19.8 UJ	1.00 UJ	1.00 UJ	0.990 UJ	0.971 UJ	0.990 UJ	0.990 UJ	1.00 UJ	0.980 UJ	1.02 UJ
1,2,4-Trichlorobenzene (8270)	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
2,4,5-Trichlorophenol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
2,4,6-Trichlorophenol	4.90 U	4.95 U	99.0 U	5.00 U	5.00 U	4.95 U	4.85 U	4.95 U	4.95 U	5.00 U	4.90 U	5.10 U
Carbazole	0.980 U	0.990 U	19.8 U	1.00 U	1.00 U	0.990 U	0.971 U	0.990 U	0.990 U	1.00 U	0.980 U	1.02 U
PAHs (µg/L)												
EPA 8270SIM												
Acenaphthene (8270SIM)	0.0971 U	**0.458**	**1.18**	**0.366**	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Acenaphthylene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Anthracene (8270SIM)	0.0971 U	0.100 U	0.500 U	**0.133**	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	**1.66**
Benzo(a)anthracene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Benzo(a)pyrene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Benzo(b)fluoranthene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Benzo(g,h,i)perylene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Benzo(k)fluoranthene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Chrysene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Dibenzo(a,h)anthracene (8270SIM)	0.194 U	0.200 U	1.00 U	0.198 U	0.204 U	0.198 U	0.192 U	0.196 U	0.194 U	0.200 U	0.194 U	0.202 U

BZTO104(e)015664

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
Fluoranthene (8270SIM)	0.0971 U	0.100 U	0.500 U	**0.256**	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Fluorene (8270SIM)	0.0971 U	**0.198**	**2.69**	**0.611**	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Indeno(1,2,3-cd)pyrene (8270SIM)	0.0971 U	0.100 U	0.500 U	0.0990 U	0.102 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.101 U
Naphthalene (8270SIM)	0.146 U	1.00 U	2.00 U	0.792 U	0.306 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	0.505 U
Phenanthrene (8270SIM)	0.0971 U	0.100 U	**1.38**	**0.435**	0.153 U	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	**0.198**
Pyrene (8270SIM)	**0.099**	0.100 U	0.500 U	**0.393**	**0.126**	0.0990 U	0.0962 U	0.0980 U	0.0971 U	0.100 U	0.0971 U	**0.122**
VOLATILES (µg/L)												
EPA 8260B												
Acetone	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U	25.0 U
Benzene	1.00 U	**8.03**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromochloromethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromodichloromethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromoform	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromomethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Butanone	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
n-Butylbenzene	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
sec-Butylbenzene	1.00 U	**1.81**	**4.72**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**1.63**
tert-Butylbenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Carbon disulfide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Carbon tetrachloride	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroform	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Chlorotoluene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Chlorotoluene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromo-3-chloropropane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Dibromochloromethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromoethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibromomethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,4-Dichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dichlorodifluoromethane	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
1,1-Dichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
2,2-Dichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,3-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,3-Dichloropropene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Ethylbenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorobutadiene (8260)	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
2-Hexanone	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Isopropylbenzene	2.00 U	**8.61**	**10.1**	**2.55**	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	**10.8**
4-Isopropyltoluene	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
4-Methyl-2-Pentanone (MIBK)	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Methyl tert-butyl ether	1.00 U	**16.4**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Methylene chloride	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Naphthalene (8260)	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
n-Propylbenzene	1.00 U	**1.93**	**10.1**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**2.05**
Styrene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1,2-Tetrachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2,2-Tetrachloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Tetrachloroethene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Toluene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichlorobenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trichlorobenzene (8260)	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,1-Trichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2-Trichloroethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichlorofluoromethane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,3-Trichloropropane	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2,4-Trimethylbenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3,5-Trimethylbenzene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl chloride	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
o-Xylene	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
m,p-Xylene	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
NWTPH-G (µg/L)												
Gasoline Range Hydrocarbons	80.0 U	**292**	**387**	**97.9**	80.0 U	80.0 U	80.0 U	80.0 U	80.0 U	80.0 U	80.0 U	80.0 U
NWTPH-Dx (µg/L)												

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
Diesel Range Hydrocarbons	243 U	243 U	**591**	248 U	278 U	250 U	245 U	248 U	245 U	243 U	243 U	250 U
Heavy Oil Range Hydrocarbons	485 U	485 U	495 U	495 U	556 U	500 U	490 U	495 U	490 U	485 U	485 U	500 U
TOTAL METALS (µg/L)												
EPA 6020/7470A												
Antimony	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Arsenic	**22.2**	**55.4**	**49.7**	**44.9**	**10.5**	1.00 U	1.00 U	**1.64**	**1.57**	**7.76**	**4.37**	**48.1**
Beryllium	1.00 U	1.00 U	1.00 U	**1.15**	**1.58**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**2.1**
Cadmium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium	**2.08**	**14.9**	**9.61**	**26.7**	**31.8**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**19.8**	**38.6**
Copper	**3.22**	**26.1**	**14.6**	**38.8**	**44.4**	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	**26.6**	**47.6**
Lead	**1.37**	**9.1**	**6.4**	**18.9**	**17.2**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**7.76**	**18.2**
Mercury	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Nickel	**4.9**	**13.8**	**10.8**	**32.4**	**56.8**	2.00 U	2.00 U	2.00 U	2.00 U	**6.12**	**27.6**	**53.2**
Selenium	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Silver	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Thallium	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Zinc	**18**	**51.5**	**36.8**	**104**	**166**	5.00 U	5.00 U	5.00 U	**5.12**	5.00 U	**73**	**159**
DISSOLVED METALS (µg/L)												
EPA 6020												
Antimony (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Arsenic (Dissolved)						1.00 U	1.00 U	**1.45**	**1.51**	**7.99**		
Beryllium (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Cadmium (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Chromium (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Copper (Dissolved)						2.00 U	2.00 U	**2.36**	2.00 U	2.00 U		
Lead (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Nickel (Dissolved)						2.00 U	2.00 U	2.00 U	2.00 U	**8.85**		
Selenium (Dissolved)						2.00 U	2.00 U	2.00 U	2.00 U	2.00 U		
Silver (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Thallium (Dissolved)						1.00 U	1.00 U	1.00 U	1.00 U	1.00 U		
Zinc (Dissolved)						5.00 U	5.00 U	5.00 U	5.00 U	5.00 U		
DIOXINS AND FURANS (ng/L)												
EPA 1613B												
2,3,7,8-TCDF												
Total TCDF												
2,3,7,8-TCDD												
Total TCDD												
1,2,3,7,8-PeCDF												
2,3,4,7,8-PeCDF												
Total PeCDF												

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TABLE 1
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTER SAMPLING EVENT, NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Parameter	LW022D P5K0698-12 11/16/2005	LW023D P5K0698-13 11/16/2005	LW024D P5K0698-09 11/16/2005	LW025D P5K0698-10 11/16/2005	LW035D P5K0698-11 11/16/2005	LW036D P5K0698-05 11/15/2005	LW037D P5K0698-02 11/15/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D P5K0698-04 11/15/2005	LW040D P5K0698-07 11/16/2005	LW045D P5K0698-08 11/16/2005
1,2,3,7,8-PeCDD												
Total PeCDD												
1,2,3,4,7,8-HxCDF												
1,2,3,6,7,8-HxCDF												
2,3,4,6,7,8-HxCDF												
1,2,3,7,8,9-HxCDF												
Total HxCDF												
1,2,3,4,7,8-HxCDD												
1,2,3,6,7,8-HxCDD												
1,2,3,7,8,9-HxCDD												
Total HxCDD												
1,2,3,4,6,7,8-HpCDF												
1,2,3,4,7,8,9-HpCDF												
Total HpCDF												
1,2,3,4,6,7,8-HpCDD												
Total HpCDD												
OCDF												
OCDD												
Total TEQ												
FIELD PARAMETERS												
pH	**7.20**	**7.75**	**6.32**	**5.77**	**7.44**	**6.72**	**6.61**	**7.27**	**7.28**	**7.32**	**6.03**	**7.34**
Temperature (deg C)	**14.8**	**14.1**	**14.5**	**14.9**	**13.7**	**15.1**	**14.2**	**15.5**	**15.5**	**14.9**	**13.0**	**13.4**
Conductivity (uS/cm)	**276**	**574**	**225**	**177**	**662**	**120**	**55**	**74**	**74**	**76**	**147**	**630**
Dissolved oxygen (mg/l)	**3.25**	**2.66**	**1.72**		**4.35**	**1.55**	**3.42**	**2.62**	**2.60**	**2.90**		**2.86**
Turbidity (NTU)	**163**	**248**	**149**	**772**	**755**	**0**	**11**	**0**	**0**	**0**	**546**	**999**
Ferrous Iron (mg/L)												

TABLE 2
LNAPL MEASUREMENTS AND OBSERVATIONS IN GROUNDWATER
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	LNAPL Thickness (ft)	NOTES
N	05/31/1994	16:30	----	
N	06/01/1994	08:35	----	
N	06/17/1994	15:35	----	
N	07/19/1994	09:56	----	Strong odor noted; no product
N	08/17/1994	08:06	----	
N	09/16/1994	07:58	----	Hydrocarbon odor
N	10/17/1994	09:25	----	
N	11/21/1994	12:26	----	Hydrocarbon odor
N	12/19/1994	11:42	----	Hydrocarbon odor
N	01/18/1995	11:48	----	
N	02/21/1995	13:54	----	
N	03/21/1995	13:21	----	
N	04/19/1995	13:15	----	Hydrocarbon odor
N	05/19/1995	14:04	----	
N	07/17/1995	14:15	----	
N	08/22/1995	08:16	----	
N	09/22/1995	09:05	----	
N	11/20/1995	08:26	----	
N	12/01/1995	09:01	----	
N	12/19/1995	07:53	----	
N	01/19/1996	09:06	----	
N	02/20/1996	11:14	----	
N	03/19/1996	09:41	----	
N	04/19/1996	12:12	0.12	Free product
N	07/22/1996	14:50	0.04	1/2" oil
N	08/20/1996	14:54	0.06	3/4" oil
N	09/24/1996	09:39	----	Odor, sheen, no product
N	10/28/1996	12:03	----	Strong hydrocarbon odor
N	12/13/1996	11:55	----	Thin product layer <0.01'; odor noted on opening wells
N	03/25/1997	11:48	----	
N	03/31/1997	08:59	----	Hydrocarbon odor, product
N	07/16/1997	07:20	1.20	Light brown color; thick coating on probe
N	10/21/1997	16:09	----	No product - strong petroleum odor
N	10/23/1997	17:20	----	No product - strong petroleum odor
N	01/27/1998	11:13	0.02	
N	05/18/1998	17:20	0.06	
N	08/17/1998	10:40	0.02	Thin coat of thick product
N	11/13/1998	09:48	0.01	
N	02/16/1999	12:55	0.27	Strong petroleum odor
N	05/18/1999	14:47	0.04	
N	09/21/1999	11:23	0.01	
N	12/06/1999	14:00	----	
N	02/16/2000	10:10	----	
N	05/23/2000	16:24	----	Strong petroleum odor, no product
N	08/29/2000	13:07	----	
N	11/09/2000	12:26	0.03	
N	02/12/2001	15:49	----	
N	06/04/2001	11:31	----	
N	08/16/2001	10:29	----	Trace product
N	11/28/2001	11:27	----	Trace product
N	02/27/2002	13:25	----	
N	04/05/2002	08:09	----	
N	05/29/2002	00:00	----	
N	06/27/2002	14:12	----	
N	08/26/2002	15:56	----	
N	11/13/2002	07:27	0.03	Product present
N	02/11/2003	08:49	----	
N	05/08/2003	06:51	----	
N	08/27/2003	13:33	----	
N	10/23/2003	12:08	----	
N	02/19/2004	12:21	----	
N	06/09/2004	07:36	----	
N	08/10/2004	10:55	----	
N	11/18/2004	08:38	----	
N	02/15/2005	10:38	----	Slight product odor
N	06/07/2005	19:15	----	
N	08/16/2005	16:27	----	
N	11/14/2005	10:05	----	
P	05/31/1994	16:34	----	
P	06/01/1994	08:39	----	Strong odor; heavy sheen; no measurable free phase product
P	06/17/1994	15:41	----	
P	07/19/1994	10:08	----	Strong odor noted; no product
P	08/17/1994	08:09	----	
P	09/16/1994	08:00	----	Hydrocarbon odor

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TABLE 2
LNAPL MEASUREMENTS AND OBSERVATIONS IN GROUNDWATER
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	LNAPL Thickness (ft)	NOTES
P	10/17/1994	09:27	----	
P	11/21/1994	12:29	----	Hydrocarbon odor
P	12/19/1994	11:44	----	Hydrocarbon odor
P	01/18/1995	11:49	----	
P	02/21/1995	13:58	----	
P	03/21/1995	13:22	----	
P	04/19/1995	13:17	----	
P	05/19/1995	14:06	----	
P	07/17/1995	14:16	----	
P	08/22/1995	08:17	----	
P	09/22/1995	09:07	----	
P	11/20/1995	08:28	----	
P	12/01/1995	09:02	----	
P	12/19/1995	07:56	----	
P	01/19/1996	09:07	----	Hydrocarbon odor
P	02/20/1996	11:16	----	Hydrocarbon odor
P	03/19/1996	09:43	----	Well has spots of oil on gauge
P	04/19/1996	12:21	0.08	Free product
P	07/22/1996	14:54	0.20	2-3/8" oil
P	08/20/1996	15:01	0.08	1" oil
P	09/24/1996	09:46	0.23	2-3/4" oil, product 1.5" on tape and bob
P	10/28/1996	12:07	----	Strong hydrocarbon odor
P	12/13/1996	11:58	----	Thin product layer <0.01'; odor noted on opening wells
P	03/25/1997	11:45	----	
P	03/31/1997	08:55	----	Hydrocarbon odor, product
P	07/16/1997	07:15	0.17	Light coating on probe; light brown color
P	10/21/1997	16:05	----	No product - strong petroleum odor
P	10/23/1997	17:25	----	No product - strong petroleum odor
P	01/27/1998	11:09	----	
P	05/18/1998	17:18	----	Trace of product on probe
P	08/17/1998	10:37	0.01	Sheen on probe, strong petroleum odor
P	11/13/1998	09:46	0.05	Strong gasoline odor
P	02/16/1999	12:52	0.06	Strong petroleum odor
P	05/18/1999	14:43	0.13	
P	09/21/1999	11:20	0.01	
P	12/06/1999	13:55	----	
P	02/16/2000	10:08	----	
P	05/23/2000	16:21	----	Trace of product on surface
P	08/29/2000	13:04	0.01	
P	11/09/2000	12:24	0.03	
P	02/12/2001	15:46	----	
P	06/04/2001	11:27	----	Trace product
P	08/16/2001	10:28	----	
P	11/28/2001	11:24	----	
P	02/27/2002	13:22	0.10	Strong ethanol-like odor
P	04/05/2002	08:07	0.10	
P	05/29/2002	00:00	----	Trace product
P	06/27/2002	14:11	----	
P	08/26/2002	15:54	----	
P	11/13/2002	07:25	0.04	Product present
P	02/11/2003	08:44	0.01	Product present
P	05/08/2003	06:47	0.01	Product barely present
P	08/27/2003	13:30	----	
P	10/23/2003	12:05	0.02	Trace product
P	02/19/2004	12:19	----	
P	06/09/2004	07:35	----	New reference elevation July 2004
P	08/10/2004	10:53	----	
P	11/18/2004	08:37	----	
P	02/15/2005	10:43	----	Slight product odor
P	06/07/2005	19:20	----	
P	08/16/2005	16:23	----	Strong petro odor
P	11/14/2005	10:08	----	
Q	05/31/1994	16:35	----	
Q	06/01/1994	08:50	0.01	Free product
Q	06/17/1994	15:49	----	No product
Q	07/19/1994	10:14	----	Strong odor noted; no product
Q	08/17/1994	08:11	----	
Q	09/16/1994	08:02	----	Hydrocarbon odor
Q	10/17/1994	09:29	----	
Q	11/21/1994	12:33	----	Hydrocarbon odor
Q	12/19/1994	11:45	----	Hydrocarbon odor
Q	01/18/1995	11:51	----	
Q	02/21/1995	14:02	----	
Q	03/21/1995	13:23	----	

TABLE 2
LNAPL MEASUREMENTS AND OBSERVATIONS IN GROUNDWATER
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	LNAPL Thickness (ft)	NOTES
Q	04/19/1995	13:18	----	
Q	05/19/1995	14:07	----	
Q	07/17/1995	14:17	----	
Q	08/22/1995	08:18	----	
Q	09/22/1995	09:11	----	
Q	11/20/1995	08:30	----	
Q	12/01/1995	09:03	----	
Q	12/19/1995	07:58	----	
Q	01/19/1996	09:08	----	
Q	02/20/1996	11:18	----	
Q	03/19/1996	09:45	0.51	Free product
Q	04/19/1996	12:24	0.52	Free product
Q	07/22/1996	15:00	0.01	1/8" oil
Q	08/20/1996	15:06	0.04	1/2" oil
Q	09/24/1996	09:59	----	Odor, sheen, no product
Q	10/28/1996	12:09	----	Strong hydrocarbon odor
Q	12/13/1996	12:01	----	Thin product layer <0.01'; odor noted on opening wells
Q	03/25/1997	11:42	----	
Q	03/31/1997	08:52	----	Hydrocarbon odor
Q	07/16/1997	07:10	0.02	Light coating on probe; light brown color
Q	10/21/1997	16:04	----	No product - strong petroleum odor
Q	10/23/1997	17:29	----	No product - strong petroleum odor
Q	01/27/1998	11:05	----	
Q	05/18/1998	17:16	----	
Q	08/17/1998	10:35	----	Slight sheen on probe; no product, strong petroleum odor
Q	11/13/1998	09:44	0.01	Strong gasoline odor
Q	02/16/1999	12:49	0.01	Strong petroleum odor
Q	05/18/1999	14:40	----	Strong odor when cap removed
Q	09/21/1999	11:17	----	
Q	12/06/1999	13:53	----	
Q	02/16/2000	10:06	----	Film of product
Q	05/23/2000	16:19	----	Strong petroleum odor, no product
Q	08/29/2000	13:01	----	
Q	11/09/2000	12:23	----	Trace of product
Q	02/12/2001	15:45	----	
Q	06/04/2001	11:25	----	
Q	08/16/2001	10:26	----	Trace product
Q	11/28/2001	11:21	0.42	
Q	02/27/2002	13:20	----	Strong petroleum odor, no product
Q	04/05/2002	08:05	----	Trace product
Q	05/29/2002	00:00	----	Trace product
Q	06/27/2002	14:10	----	Trace product
Q	08/26/2002	15:52	----	
Q	11/13/2002	07:30	0.01	Product present
Q	02/11/2003	08:47	----	
Q	05/08/2003	06:48	0.22	
Q	08/27/2003	13:28	----	
Q	10/23/2003	12:03	0.24	
Q	02/19/2004	12:17	----	Trace product
Q	06/09/2004	07:34	----	
Q	08/10/2004	10:52	----	
Q	11/18/2004	08:35	0.25	
Q	02/15/2005	10:46	----	Strong product odor
Q	06/07/2005	19:25	----	
Q	08/16/2005	16:20	----	Strong petro odor
Q	11/14/2005	10:10	----	
LW008S	05/18/1999	14:55	----	
LW008S	09/21/1999	12:24	----	
LW008S	12/06/1999	14:40	----	
LW008S	02/16/2000	10:16	----	
LW008S	05/23/2000	17:42	----	
LW008S	08/29/2000	14:26	----	
LW008S	11/09/2000	13:32	----	
LW008S	02/12/2001	15:58	----	
LW008S	06/04/2001	13:05	----	
LW008S	08/16/2001	12:00	----	
LW008S	11/28/2001	12:57	0.04	
LW008S	02/27/2002	14:37	----	
LW008S	03/05/2002	11:09	----	
LW008S	04/05/2002	08:17	----	
LW008S	05/29/2002	00:00	----	
LW008S	06/27/2002	15:21	----	
LW008S	08/26/2002	16:38	----	
LW008S	11/13/2002	08:50	----	

TABLE 2
LNAPL MEASUREMENTS AND OBSERVATIONS IN GROUNDWATER
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	LNAPL Thickness (ft)	NOTES
LW008S	02/11/2003	09:48	----	
LW008S	05/08/2003	08:00	----	
LW008S	08/27/2003	14:25	----	
LW008S	10/23/2003	12:42	----	
LW008S	02/19/2004	15:03	----	
LW008S	06/09/2004	08:43	----	
LW008S	08/10/2004	12:05	----	
LW008S	11/18/2004	09:15	----	
LW008S	02/15/2005	09:59	----	
LW008S	06/07/2005	19:51	----	
LW008S	08/16/2005	16:25	----	
LW008S	11/14/2005	09:33	----	
LW011S	05/18/1999	15:10	----	
LW011S	09/21/1999	11:51	----	
LW011S	12/06/1999	15:05	----	
LW011S	02/16/2000	11:01	----	
LW011S	05/23/2000	11:01	----	
LW011S	08/29/2000	14:55	----	
LW011S	11/09/2000	13:36	0.37	First occurrence of product in well.
LW011S	02/12/2001	15:18	----	
LW011S	06/04/2001	13:12	----	
LW011S	08/16/2001	11:24	0.28	
LW011S	11/28/2001	12:51	----	Trace product
LW011S	02/27/2002	14:59	----	
LW011S	03/05/2002	11:40	----	
LW011S	04/05/2002	08:34	----	
LW011S	05/29/2002	00:00	----	
LW011S	06/27/2002	15:09	----	
LW011S	08/26/2002	16:48	----	
LW011S	11/13/2002	08:54	----	
LW011S	02/11/2003	10:03	----	
LW011S	05/08/2003	08:07	----	
LW011S	08/27/2003	14:36	----	
LW011S	10/23/2003	14:12	----	
LW011S	02/19/2004	14:02	----	
LW011S	06/09/2004	08:56	----	
LW011S	08/10/2004	12:08	----	
LW011S	11/18/2004	09:08	0.09	
LW011S	02/15/2005	11:03	----	Product odor
LW011S	06/07/2005	20:05	----	
LW011S	08/16/2005	17:10	----	
LW011S	11/14/2005	08:16	----	
LW021S	10/23/2003	12:16	----	
LW021S	02/19/2004	14:54	1.03	
LW021S	06/09/2004	07:44	0.11	
LW021S	08/10/2004	11:02	0.17	
LW021S	11/18/2004	08:43	0.11	
LW021S	02/15/2005	10:52	0.02	
LW021S	06/09/2005	16:00	0.09	Product observed
LW021S	08/16/2005	17:33	0.16	
LW021S	11/14/2005	10:20	0.04	
LW027S	10/23/2003	12:20	----	
LW027S	02/19/2004	12:44	0.69	
LW027S	06/09/2004	07:39	----	
LW027S	08/10/2004	10:58	0.12	
LW027S	11/18/2004	07:39	0.02	
LW027S	02/15/2005	10:58	0.02	
LW027S	06/06/2005	19:10	0.10	Product observed
LW027S	08/16/2005	16:30	0.03	
LW027S	11/14/2005	10:02	----	Strong petroleum odor
PZ2	06/27/2002	15:18	----	
PZ2	08/26/2002	16:34	----	
PZ2	11/13/2002	08:25	----	
PZ2	02/11/2003	09:44	----	
PZ2	05/08/2003	07:45	----	
PZ2	08/27/2003	14:03	----	
PZ2	10/23/2003	13:21	0.06	
PZ2	02/19/2004	13:50	----	
PZ2	06/09/2004	08:33	----	
PZ2	08/10/2004	12:02	----	
PZ2	11/18/2004	09:20	----	

TABLE 2
LNAPL MEASUREMENTS AND OBSERVATIONS IN GROUNDWATER
QUARTERLY SAMPLING EVENTS, MARCH 1997 - NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	LNAPL Thickness (ft)	NOTES
PZ2	06/07/2005	18:35	----	
PZ2	08/16/2005	15:52	----	
PZ2	11/14/2005	09:20	----	
OX001S	06/27/2002	15:13	----	
OX001S	08/26/2002	16:45	----	
OX001S	11/13/2002	08:30	----	
OX001S	02/11/2003	09:59	----	
OX001S	05/08/2003	08:04	----	
OX001S	08/27/2003	14:38	----	
OX001S	10/23/2003	14:09	----	
OX001S	02/19/2004	14:10	----	
OX001S	06/09/2004	08:45	----	
OX001S	08/10/2004	12:07	----	
OX001S	11/18/2004	09:07	0.03	
OX001S	02/15/2005	11:11	----	Strong product odor
OX001S	06/07/2005	19:35	----	
OX001S	08/16/2005	16:35	----	
OX001S	11/14/2005	08:53	----	
OX002S	06/27/2002	15:12	----	
OX002S	08/26/2002	16:44	----	
OX002S	11/13/2002	08:33	----	New reference elevation September 2002
OX002S	02/11/2003	10:06	----	
OX002S	05/08/2003	08:09	----	
OX002S	08/27/2003	14:33	----	
OX002S	10/23/2003	14:14	0.31	
OX002S	02/19/2004	14:07	----	
OX002S	06/09/2004	08:52	----	New reference elevation July 2004
OX002S	08/10/2004	12:09	----	
OX002S	11/18/2004	09:10	0.13	
OX002S	02/15/2005	11:09	0.03	
OX002S	06/07/2005	20:00	----	
OX002S	08/16/2005	00:00	0.23	
OX002S	11/14/2005	08:09	0.07	Strong odor
OX003S	06/27/2002	15:14	----	
OX003S	08/26/2002	16:42	----	
OX003S	11/13/2002	08:31	----	
OX003S	02/11/2003	09:58	----	
OX003S	05/08/2003	08:03	----	
OX003S	08/27/2003	14:40	----	
OX003S	10/23/2003	14:10	----	
OX003S	02/19/2004	14:09	----	
OX003S	06/09/2004	08:51	----	
OX003S	08/10/2004	12:06	----	
OX003S	11/18/2004	09:13	0.33	
OX003S	02/15/2005	11:18	----	Slight product odor
OX003S	06/07/2005	19:50	----	
OX003S	08/16/2005	17:20	----	
OX003S	11/14/2005	11:23	----	

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 el conducted by Zarosinski-Tatone Engineers, Inc., Portland, Oregon. For the river gauge, the reference eleva 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 using the method in " *Estimation of Free Hydrocarbon Volume from Fluid Levels in Monitoring Wells* " [Lent Groundwater 28(1):57-67].

TABLE 3
SUMMARY OF STORM DRAIN ANALYTICAL RESULTS
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**
	ED34K	2/28/2002	NA	NA	NA	**0.3**	0.50 U	**100**
	EG43A	4/5/2002	NA	NA	NA	NA	NA	**82**
	EN01A	6/27/2002	NA	NA	NA	NA	NA	**190**
	ES04I	8/28/2002	NA	NA	NA	NA	NA	**25**
	FU31G	8/27/2003	NA	NA	NA	NA	NA	**120** (b)
	FY64A	10/20/2003	NA	NA	NA	NA	NA	**43** (b)
	0402113-12	2/23/2004	NA	NA	NA	NA	NA	**791** (b)
	0405022-07	5/4/2004	NA	NA	NA	NA	NA	**1000** (b)
	0406059-04	6/9/2004	NA	NA	NA	NA	NA	**595** (b)
	0408036-10	8/5/2004	NA	NA	NA	NA	NA	**158** (b)
	0411066-13	11/11/2004	NA	NA	NA	NA	NA	**1.61** (b)
	0502087-10	2/18/2005	NA	NA	NA	NA	NA	**7.2** (b)
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**
	EN01B	6/27/2002	NA	NA	NA	NA	NA	0.25 U
	ES04J	8/28/2002	NA	NA	NA	NA	NA	0.30 U
	FY64B	10/20/2003	NA	NA	NA	NA	NA	**0.79**
RIVER OUTFALL (c)	0210111-01	10/16/2002	NA	NA	NA	NA	NA	5 U
	0408057-01	8/9/2004	NA	NA	NA	NA	NA	0.507 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.
(b) PCP results after October 2002 represent concentrations intercepted by the stormwater intercept system for treatment at the onsite wastewater treatment plant.
(c) River outfall samples only collected when outfall is exposed during quarterly events.

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW036D 0411059-08 11/10/2004	LW036D 0502088-01 02/17/2005	LW036D P5F0441-04 06/08/2005	LW036D P5H0734-08 08/17/2005	LW036D P5K0698-05 11/15/2005	LW037D 0411059-09 11/10/2004	LW037D 0502088-02 02/17/2005	LW037D P5F0441-05 06/08/2005
SEMIVOLATILES (µg/L)									
EPA 8270C									
Bis(2-ethylhexyl)phthalate	0.22 (g)	0.99 U	0.951 U	10.0 U	10.0 U	9.90 U	1.01 U	1.01 U	10.0 U
PAHs (µg/L)									
EPA 8270SIM									
Acenaphthene	0.2	0.0505 U	0.0478 U	0.100 U	0.100 U	0.0990 U	0.054 U	0.0499 U	0.100 U
Fluoranthene	0.2	0.0505 U	0.0478 U	0.100 U	0.100 U	0.0990 U	**0.0756**	0.0499 U	0.100 U
Fluorene	0.2	0.0505 U	0.0478 U	0.100 U	0.100 U	0.0990 U	0.054 U	0.0499 U	0.100 U
Naphthalene	0.2	0.0505 U	0.0478 U	0.100 U	0.300 U	0.0990 U	0.054 U	0.0499 U	0.100 U
Pyrene	0.2	0.0505 U	0.0478 U	0.100 U	0.100 U	0.0990 U	**0.0864**	0.0499 U	0.100 U
NWTPH-G (µg/L)									
Gasoline-Range Hydrocarbons	--	100 U	100 U	80.0 U	80.0 U	80.0 U	100 U	100 U	80.0 U
NWTPH-Dx (µg/L)									
Diesel-Range Hydrocarbons	--	**252**	243 U	250 U	250 U	250 U	250 U	248 U	250 U
TPH-Motor Oil Range	--	**580**	NA	NA	NA	NA	500 U	NA	NA

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW036D 0411059-08 11/10/2004	LW036D 0502088-01 02/17/2005	LW036D P5F0441-04 06/08/2005	LW036D P5H0734-08 08/17/2005	LW036D P5K0698-05 11/15/2005	LW037D 0411059-09 11/10/2004	LW037D 0502088-02 02/17/2005	LW037D P5F0441-05 06/08/2005
TOTAL METALS (µg/L)									
EPA 6020									
Arsenic	0.014 (g)	1 U	1 U	**1.06**	1 U	1 U	**5.78**	1 U	1 U
Chromium	100	5 U	**6.4**	1 U	1 U	1 U	**26.1**	**7.8**	1 U
Copper	2.7	10 U	10 U	2 U	**1.11**	2 U	**19.6**	10 U	2 U
Lead	0.54	**0.25**	0.1 U	1 U	1 U	1 U	**9.8**	**0.728**	1 U
Nickel	16	5 U	5 U	2 U	**5.61**	2 U	**11.7**	5 U	2 U
Zinc	33	10 U	10 U	5 U	10 U	5 U	**50.5**	10 U	5 U
DISSOLVED METALS (µg/L)									
EPA 6020									
Arsenic	0.014 (g)	NA	1 U	1 U	1 U	1 U	NA	1 U	1 U
Chromium	100	NA	**6**	2 U	1 U	1 U	NA	**5**	2 U
Copper	2.7	NA	10 U	2 U	1 U	2 U	NA	10 U	2 U
	16	NA	5 U	2 U	**4.73**	2 U	NA	5 U	2 U

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW037D P5H0734-09 08/17/2005	LW037D P5K0698-02 11/15/2005	LW038D 0411059-10 11/10/2004	LW038D 0502088-03 02/17/2005	LW038D P5F0441-03 06/08/2005
SEMIVOLATILES (µg/L)						
EPA 8270C						
Bis(2-ethylhexyl)phthalate	0.22 (g)	10.0 U	9.71 U	0.984 U	0.997 U	10.0 U
PAHs (µg/L)						
EPA 8270SIM						
Acenaphthene	0.2	0.100 U	0.0962 U	**0.12**	**0.0515**	0.100 U
Fluoranthene	0.2	0.100 U	0.0962 U	0.05 U	0.0515 U	0.100 U
Fluorene	0.2	0.100 U	0.0962 U	**0.19**	**0.0515**	0.100 U
Naphthalene	0.2	0.100 U	0.0962 U	**0.08**	0.0515 U	0.100 U
Pyrene	0.2	0.100 U	0.0962 U	0.05 U	0.0515 U	0.100 U
NWTPH-G (µg/L)						
Gasoline-Range Hydrocarbons	--	80.0 U	80.0 U	**120**	100 U	80.0 U
NWTPH-Dx (µg/L)						
Diesel-Range Hydrocarbons	--	250 U	245 U	**954**	**375**	250 U
TPH-Motor Oil Range	--	NA	NA	**702**	NA	NA

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW037D P5H0734-09 08/17/2005	LW037D P5K0698-02 11/15/2005	LW038D 0411059-10 11/10/2004	LW038D 0502088-03 02/17/2005	LW038D P5F0441-03 06/08/2005
TOTAL METALS (µg/L)						
EPA 6020						
Arsenic	0.014 (g)	1 U	1 U	**8.67**	**3.91**	**4.38**
Chromium	100	**1.58**	1 U	**13.8**	**8**	1 U
Copper	2.7	**1.96**	2 U	10 U	10 U	2 U
Lead	0.54	1 U	1 U	**0.2**	**0.117**	1 U
Nickel	16	**2.49**	2 U	5 U	5 U	2 U
Zinc	33	10 U	5 U	10 U	10 U	5 U
DISSOLVED METALS (µg/L)						
EPA 6020						
Arsenic	0.014 (g)	1 U	1 U	NA	**3.7**	**3.49**
Chromium	100	1 U	1 U	NA	**7.6**	2 U
Copper	2.7	1 U	2 U	NA	10 U	2 U
	16	**1.16**	2 U	NA	5 U	2 U

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW038D P5H0734-10 08/17/2005	Dup of LW038D Y P5H0734-12 08/17/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D 0411059-11 11/10/2004	LW039D 0502088-04 02/17/2005	Dup of LW039D Y 0502088-05 02/17/2005	LW039D P5F0441-02 06/08/2005
SEMIVOLATILES (µg/L)									
EPA 8270C									
Bis(2-ethylhexyl)phthalate	0.22 (g)	10.0 U	10.0 U	9.9 U	9.9 U	1.06 U	0.978 U	**1.25**	10.0 U
PAHs (µg/L)									
EPA 8270SIM									
Acenaphthene	0.2	0.100 U	0.111 U	0.098 U	0.0971 U	**0.145**	**0.061**	**0.0612**	0.100 U
Fluoranthene	0.2	0.100 U	0.111 U	0.098 U	0.0971 U	0.0517 U	0.0509 U	0.051 U	0.100 U
Fluorene	0.2	0.100 U	0.111 U	0.098 U	0.0971 U	0.0517 U	0.0509 U	0.051 U	0.100 U
Naphthalene	0.2	0.200 U	0.222 U	0.098 U	0.0971 U	**0.114**	0.0509 U	0.051 U	0.100 U
Pyrene	0.2	0.100 U	0.111 U	0.098 U	0.0971 U	0.0517 U	0.0509 U	0.051 U	0.100 U
NWTPH-G (µg/L)									
Gasoline-Range Hydrocarbons	--	80.0 U	80.0 U	80.0 U	80.0 U	**133**	100 U	100 U	80.0 U
NWTPH-Dx (µg/L)									
Diesel-Range Hydrocarbons	--	250 UJ	250 U	248 U	245 U	**455**	247 U	**758**	250 U
TPH-Motor Oil Range	--	NA	NA	NA	NA	**520**	NA	NA	NA

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW038D P5H0734-10 08/17/2005	Dup of LW038D Y P5H0734-12 08/17/2005	LW038D P5K0698-03 11/15/2005	Dup of LW038D Y P5K0698-01 11/15/2005	LW039D 0411059-11 11/10/2004	LW039D 0502088-04 02/17/2005	Dup of LW039D Y 0502088-05 02/17/2005	LW039D P5F0441-02 06/08/2005
TOTAL METALS (µg/L)									
EPA 6020									
Arsenic	0.014 (g)	**5.07**	**4.93**	**1.64**	**1.57**	**10.7**	**2.92**	**2.74**	**1.05**
Chromium	100	1 U	1 U	1 U	1 U	**12.4**	**6.3**	**6.4**	1 U
Copper	2.7	1 U	1 U	2 U	2 U	10 U	10 U	10 U	2 U
Lead	0.54	1 U	1 U	1 U	1 U	**0.3**	**0.132**	**0.1**	1 U
Nickel	16	**3.34**	**3.24**	2 U	2 U	5 U	5 U	5 U	**3.65**
Zinc	33	10 U	10 U	5 U	**5.12**	10 U	10 U	10 U	5 U
DISSOLVED METALS (µg/L)									
EPA 6020									
Arsenic	0.014 (g)	**5.86**	**5.17**	**1.45**	**1.51**	NA	**2.70**	**3.00**	**1.16**
Chromium	100	1 U	1 U	1 U	1 U	NA	**8.8**	**8.1**	2 U
Copper	2.7	1 U	1 U	**2.36**	2 U	NA	10 U	10 U	2 U
	16	**2.96**	**3.07**	2 U	2 U	NA	5 U	5 U	**3.11**

TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW039D P5H0734-11 08/17/2005	LW039D P5K0698-04 11/15/2005
SEMIVOLATILES (µg/L)			
EPA 8270C			
Bis(2-ethylhexyl)phthalate	0.22 (g)	10.0 U	10.0 U
PAHs (µg/L)			
EPA 8270SIM			
Acenaphthene	0.2	0.100 U	0.100 U
Fluoranthene	0.2	0.100 U	0.100 U
Fluorene	0.2	0.100 U	0.100 U
Naphthalene	0.2	0.100 U	0.100 U
Pyrene	0.2	0.100 U	0.100 U
NWTPH-G (µg/L)			
Gasoline-Range Hydrocarbons	--	80.0 U	80.0 U
NWTPH-Dx (µg/L)			
Diesel-Range Hydrocarbons	--	250 U	243 U
TPH-Motor Oil Range	--	NA	NA

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TABLE 4
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVS
SHORELINE WELLS - NOVEMBER 2004 TO NOVEMBER 2005
TIME OIL NORTHWEST TERMINAL

	Minimum SLV From Table 3-1 of JSCS	LW039D P5H0734-11 08/17/2005	LW039D P5K0698-04 11/15/2005
TOTAL METALS (µg/L)			
EPA 6020			
Arsenic	0.014 (g)	**4.06**	**7.76**
Chromium	100	1 U	1 U
Copper	2.7	**1.47**	2 U
Lead	0.54	1 U	1 U
Nickel	16	**24.3**	**6.12**
Zinc	33	10 U	5 U
DISSOLVED METALS (µg/L)			
EPA 6020			
Arsenic	0.014 (g)	**4.59**	**7.99**
Chromium	100	1 U	1 U
Copper	2.7	1 U	2 U
	16	**28.3**	**8.85**

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.
Red value indicates exceedance of screening level values (SLVs) from Table 3-1 of Joint Source Control Strategy (JSCS).
Bold indicates detected constituent.
RI Preliminary Screening Levels:

(a) Oregon Screening Level Values (SLVs) - surface water, aquatic.
(b) Oregon Screening Level Values (SLVs), surface water - aquatic and Oregon Ambient Water Quality Criteria (AWQC), Tables 20 and 33A, fresh water, acute.
(c) Oregon AWQC, Tables 20 and 33A, fish consumption only and National Recommended Water Quality Criteria, organism only.
(d) Site-specific background concentrations (Phase I and II Contaminants of Potential Concern Screening Report, Time Oil Northwest Terminal, Landau Associates, September 10, 1999).
(e) Oregon Screening Level Values (SLVs), surface water - aquatic and National Recommended Water Quality Criteria, fresh water chronic.
(f) Oregon AWQC, fresh water acute and fresh chronic.
(g) Screening level less than laboratory reporting limit.

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

		Upper Zone Wells:							
	Minimum SLV From Table 3-1 of JSCS	LW028S P5F0441-09 6/9/2005	LW029S 0411047-02 11/8/2004	LW029S 0502059-02 2/15/2005	LW029S P5F0343-04 6/8/2005	LW029S P5H0625-08 8/15/2005	LW030S 0411047-04 11/8/2004	LW030S 0502059-03 2/15/2005	LW030S P5F0441-07 6/9/2005
TOTAL METALS									
EPA 6010/7000 Series (µg/L)									
Arsenic	0.014	1 U	3.29	2.34	1.96	2.05	14.1	15.5	17
Beryllium	--	1 U			1 U				1 U
Cadmium	0.094	1 U			1 U				1 U
Chromium	100	1 U	**16.9**	**8.8**	1 U	1 U	**22.9**	**5.9**	1 U
Copper	2.7	2 U	10 U	10 U	2 U	1 U	10 U	10 U	2 U
Lead	0.54	1 U	0.1 U	0.1 U	1 U	1 U	0.76	1.41	1 U
Magnesium	--			**2470**				**3180**	
Mercury	0.012	0.20 U			0.20 U				0.20 U
Nickel	16	**12.4**	5 U	5 U	**3.28**	**2.74**	5 U	5 U	**2.10**
Selenium	5	2 U			2 U				2 U
Silver	0.12	1 U			1 U				1 U
Thallium	--	1 U			1 U				1 U
Zinc	33	5 U	10 U	10 U	5 U	10 U	10 U	10 U	**5.60**
PETROLEUM HYDROCARBONS									
NWTPH-Dx (mg/L)									
Diesel	--	250 U	**360**	242 U	250 U	250 U	**747**	**1340**	**427**
Motor Oil	--		503 U				491 U		
Lube Oil	--			484 U				496 U	
NWTPH-G (mg/L)									
Gasoline	--	80 U	100 U	**108**	80 U	80 U	**637**	**927**	**225**
BTEX									
EPA Method 8260 (µg/L)									
Benzene	0.35	1 U	0.3 U	0.3 U	1 U	1 U	0.3 U	0.3 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	13	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW028S P5F0441-09 6/9/2005	LW029S 0411047-02 11/8/2004	LW029S 0502059-02 2/15/2005	LW029S P5F0343-04 6/8/2005	LW029S P5H0625-08 8/15/2005	LW030S 0411047-04 11/8/2004	LW030S 0502059-03 2/15/2005	LW030S P5F0441-07 6/9/2005
cPAHs									
EPA Method 8270SIM (µg/L)									
Pentachlorophenol	0.3								
Benzo(a)anthracene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Benzo(a)pyrene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Benzo(b)fluoranthene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Benzo(g,h,i)perylene	0.2	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Benzo(k)fluoranthene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Chrysene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
Dibenzo(a,h)anthracene	0.0018	0.20 U	0.0529 U	0.0507 U	0.20 U	0.20 U	0.0481 U	0.0483 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.0018	0.10 U	0.0529 U	0.0507 U	0.10 U	0.10 U	0.0481 U	0.0483 U	0.10 U
SVOCs									
EPA Method 8270 (µg/L)									
Pentachlorophenol	0.3	10 U	5.18 U	4.9 U	10 U	6.00 UJ	4.89 U	5.11 U	10 U
2,3,4,6-Tetrachlorophenol	1100								
2,4,5-Trichlorophenol	360	5 U	5.18 U	4.9 U	5 U	5.71 U	4.89 U	5.11 U	5 U
2,4,6-Trichlorophenol	0.24	5 U	5.18 U	4.9 U	5 U	5.71 U	4.89 U	5.11 U	5 U
2,4-Dichlorophenol	29	5 U	3.11 U	2.94 U	5 U	5.71 U	2.93 U	3.06 U	5 U
2-Chlorophenol	15	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
4-Chloro-3-methylphenol	--	5 U	2.07 U	1.96 U	5 U	5.71 U	1.96 U	2.04 U	5 U
Benzo(a)anthracene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Benzo(a)pyrene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Benzo(b)fluoranthene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Benzo(g,h,i)perylene	0.2	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Benzo(k)fluoranthene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Chrysene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Dibenzo(a,h)anthracene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U
Indeno(1,2,3-cd)pyrene	0.0018	5 U	1.04 U	0.98 U	5 U	5.71 U	0.978 U	1.02 U	5 U

TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW030S P5H0625-03 8/15/2005	LW031S 0411052-02 11/9/2004	LW031S 0502056-01 2/14/2005	LW031S P5F0441-11 6/9/2005	LW031S P5H0734-01 8/17/2005	LW032S 0411052-03 11/9/2004	LW032S 0502056-04 2/14/2005	LW032S P5F0343-01 6/8/2005
TOTAL METALS									
EPA 6010/7000 Series (µg/L)									
Arsenic	0.014	14	1.36	1.09	1 U	1.03	30.3	30.2	20.2
Beryllium	--				1 U				1 U
Cadmium	0.094				1 U				1 U
Chromium	100	1 U	**18.2**	**5.6**	1 U	1 U	**17.5**	5 U	1 U
Copper	2.7	1 U	10 U	10 U	2 U	1 U	10 U	10 U	2 U
Lead	0.54	1 U	**0.18**	0.1 U	1 U	1 U	0.1 U	0.1 U	1 U
Magnesium	--			**4170**				**7200**	
Mercury	0.012				0.20 U				0.20 U
Nickel	16	1 U	5 U	5 U	**2.40**	**1.99**	5 U	5 U	**14.7**
Selenium	5				2 U				2 U
Silver	0.12				1 U				1 U
Thallium	--				1 U				1 U
Zinc	33	10 U	10 U	10 U	5 U	10 U	10 U	10 U	5 U
PETROLEUM HYDROCARBONS									
NWTPH-Dx (mg/L)									
Diesel	--	**349**	**568**	**261**	250 U	250 U	**4440**	**3130**	**562**
Motor Oil	--		**593**				**721**		
Lube Oil	--			500 U				500 U	
NWTPH-G (mg/L)									
Gasoline	--	**271**	100 U	100 U	80 U	80 U	**2870**	**4670**	**971**
BTEX									
EPA Method 8260 (µg/L)									
Benzene	0.35	1 U	0.3 U	0.3 U	1 U	1 U	0.3 U	0.3 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	13	1 U	1 U	1 U	1 U	1 U	**1.6**	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW030S P5H0625-03 8/15/2005	LW031S 0411052-02 11/9/2004	LW031S 0502056-01 2/14/2005	LW031S P5F0441-11 6/9/2005	LW031S P5H0734-01 8/17/2005	LW032S 0411052-03 11/9/2004	LW032S 0502056-04 2/14/2005	LW032S P5F0343-01 6/8/2005
cPAHs									
EPA Method 8270SIM (µg/L)									
Pentachlorophenol	0.3								
Benzo(a)anthracene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Benzo(a)pyrene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Benzo(b)fluoranthene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Benzo(g,h,i)perylene	0.2	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Benzo(k)fluoranthene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Chrysene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
Dibenzo(a,h)anthracene	0.0018	0.20 U	0.0521 U	0.0479 U	0.222 U	0.20 U	0.0489 U	0.0497 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.0018	0.10 U	0.0521 U	0.0479 U	0.111 U	0.10 U	0.0489 U	0.0497 U	0.10 U
SVOCs									
EPA Method 8270 (µg/L)									
Pentachlorophenol	0.3	5 UJ	4.93 U	4.83 U	10 U	5 UJ	4.96 U	4.93 U	10 U
2,3,4,6-Tetrachlorophenol	1100								
2,4,5-Trichlorophenol	360	5 U	4.93 U	4.83 U	5 U	5 U	4.96 U	4.93 U	5 U
2,4,6-Trichlorophenol	0.24	5 U	4.93 U	4.83 U	5 U	5 U	4.96 U	4.93 U	5 U
2,4-Dichlorophenol	29	5 U	2.96 U	2.9 U	5 U	5 U	2.97 U	2.96 U	5 U
2-Chlorophenol	15	5 U	0.985 U	0.965 U	5 U	5 U	0.991 U	0.986 U	5 U
4-Chloro-3-methylphenol	--	5 U	1.97 U	1.93 U	5 U	5 U	1.98 U	1.97 U	5 U
Benzo(a)anthracene	0.0018	5 U	0.985 U	0.965 U	5 U	5 U	0.991 U	0.986 U	5 U
Benzo(a)pyrene	0.0018	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U
Benzo(b)fluoranthene	0.0018	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U
Benzo(g,h,i)perylene	0.2	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U
Benzo(k)fluoranthene	0.0018	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U
Chrysene	0.0018	5 U	0.985 U	0.965 U	5 U	5 U	0.991 U	0.986 U	5 U
Dibenzo(a,h)anthracene	0.0018	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U
Indeno(1,2,3-cd)pyrene	0.0018	5 U	0.985 U	0.965 U	15 U	5 U	0.991 U	0.986 U	5 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW032S P5H0701-03 8/16/2005	LW033S 0502099-06 2/22/2005	LW033S P5F0343-03 6/8/2005	LW033S P5H0701-02 8/16/2005	LW034S 0411047-01 11/8/2004	LW034S 0502099-07 2/22/2005	LW034S P5F0441-06 6/9/2005	LW034S P5H0701-01 8/16/2005
TOTAL METALS									
EPA 6010/7000 Series (µg/L)									
Arsenic	0.014	25.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Beryllium	--			1 U				1 U	
Cadmium	0.094			1 U				1 U	
Chromium	100	1 U	**7.9**	1 U	1 U	5 U	**8**	1 U	1 U
Copper	2.7	**1.17**	10 U	2 U	1 U	10 U	10 U	2 U	1 U
Lead	0.54	1 U	**0.251**	1 U	1 U	**0.15**	0.1 U	1 U	1 U
Magnesium	--		**4700**				**14000**		
Mercury	0.012			0.20 U				0.20 U	
Nickel	16	**2.05**	5 U	**2.70**	**2.78**	5 U	5 U	**3.77**	**3.37**
Selenium	5			2 U				2 U	
Silver	0.12			1 U				1 U	
Thallium	--			1 U				1 U	
Zinc	33	10 U	10 U	5 U	10 U	10 U	10 U	5 U	10 U
PETROLEUM HYDROCARBONS									
NWTPH-Dx (mg/L)									
Diesel	--	**987**	243 U	250 U	250 U	251 U	248 U	250 U	250 U
Motor Oil	--					501 U			
Lube Oil	--		669 U				495 U		
NWTPH-G (mg/L)									
Gasoline	--	**807**	100 U	80 U	80 U	100 U	100 U	80 U	80 U
BTEX									
EPA Method 8260 (µg/L)									
Benzene	0.35	1 U	0.3 U	1 U	1 U	0.3 U	0.3 U	1 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	13	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW032S P5H0701-03 8/16/2005	LW033S 0502099-06 2/22/2005	LW033S P5F0343-03 6/8/2005	LW033S P5H0701-02 8/16/2005	LW034S 0411047-01 11/8/2004	LW034S 0502099-07 2/22/2005	LW034S P5F0441-06 6/9/2005	LW034S P5H0701-01 8/16/2005
cPAHs									
EPA Method 8270SIM (µg/L)									
Pentachlorophenol	0.3								
Benzo(a)anthracene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Benzo(a)pyrene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Benzo(b)fluoranthene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Benzo(g,h,i)perylene	0.2	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Benzo(k)fluoranthene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Chrysene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
Dibenzo(a,h)anthracene	0.0018	0.40 U	0.0486 U	0.222 U	0.20 U	0.0498 U	0.0489 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.0018	0.20 U	0.0486 U	0.111 U	0.10 U	0.0498 U	0.0489 U	0.10 U	0.10 U
SVOCs									
EPA Method 8270 (µg/L)									
Pentachlorophenol	0.3	5 UJ	4.84 U	10 U	5 UJ	5 U	4.81 U	10 U	5 UJ
2,3,4,6-Tetrachlorophenol	1100								
2,4,5-Trichlorophenol	360	5 U	4.84 U	5 U	5 U	5 U	4.81 U	5 U	5 U
2,4,6-Trichlorophenol	0.24	5 U	4.84 U	5 U	5 U	5 U	4.81 U	5 U	5 U
2,4-Dichlorophenol	29	5 U	2.9 U	5 U	5 U	3 U	2.88 U	5 U	5 U
2-Chlorophenol	15	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
4-Chloro-3-methylphenol	--	5 U	1.94 U	5 U	5 U	2 U	1.92 U	5 U	5 U
Benzo(a)anthracene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Benzo(a)pyrene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Benzo(b)fluoranthene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Benzo(g,h,i)perylene	0.2	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Benzo(k)fluoranthene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Chrysene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Dibenzo(a,h)anthracene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U
Indeno(1,2,3-cd)pyrene	0.0018	5 U	0.968 U	5 U	5 U	1 U	0.962 U	5 U	5 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

		Lower Zone Wells:							
	Minimum SLV From Table 3-1 of JSCS	LW029D 0411047-03 11/8/2004	LW029D 0502059-01 2/15/2005	LW029D P5F0343-05 6/8/2005	LW029D P5H0625-10 8/15/2005	LW030D 0411047-05 11/8/2004	LW030D 0502059-04 2/15/2005	LW030D P5F0441-08 6/9/2005	LW030D P5H0625-09 8/15/2005
TOTAL METALS									
EPA 6010/7000 Series (µg/L)									
Arsenic	0.014	6.58	8.23	11.1	7.19	12.8	11.4	14.4	14.8
Beryllium	--			1 U				1 U	
Cadmium	0.094			1 U				1 U	
Chromium	100	**24**	**8.8**	**1.77**	**3.71**	**44.2**	**8.4**	**13.40**	**24.5**
Copper	2.7	11.5	10 U	2 U	4.58	38.5	10 U	25.8	34.7
Lead	0.54	2.74	1.32	1 U	1.13	7.85	0.81	5.01	7.85
Magnesium	--		**35600**				**18500**		
Mercury	0.012			0.20 U				0.20 U	
Nickel	16	5 U	5 U	**4.59**	**5.33**	5 U	5 U	**15.4**	19.7
Selenium	5			2 U				2 U	
Silver	0.12			1 U				1 U	
Thallium	--			1 U				1 U	
Zinc	33	**21.6**	10 U	**8.09**	**14.10**	73.6	**10.7**	42.1	56.7
PETROLEUM HYDROCARBONS									
NWTPH-Dx (mg/L)									
Diesel	--	252 U	239 U	250 U	250 U	**319**	**370**	250 U	250 U
Motor Oil	--	503 U				525 U			
Lube Oil	--		478 U				**545**		
NWTPH-G (mg/L)									
Gasoline	--	100 U	**106**	80 U	80 U	100 U	**211**	80 UJ	80 U
BTEX									
EPA Method 8260 (µg/L)									
Benzene	0.35	0.3 U	0.3 U	1 U	1 U	0.3 U	0.3 U	1 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	13	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW029D 0411047-03 11/8/2004	LW029D 0502059-01 2/15/2005	LW029D P5F0343-05 6/8/2005	LW029D P5H0625-10 8/15/2005	LW030D 0411047-05 11/8/2004	LW030D 0502059-04 2/15/2005	LW030D P5F0441-08 6/9/2005	LW030D P5H0625-09 8/15/2005
cPAHs									
EPA Method 8270SIM (µg/L)									
Pentachlorophenol	0.3								
Benzo(a)anthracene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Benzo(a)pyrene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Benzo(b)fluoranthene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Benzo(g,h,i)perylene	0.2	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Benzo(k)fluoranthene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Chrysene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
Dibenzo(a,h)anthracene	0.0018	0.0495 U	0.0479 U	0.20 U	0.200 U	0.05 U	0.0508 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.0018	0.0495 U	0.0479 U	0.10 U	0.100 U	0.05 U	0.0508 U	0.10 U	0.10 U
SVOCs									
EPA Method 8270 (µg/L)									
Pentachlorophenol	0.3	5.05 U	4.79 U	10 U	5 UJ	4.99 U	5.11 U	10 U	5 UJ
2,3,4,6-Tetrachlorophenol	1100								
2,4,5-Trichlorophenol	360	5.05 U	4.79 U	5 U	5 U	4.99 U	5.11 U	5 U	5 U
2,4,6-Trichlorophenol	0.24	5.05 U	4.79 U	5 U	5 U	4.99 U	5.11 U	5 U	5 U
2,4-Dichlorophenol	29	3.03 U	2.88 U	5 U	5 U	2.99 U	3.07 U	5 U	5 U
2-Chlorophenol	15	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
4-Chloro-3-methylphenol	--	2.02 U	1.92 U	5 U	5 U	1.99 U	2.04 U	5 U	5 U
Benzo(a)anthracene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Benzo(a)pyrene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Benzo(b)fluoranthene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Benzo(g,h,i)perylene	0.2	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Benzo(k)fluoranthene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Chrysene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Dibenzo(a,h)anthracene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U
Indeno(1,2,3-cd)pyrene	0.0018	1.01 U	0.959 U	5 U	5 U	0.997 U	1.02 U	5 U	5 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW032D 0411052-04 11/9/2004	LW032D 0502056-03 2/14/2005	LW032D P5F0343-02 6/8/2005	LW032D P5H0701-04 8/16/2005
TOTAL METALS					
EPA 6010/7000 Series (µg/L)					
Arsenic	0.014	10.4	9.56	9.59	11.1
Beryllium	--			1 U	
Cadmium	0.094			1 U	
Chromium	100	**44.6**	**9.3**	**1.75**	**30**
Copper	2.7	30.5	10 U	**2.49**	34.9
Lead	0.54	5.82	1.3	1.62	8.21
Magnesium	--		**31800**		
Mercury	0.012			0.20 U	
Nickel	16	**13**	5 U	**2.83**	23.6
Selenium	5			2 U	
Silver	0.12			1 U	
Thallium	--			1 U	
Zinc	33	73.4	10 U	**9.92**	69.2
PETROLEUM HYDROCARBONS					
NWTPH-Dx (mg/L)					
Diesel	--	**600**	579	250 U	250 U
Motor Oil	--	**501**			
Lube Oil	--		500 U		
NWTPH-G (mg/L)					
Gasoline	--	**105**	**221**	80 U	80 UJ
BTEX					
EPA Method 8260 (µg/L)					
Benzene	0.35	0.3 U	0.3 U	1 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U
o-Xylene	13	1 U	1 U	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U

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TABLE 5
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
BELL TERMINAL TANK FARM WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW032D 0411052-04 11/9/2004	LW032D 0502056-03 2/14/2005	LW032D P5F0343-02 6/8/2005	LW032D P5H0701-04 8/16/2005
cPAHs					
EPA Method 8270SIM (µg/L)					
Pentachlorophenol	0.3				
Benzo(a)anthracene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
Benzo(a)pyrene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
Benzo(b)fluoranthene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
Benzo(g,h,i)perylene	0.2	0.0498 U	0.0478 U	0.100 U	0.10 U
Benzo(k)fluoranthene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
Chrysene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
Dibenzo(a,h)anthracene	0.0018	0.0498 U	0.0478 U	0.200 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.0018	0.0498 U	0.0478 U	0.100 U	0.10 U
SVOCs					
EPA Method 8270 (µg/L)					
Pentachlorophenol	0.3	4.89 U	4.76 U	10 U	6.00 UJ
2,3,4,6-Tetrachlorophenol	1100				
2,4,5-Trichlorophenol	360	4.89 U	4.76 U	5 U	5.56 U
2,4,6-Trichlorophenol	0.24	4.89 U	4.76 U	5 U	5.56 U
2,4-Dichlorophenol	29	2.93 U	2.86 U	5 U	5.56 U
2-Chlorophenol	15	0.978 U	0.952 U	5 U	5.56 U
4-Chloro-3-methylphenol	--	1.96 U	1.9 U	5 U	5.56 U
Benzo(a)anthracene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Benzo(a)pyrene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Benzo(b)fluoranthene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Benzo(g,h,i)perylene	0.2	0.978 U	0.952 U	5 U	5.56 U
Benzo(k)fluoranthene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Chrysene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Dibenzo(a,h)anthracene	0.0018	0.978 U	0.952 U	5 U	5.56 U
Indeno(1,2,3-cd)pyrene	0.0018	0.978 U	0.952 U	5 U	5.56 U

Notes:
mg/L = milligrams per liter (ppm).
µg/L = micrograms per liter (ppb).
U = Indicates the compound was not detected at the given reporting limit.
UJ = Indicates the compound was not detected; the given reporting limit is an estimate
J = Indicates the compound was identified; the given concentration is an estimate
Bold font indicates the compound was detected above the laboratory reporting limits
Red values indicate an exceedance of SLVs from Table 3-1 of Joint Source Control Strategy (JSCS)

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TABLE 6
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
PCP PLUME DOWNGRADIENT WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW006D 0411051-07 11/9/2004	LW006D 0502087-06 2/18/2005	LW006D P5F0553-03 6/14/2005	LW006D P5H1000-13 8/23/2005	LW006D P5K0820-06 11/17/2005	LW009D 0411051-02 11/9/2004	LW009D 0502087-07 2/18/2005	LW009D P5F0553-04 6/14/2005
TOTAL METALS									
EPA 6010/7000 Series (µg/L)									
Arsenic	0.014	14	11.3	10.9	14.3	10.80	45.8	32.1	36.6
Beryllium	--			1 U		1 U			1 U
Cadmium	0.094			1 U		1 U			1 U
Chromium	100	**18.2**	**7.7**	1 U	**2.06**	1 U	**18.2**	**8.6**	1 U
Copper	2.7	10 U	10 U	2 U	2.98	2 U	10 U	10 U	2 U
Lead	0.54	**0.42**	0.168 U	1 U	1.20	1 U	0.68	1.44	1 U
Magnesium	--		**17200**					**12900**	
Mercury	0.012			0.20 U		0.20 U			0.20 U
Nickel	16	5 U	5 U	**4.18**	**7.55**	**15.5**	5 U	5 U	**2.33**
Selenium	5			2 U		2 U			2 U
Silver	0.12			1 U		1 U			1 U
Thallium	--			1 U		1 U			1 U
Zinc	33	10 U	10 U	**5.23**	10 U	**8.29**	**12.4**	**14.6**	**8.08**
PETROLEUM HYDROCARBONS									
NWTPH-Dx (mg/L)									
Diesel	--	**1900**	**1570**	**326**	**383**	**452** J	**289**	255 U	250 U
Motor Oil	--	509 U					514 U		
Lube Oil	--		517 U					511 U	
NWTPH-G (mg/L)									
Gasoline	--				918	**329**		**436**	**109**
BTEX									
EPA Method 8260 (µg/L)									
Benzene	0.35	0.3 U	0.3 U	1 U	1 U	1 U	0.3 U	0.3 U	1 U
Ethylbenzene	7.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	1.8	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	13	**1.38**	**1.6**	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	9.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

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TABLE 6
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
PCP PLUME DOWNGRADIENT WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW006D 0411051-07 11/9/2004	LW006D 0502087-06 2/18/2005	LW006D P5F0553-03 6/14/2005	LW006D P5H1000-13 8/23/2005	LW006D P5K0820-06 11/17/2005	LW009D 0411051-02 11/9/2004	LW009D 0502087-07 2/18/2005	LW009D P5F0553-04 6/14/2005
cPAHs									
EPA Method 8270/8270 SIM (µg/L)									
Benzo(a)anthracene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Benzo(a)pyrene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Benzo(b)fluoranthene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Benzo(g,h,i)perylene	0.2	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Benzo(k)fluoranthene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Chrysene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
Dibenzo(a,h)anthracene	0.0018	1.04 U	1.02 U	5 U	0.2 U	3.96 U	1 U	1.01 U	5 U
Indeno(1,2,3-cd)pyrene	0.0018	1.04 U	1.02 U	5 U	0.1 U	3.96 U	1 U	1.01 U	5 U
SVOCs									
EPA Method 8270/8270 SIM (µg/L)									
Pentachlorophenol	0.3	0.495 U	0.607	0.5 U	0.490 U	0.485 U	0.504 U	0.507 U	0.5 U
2,3,4,6-Tetrachlorophenol	1100					19.8 U			
2,4,5-Trichlorophenol	360	5.21 U	5.12 U	5 U	5 U	19.8 U	5.01 U	5.06 U	5 U
2,4,6-Trichlorophenol	0.24	5.21 U	5.12 U	5 U	5 U	19.8 U	5.01 U	5.06 U	5 U
2,4-Dichlorophenol	29	3.12 U	3.07 U	5 U	5 U	11.9 U	3.01 U	3.03 U	5 U
2-Chlorophenol	15	1.04 U	1.02 U	5 U	5 U	3.96 U	1 U	1.01 U	5 U
4-Chloro-3-methylphenol	--	2.08 U	2.05 U	5 U	5 U	7.92 U	2 U	2.02 U	5 U

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TABLE 6
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
PCP PLUME DOWNGRADIENT WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW009D P5H1000-12 8/23/2005	LW009D P5K0820-05 11/17/2005
TOTAL METALS			
EPA 6010/7000 Series (µg/L)			
Arsenic	0.014	32.1	32.6
Beryllium	--		1 U
Cadmium	0.094		1 U
Chromium	100	1 U	**1.04**
Copper	2.7	1 U	2 U
Lead	0.54	1 U	1 U
Magnesium	--		
Mercury	0.012		0.20 U
Nickel	16	**1.09**	2 U
Selenium	5		2 U
Silver	0.12		1 U
Thallium	--		1 U
Zinc	33	10 U	5 U
PETROLEUM HYDROCARBONS			
NWTPH-Dx (mg/L)			
Diesel	--	250 U	248 U
Motor Oil	--		
Lube Oil	--		
NWTPH-G (mg/L)			
Gasoline	--	**127**	80 U
BTEX			
EPA Method 8260 (µg/L)			
Benzene	0.35	1 U	1 U
Ethylbenzene	7.3	1 U	1 U
m,p-Xylene	1.8	2 U	2 U
o-Xylene	13	1 U	1 U
Toluene	9.8	1 U	1 U

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TABLE 6
COMPARISON OF GROUNDWATER RESULTS TO JSCS SLVs
PCP PLUME DOWNGRADIENT WELLS
NOVEMBER 2004 TO NOVEMBER 2005

	Minimum SLV From Table 3-1 of JSCS	LW009D P5H1000-12 8/23/2005	LW009D P5K0820-05 11/17/2005
cPAHs			
EPA Method 8270/8270 SIM (µg/L)			
Benzo(a)anthracene	0.0018	0.1 U	1.98 U
Benzo(a)pyrene	0.0018	0.1 U	1.98 U
Benzo(b)fluoranthene	0.0018	0.1 U	1.98 U
Benzo(g,h,i)perylene	0.2	0.1 U	1.98 U
Benzo(k)fluoranthene	0.0018	0.1 U	1.98 U
Chrysene	0.0018	0.1 U	1.98 U
Dibenzo(a,h)anthracene	0.0018	0.2 U	1.98 U
Indeno(1,2,3-cd)pyrene	0.0018	0.1 U	1.98 U
SVOCs			
EPA Method 8270/8270 SIM (µg/L)			
Pentachlorophenol	0.3	0.490 U	0.505 U
2,3,4,6-Tetrachlorophenol	1100		9.90 U
2,4,5-Trichlorophenol	360	5 U	9.90 U
2,4,6-Trichlorophenol	0.24	5 U	9.90 U
2,4-Dichlorophenol	29	5 U	5.94 U
2-Chlorophenol	15	5 U	1.98 U
4-Chloro-3-methylphenol	--	5 U	3.96 U

Notes:
mg/L = milligrams per liter (ppm).
µg/L = micrograms per liter (ppb).
U = Indicates the compound was not detected at the given reporting limit.
UJ = Indicates the compound was not detected; the given reporting limit is an estimate
J = Indicates the compound was identified; the given concentration is an estimate
Red values indicate an exceedance of SLVs from Table 3-1 of Joint Source Control Strategy (JSCS)

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APPENDIX A

Monitored Natural Attenuation Evaluation

APPENDIX A
MONITORED NATURAL ATTENUATION EVALUATION

As part of the source control evaluation, an evaluation was conducted to assess the potential for light non-aqueous phase liquid (LNAPL) from the Main Terminal Tank Farm to migrate and reach the Willamette River. The assessment used monitored natural attenuation (MNA) parameters and fate and transport modeling to determine the migration potential of the LNAPL and evaluate the effectiveness of MNA as a source control option. The MNA parameter results [e.g., pH, dissolved oxygen (DO), oxidation-reduction potential (ORP), nitrate, and sulfate] were used to evaluate the potential for biodegradation to occur under current aquifer conditions. The specific objective of the fate and transport modeling was to assess the potential for an upland petroleum hydrocarbon source, present as LNAPL on upper zone groundwater in the Main Terminal Tank Farm area, to impact the Willamette River after taking into consideration the MNA conditions. The following sections describe the results of the MNA evaluation.

MNA Parameter Measurements

Water quality parameters, including pH, DO, and ORP, were measured for six months between July and December 2005 at 24 wells within the Main Terminal Tank Farm area and 14 wells within the Bell Terminal Tank Farm area to evaluate MNA processes at the Terminal (Table A-1). The water quality parameters were collected prior to purging the wells using a water quality meter probe inserted into the well. In addition, nitrate and sulfate were sampled and analyzed in select wells in February and August 2005; these results are provided in Table A-2 of this appendix. MNA parameters for the August 2005 event are shown on Figure A-1.

The following paragraphs discuss trends observed in the MNA data. For purposes of the MNA evaluation, the discussion focuses on two groundwater flow paths within the Main Terminal Tank Farm area: the first flow path (flow path 1) includes wells LW-21S (where product has consistently been observed), N (where product has been observed intermittently, but not currently), LW-22D, and LW-36D (shoreline well); the second flow path (flow path 2) includes wells LW-27S (where product has consistently been observed), LW-24D and LW-37D (shoreline well). For both flow paths, well LW-40D (for pH, DO, and ORP) or well LW-1S (for nitrate and sulfate) are included to represent groundwater conditions outside the area of impacted groundwater. The MNA data were evaluated in two ways: 1) concentrations over time and relative to groundwater elevation to determine if there are seasonal influences related to these factors, and 2) concentrations along the two flow paths to assess whether

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changes occurred between wells outside and within the area of impacted groundwater (referred to herein as the "plume area").

Generally, pH values ranging from 6 to 8 are considered favorable for microbial populations known to degrade petroleum hydrocarbons (Chevron 1995). The pH measurements collected in the Main Terminal Tank Farm area during the 6-month period between July and December 2005 for the two flow paths ranged from 6.16 to 7.72 (Figures A-2 and A-3), which are within the favorable range for biodegradation to occur. A rise or fall in pH values within the area of the dissolved phase plume for petroleum hydrocarbons (e.g., gasoline- and diesel-range), as compared to the area outside the dissolved phase plume, may be indicative of biodegradation since respiration and decomposition processes have a tendency to alter pH. As shown on Figures A-1 through A-5, pH values in the downgradient shoreline wells tend to have higher pH values than those within the area of dissolved phase contamination for most of the measurement events, particularly for flow path 2. Values in well LW-40D located outside the area of impacted groundwater are less definitive in determining trends along the flow paths. The pH values may indicate that biodegradation is occurring; however, because there is not a definitive indication of change in pH values between wells inside and outside of the dissolved plume area, pH cannot be used to conclusively determine MNA conditions.

A reduction in the concentration of DO in groundwater within the dissolved phase plume, as compared to the area outside the dissolved phase plume, can also be indicative of biodegradation processes occurring, since microbes utilize oxygen during aerobic biodegradation of petroleum hydrocarbons (Chevron 1995). Aerobic biodegradation can typically occur at concentrations as low as 1.0 mg/L; a DO concentration below 0.5 mg/L typically indicates an environment more suitable for anaerobic degradation (EPA 1995). The DO concentrations measured in the Main Terminal Tank Farm area between July and December 2005 (Figures A-6 through A-9) indicate that groundwater within the area of dissolved petroleum contamination (with exceptions during the July 22, 2005 event) is predominantly in an anaerobic state (DO less than 0.5 mg/L) and is slightly aerobic (DO greater than 1.0 mg/L) within the wells outside the area of impacted groundwater (Figures A-8 and A-9). The slightly aerobic conditions in the shoreline wells may also be a reflection of the influence by the river water chemistry during periods of river recharge which may create a more oxygen-rich environment. As shown on Figures A-8 and A-9, DO concentrations tend to decrease as the groundwater passes through the area of dissolved contamination and then "rebound" at the downgradient locations outside of the area of contamination and near the river, which may be indicative of aerobic biodegradation occurring during this time period. For some events, the DO appears to represent more anaerobic conditions (August 30 and October 26, 2005 events), as reflected by the less dramatic change in DO between the wells within and outside of the area of impacted groundwater. The nitrate and sulfate results provide further evidence of

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anaerobic biodegradation, as discussed below. The variability in DO concentrations over time between measurement events may reflect some seasonal fluctuations as demonstrated by the slight correlation between the DO measurements and groundwater elevations, but may also reflect some equipment variability because of instrument sensitivity (Figures A-6 and A-7). These observations are supporting evidence that biodegradation processes are likely occurring within the area where petroleum hydrocarbons are observed in groundwater.

Following depletion of DO in a system, nitrate may be used as an anaerobic electron acceptor for biodegradation through the process of denitrification. Similar to DO, areas within the dissolved phase plume with lowered nitrate concentrations, compared to background, would indicate that anaerobic biodegradation is occurring in those areas. After DO and nitrate have been depleted, sulfate may be used as an anaerobic electron acceptor for anaerobic biodegradation via sulfate reduction. During the process of sulfate reduction, sulfide is produced and sulfate concentrations in groundwater decrease within the dissolved phase plume. Nitrate and sulfate concentrations were measured during events in February and August 2005 for wells along an approximate groundwater flow path between wells LW-1S and LW-36D (Figures A-1 and A-10 and Table A-2). Well LW-1S represents upgradient conditions, wells LW-21S, N, P, Q represent conditions within the dissolved plume (the extent of the benzene plume is shown on Figure A-10), and wells LW-22D and LW-36D represent conditions downgradient of the plume. As shown on Figure A-10, nitrate and sulfate concentrations decrease dramatically between the upgradient well (LW-1S) and within the plume area (N). For the August 2005 event, a rebound in nitrate and sulfate concentrations is also evident downgradient of the plume in the shoreline well. These results likely indicate that anaerobic biodegradation was occurring during this time frame. For the February 2005 event, nitrate concentrations were not detected within the plume area and at the downgradient wells, while sulfate increases dramatically in the downgradient well and then decreases again at the shoreline well. These results may indicate that anaerobic biodegradation processes may have sufficiently depleted the limited amount of nitrate available in the groundwater which precludes denitrification processes from being an effective means of anaerobic biodegradation. However, based on the upgradient and downgradient concentrations of sulfate, anaerobic biodegradation utilizing sulfate reduction may be an ongoing process. The decrease in the sulfate concentration at the shoreline well may indicative of the influence of dilution from river water. Other anaerobic biodegradation processes (e.g., iron reduction and methanogenesis) have not been fully evaluated and may provide additional means for decreasing petroleum impacts.

The ORP measured in groundwater is generally positive under oxidizing conditions and negative under reducing conditions (Chevron 1995). As biodegradation occurs and oxygen is consumed, the groundwater becomes more reducing and the ORP of the water decreases. Therefore, a decrease in ORP

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values within the area of a dissolved phase plume, as compared to the area outside the dissolved phase plume should indicate the occurrence of aerobic biodegradation. As would be expected with low DO concentrations, ORP measurements were typically negative throughout the terminal, indicating mostly reducing conditions in the upper and lower zones with the higher values occurring at locations closer to the river and outside the area where petroleum constituents were detected in groundwater, and the lower values occurring within the area where petroleum constituents are detected (Figure A-11 through A-14). As shown on Figures A-13 and A-14 for the two flow paths described earlier, ORP measurements in the shoreline wells located closest to the river (LW-36D, LW-37D) and in wells located outside of the dissolved phase plume (e.g., LW-40D) typically tend to be higher than those within the plume area or at locations where petroleum constituents are observed at detected concentrations, indicating that groundwater is in a reduced state. Similar to DO, the wells adjacent to the river may be influenced by river recharge which may create more oxidizing conditions, and the wells outside of the plume area may be more oxidative because of the higher DO concentrations.

The combined results for the MNA parameters indicate that anaerobic biodegradation processes (and possibly some aerobic biodegradation during certain times of the year) have occurred within the areas where petroleum hydrocarbons are observed in upper and lower zone groundwater within the Main Terminal Tank Farm area. The biodegradation processes appear to have attenuated migration of LNAPL and petroleum constituents before reaching downgradient locations near the point of groundwater discharge to the river. Additional MNA measurements are necessary to determine whether anaerobic biodegradation will continue without augmentation of the supply of electron acceptors.

FATE AND TRANSPORT MODELING

To evaluate whether there is a potential for LNAPL observed in upland wells to migrate to the river, a fate and transport model was used that takes into account the effects of natural attenuation. A description of the model software and the modeling results are provided in the following sections. The results of the model are then used with the results of the MNA measurements to assess whether there is a potential for natural attenuation to prohibit migration of LNAPL from the Main Terminal Tank Farm area to the river.

Description of Natural Attenuation Software

The Natural Attenuation Software (NAS) model was used for the fate and transport modeling for the MNA evaluation (Widdowson et. al). The NAS model was developed by Virginia Institute of Technology and the United States Geological Survey for the U.S. Navy, and was designed to calculate the

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period of time required to achieve site-specific remediation goals at sites contaminated with either fuels or chlorinated solvents. The NAS model can be used to estimate distance of stabilization (DOS), time of stabilization (TOS) or time of remediation (TOR) for a particular contaminant. The DOS function can be used to estimate a required target source concentration to meet preliminary screening levels at a designated point of compliance within the required time for the plume to meet the screening levels after a source cleanup. The TOS function can be used to estimate the maximum distance from the source at which preliminary screening levels can be met without remediation. The TOR function can also be used to estimate the required time to meet preliminary screening levels in the source area with or without partial or full removal of LNAPL.

The following parameters are entered into the model:

- Site specific hydrogeology (hydraulic conductivity, hydraulic gradient, total porosity, effective porosity, and groundwater velocity)
- MNA parameters (e.g., DO, nitrate, and sulfate)
- Contaminant concentrations (benzene, toluene, ethylbenzene, xylenes, and naphthalene)
- Preliminary screening levels at the point of compliance (for the model, equivalent to the JSCS screening levels at the shoreline wells).

The model estimates groundwater flow rates, biodegradation rates, and sorption properties. Analytical solutions are used to calculate the DOS/TOS. Using the preliminary screening levels at the point of compliance, the NAS model calculates the maximum allowed source zone concentration and estimates the required time (TOS) to reach that concentration after the source area has been remediated. In contrast, a numerical solution (SEAM3D and MODFLOW) is used for the TOR approach to determine the required time for LNAPL to dissolve and a source compliance concentration to be reached with or without partial or full removal of the LNAPL.

NAS Model Parameters and Assumptions

Site-specific data, including hydraulic conductivity, hydraulic gradient, and porosity, collected during the Phase II and Phase III remedial investigations (RI) was used for the model. Previous field data collected during the Phase II RI was used to approximate the hydrogeologic conditions. Hydraulic conductivity data that were previously estimated through slug/bail tests and pumping tests were used in the model, including a minimum value of 44 ft/d, a maximum of 156 ft/d, and an average value of 82.3 ft/day (Landau Associates 2001). The overall horizontal hydraulic gradient was established by estimating the gradient between the wells along the pathway for the August 2005 event. The minimum and maximum values (0.0014 and 0.0158 ft/ft, respectively) were directly used for the model. The average

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for the entire flow path (0.009 ft/ft) was estimated by calculating the average for the upper and lower zone along the pathway and thereafter predicting a normalized total value. Furthermore, total organic carbon (soil) measured in March 1997 at LW-006D (0.084%) and LW-001S (0.65%) was used as the best estimate for the model. Freeze and Cherry (1979) estimates the total porosity of sand to be between 0.25 and 0.50, and for this model a porosity of 0.4 was chosen. The effective porosity number chosen was 0.3, as estimated in the Phase II RI report (Landau Associates 2001) for calculation of groundwater velocities. For the purposes of the model, the source zone was estimated to have a length and width of 50 ft for both N and LW-21S. Boring logs and groundwater elevation data history was utilized to determine the source depth which was estimated to be equivalent to the saturated thickness of the upper zone, 4.55 ft at LW-021S and 2.31 ft at N.

Similar to the evaluation for the MNA parameters, a groundwater flow path (flow path 1), including wells LW-21S (where LNAPL is currently observed), N, P, and Q (where LNAPL has historically been observed), LW-22D, and LW-36D was used. The point of compliance was considered as the shoreline well (LW-36D), located downgradient of wells LW-21S, N, P, Q, and LW-22D. Flow path 2, used for the MNA parameter discussion in the previous section, was not used for the fate and transport model because two of the three wells along the flow path had nondetected concentrations of BTEX and naphthalene and the model could not run reliably with these concentrations.

Using flow path 1, two model scenarios were run: one scenario where well LW-21S was considered representative of the source zone, and a second scenario where well N was considered representative of the source zone. The source zone wells were chosen based on the historical or current presence of LNAPL in these wells and their location upgradient of the point of compliance well. For the purposes of the model, the area including the wells within the flow path was assumed to be a single hydrogeologic unit (i.e., not to be divided into an upper and lower zone) under the assumption that upper zone groundwater in the area where LNAPL is observed flows across the confining unit into the lower zone and discharges to the river near where the point of compliance well is located. Model parameters and model results are presented in Appendix B.

For the purposes of the model, the remediation goals are analogous to the JSCS SLVs for BTEX and naphthalene, as presented in the following table.

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JSCS SLVS USED AT POINT OF COMPLIANCE, WELL LW-36D

Compound	JSCS SLVs (µg/L)[a]
Benzene	5.1
Toluene	9.8
Ethylbenzene	7.3
Xylenes	13
Naphthalene	0.2

(a) DEQ and EPA 2005

Product has consistently been detected in well LW-21S and therefore, groundwater samples have not been collected and BTEX and naphthalene have not been measured. The NAS model does not estimate transportation of LNAPL; therefore, saturated aqueous concentrations for the constituents were assumed and used in the model. Five different sets of contaminant data measured between August 2004 and November 2005 were used to set up the model. The data collected in during the August 2005 (third quarter) sampling event was mainly used for this discussion, because that event included the largest and most complete data set.

The August 2005 MNA data indicate very low levels of oxygen and nitrate at concentrations near or below the laboratory reporting limit; sulfate concentrations are low within the area of impacted groundwater, but increase at the wells located upgradient and downgradient of the impacted area (Figures A-1 and A-10). These data indicate that sulfate-reducing anaerobic biodegradation processes may be occurring along the flow path and the higher concentrations of petroleum constituents correlate with the lowest concentrations of sulfate It is possible that two redox zones exist in the area of the plume, and measured data at other dates have indicated that slightly aerobic zones might exist outside the area of impacted groundwater or at the shoreline well (LW-36D), possibly due to river influences. However, using redox data from only five wells, NAS will be able to provide the best approximation if the area is treated as one zone. For example, if only LW-36D is considered aerobic in the model, NAS tries to calculate the decay rate for that condition, but with only one well in the aerobic zone the model extrapolates from that point using only one point, and can therefore not produce reliable results.

After data along the pathway is entered into the NAS model, the model is used to estimate if the preliminary screening levels (JSCS SLVs) would be met at the point of compliance, which would be the case if the DOS was less than the distance between the source and the point of compliance. If the model estimates that they will not be met, the next step for NAS is to estimate reduction goals at the source zone and the time requirement after reduction until 50 percent breakthrough and equilibrium has been met at

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the point of compliance (TOS). If a known amount of NAPL exists at the source zone, an option is to calculate the time to reach a chosen aqueous concentration after a known amount of NAPL is removed from the source zone (TOR).

NAS Model Results

The NAS model results indicate that no reduction in concentrations of the compounds modeled at any wells along the designated pathway (LW-21S, N, P, Q, LW-22D) is required to meet preliminary screening levels at LW-36D, whether the source well is considered to be LW-21S or N (Appendix B). Well N is located about 225 ft closer to the river along the groundwater flow path than LW-21S. The contaminant data supports this conclusion, showing a rapid consistent decay of total BTEX and petroleum constituents along the flow path. This conclusion is also supported by the MNA parameter data that indicate that anaerobic biodegradation (sulfate reduction) is likely occurring within the area of the dissolved contamination.

Furthermore, to test the sensitivity for measurement errors and other factors that might influence the results, a few different scenarios were evaluated. The hydraulic conductivity, hydraulic gradient, source volume and contaminant concentrations were each increased by 20, 50 and 100 percent. The output results were still the same (i.e., no reduction in groundwater concentrations required). In addition, contaminant concentrations for well LW-36D were excluded to evaluate if the model would be more conservative, but the results still indicated that no reduction in groundwater concentration is required. Finally, different redox conditions were chosen (still only using one zone, i.e., same condition in all wells) with no change in the results.

Because the model predicts that no reduction in concentration is required to meet the preliminary screening levels, TOS and TOR are not estimated. The DOS was determined for individual BTEX constituents and naphthalene using both wells LW-21S and N to represent the source zone. As shown on Figures A-15 through A-24, in every case the model predicts that the distances between the source zone and where preliminary screening levels are estimated to be met are less than the distance between the source and the point of compliance or shoreline well. Using well LW-21S to represent the source zone, with the distance between the source zone and the point of compliance equal to about 440 ft, predicted DOS values ranged from 240 to 360 ft. Using well N to represent the source zone, with the distance between the source zone and the point of compliance equal to about 265 ft, predicted DOS values ranged from about 32 to 130 ft. The use of saturated aqueous concentrations for contaminants within the source zone at LW-21S versus measured groundwater concentrations at N is likely the reason why the predicted DOS values are greater for the case where the source zone is farthest from the point of compliance.

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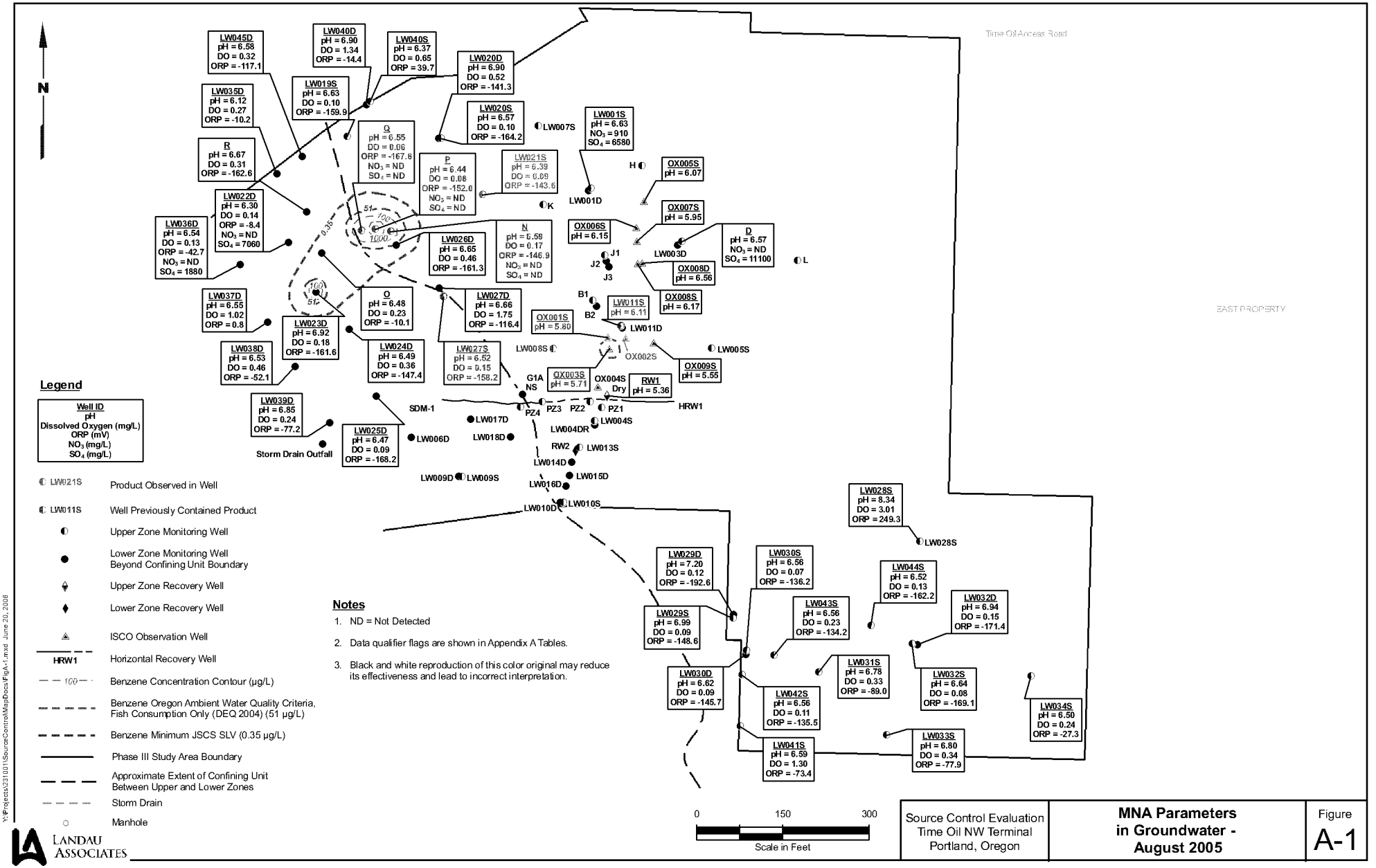

Legend

Well ID
pH
Dissolved Oxygen (mg/L)
ORP (mV)
NO_3 (mg/L)
SO_4 (mg/L)

- LW021S — Product Observed in Well
- LW011S — Well Previously Contained Product
- Upper Zone Monitoring Well
- Lower Zone Monitoring Well Beyond Confining Unit Boundary
- Upper Zone Recovery Well
- Lower Zone Recovery Well
- ISCO Observation Well
- HRW1 — Horizontal Recovery Well
- 100 — Benzene Concentration Contour (µg/L)
- Benzene Oregon Ambient Water Quality Criteria, Fish Consumption Only (DEQ 2004) (51 µg/L)
- Benzene Minimum JSCS SLV (0.35 µg/L)
- Phase III Study Area Boundary
- Approximate Extent of Confining Unit Between Upper and Lower Zones
- Storm Drain
- Manhole

Notes

1. ND = Not Detected
2. Data qualifier flags are shown in Appendix A Tables.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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MNA Parameters in Groundwater - August 2005

Figure A-1

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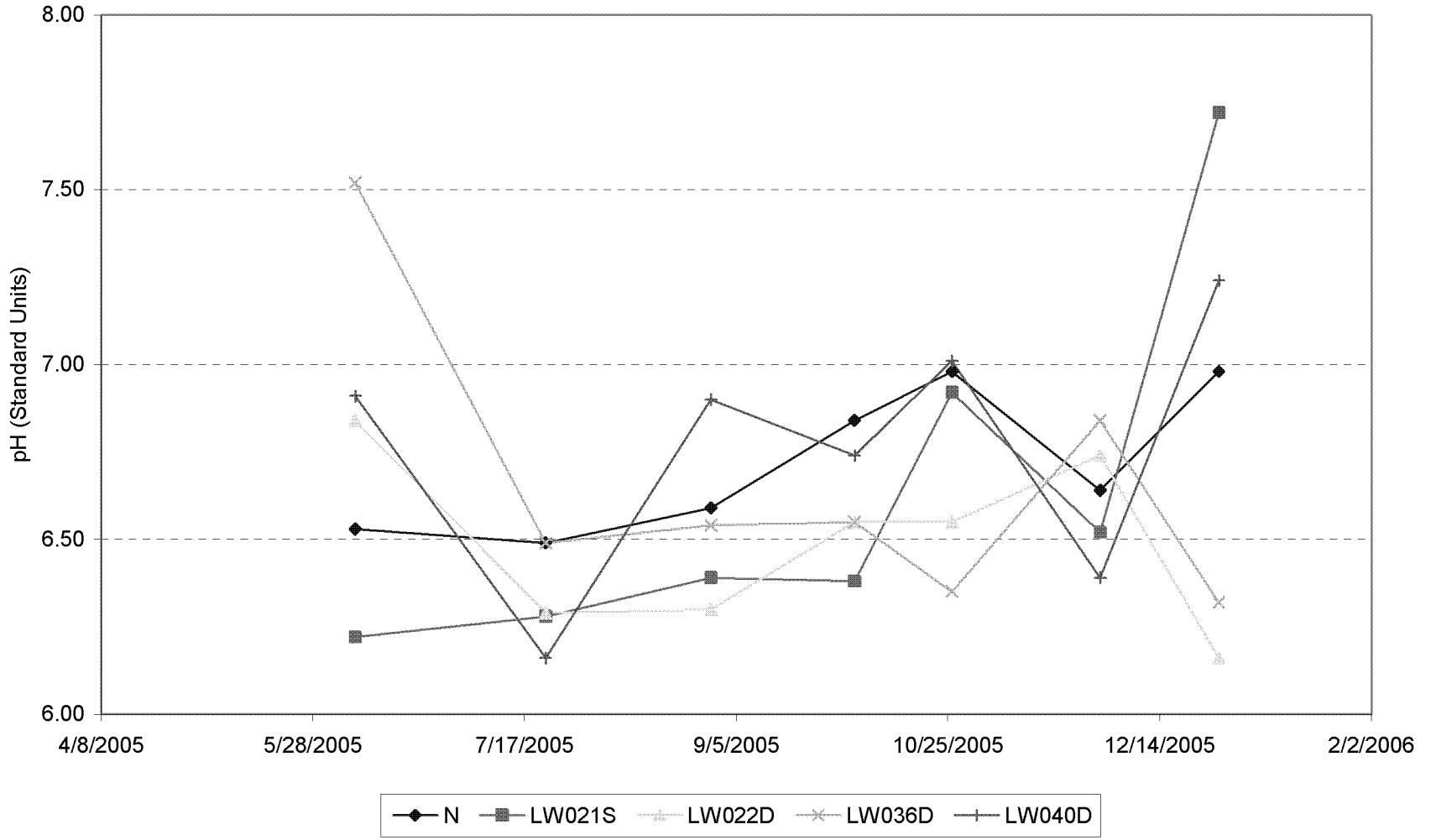

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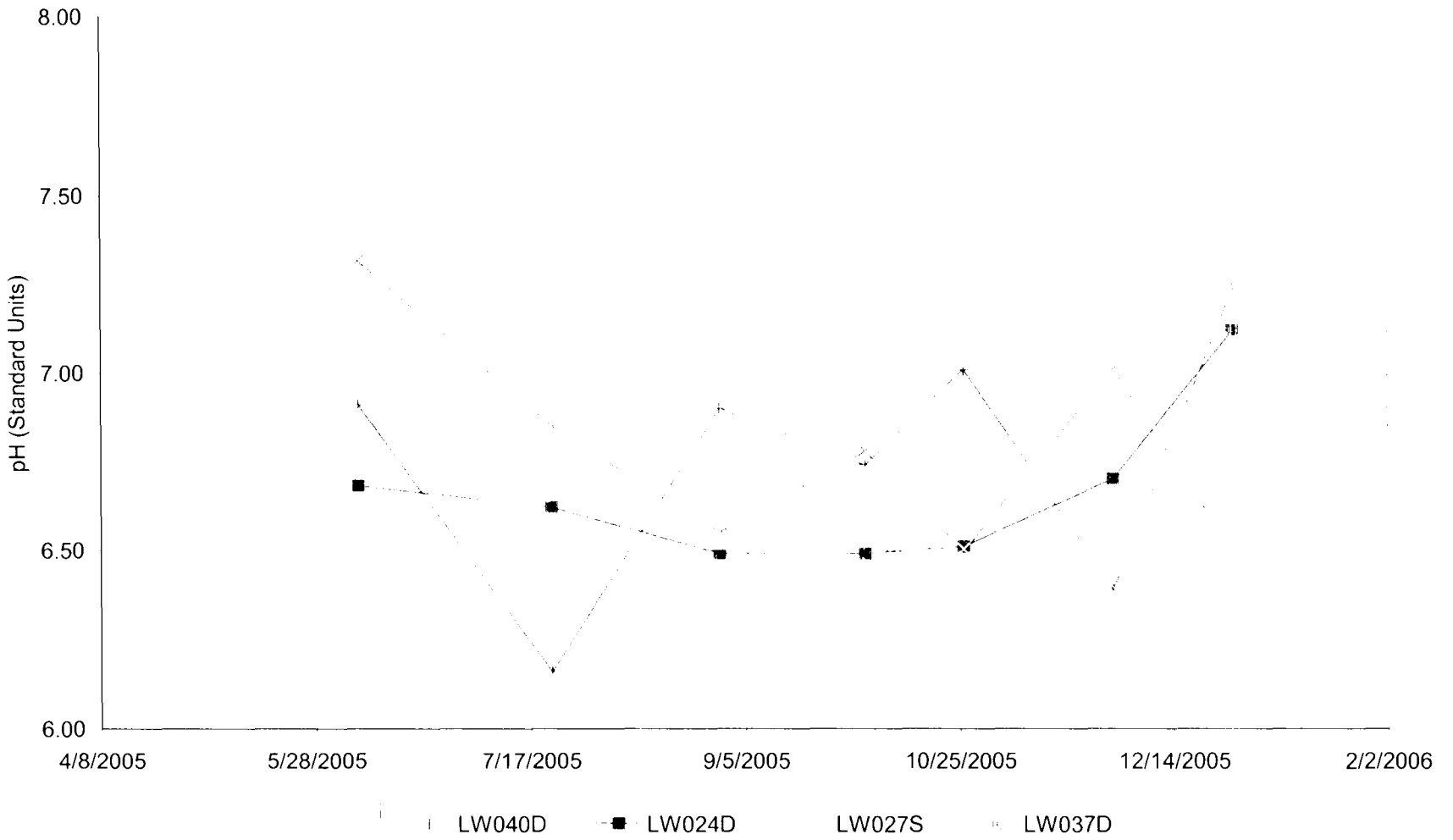
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**pH Values, June-December 2005 Flow Path 1**	Figure A-2



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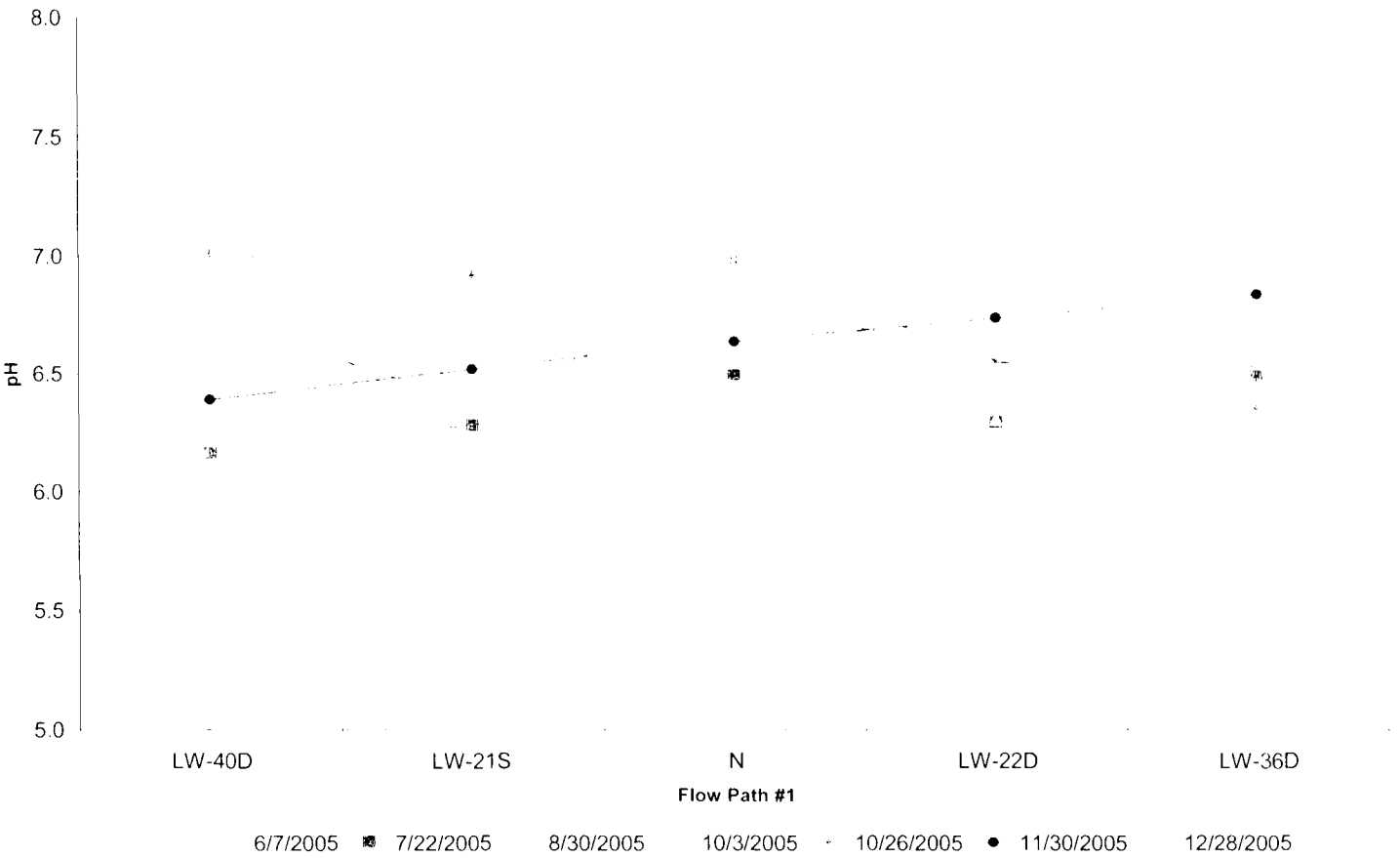
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**pH Values, June-December 2005 Flow Path 2**	Figure A-3



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**pH Trends - Flow Path 1**	Figure A-4

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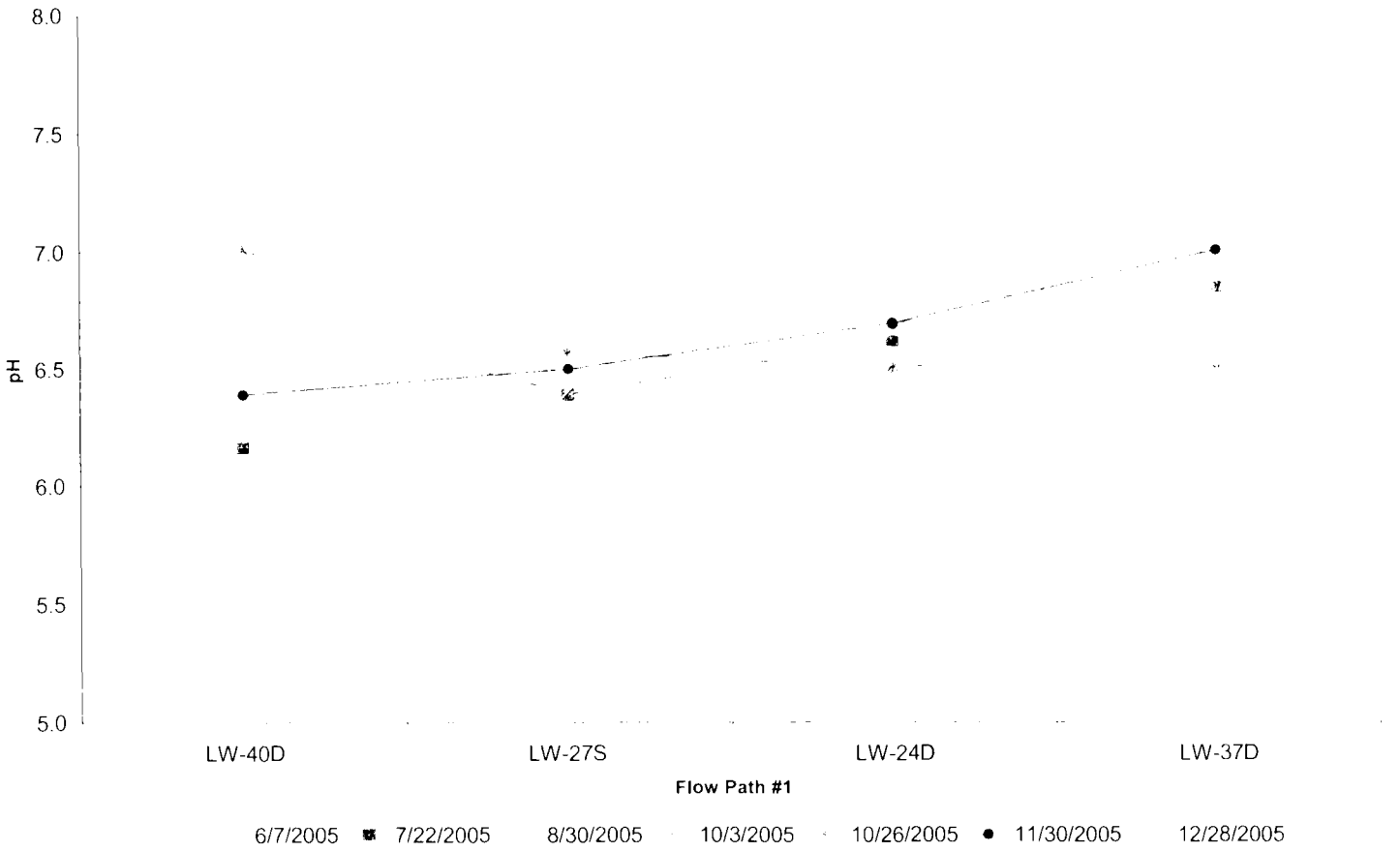

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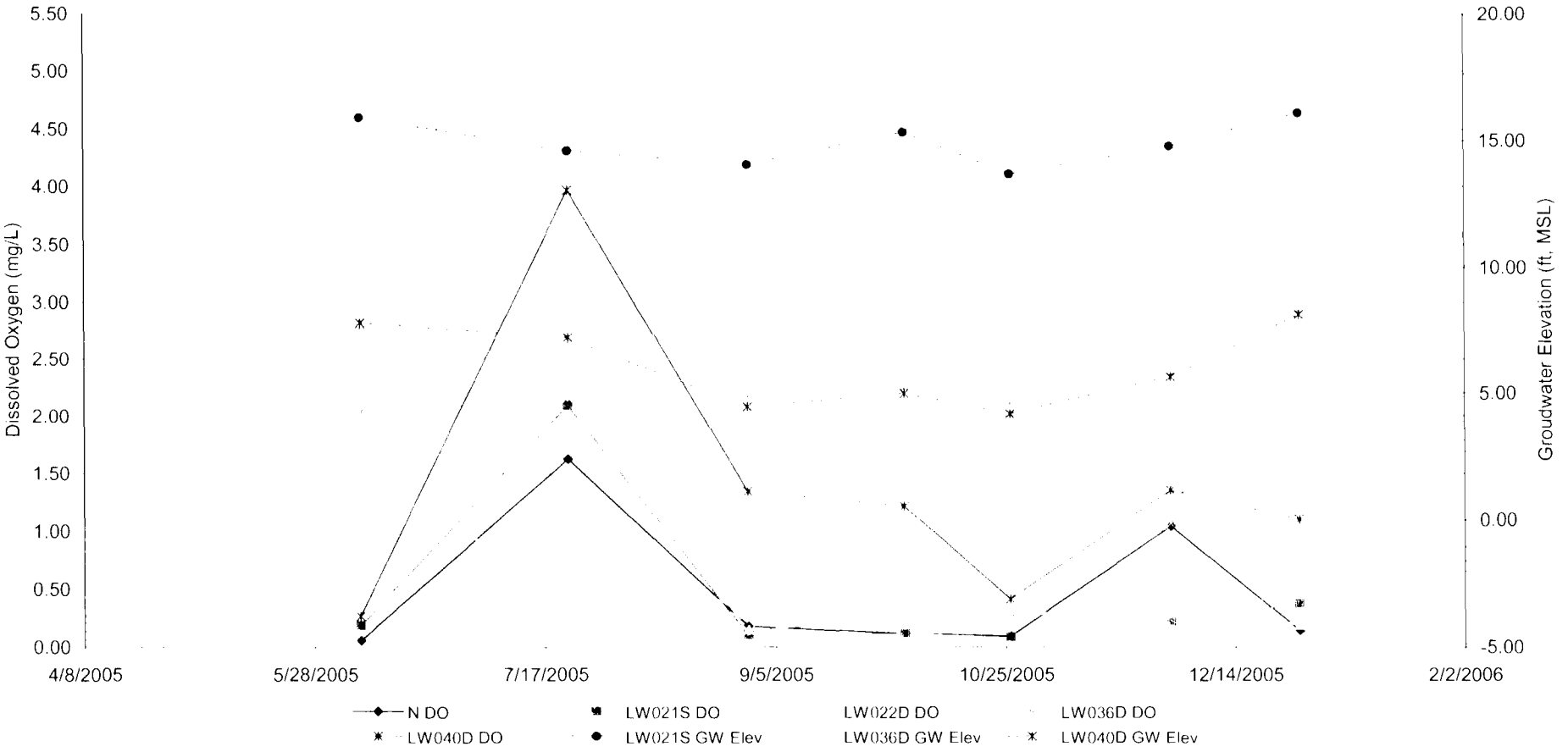
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**pH Trends - Flow Path 2**	Figure A-5

BZTO104(e)015711



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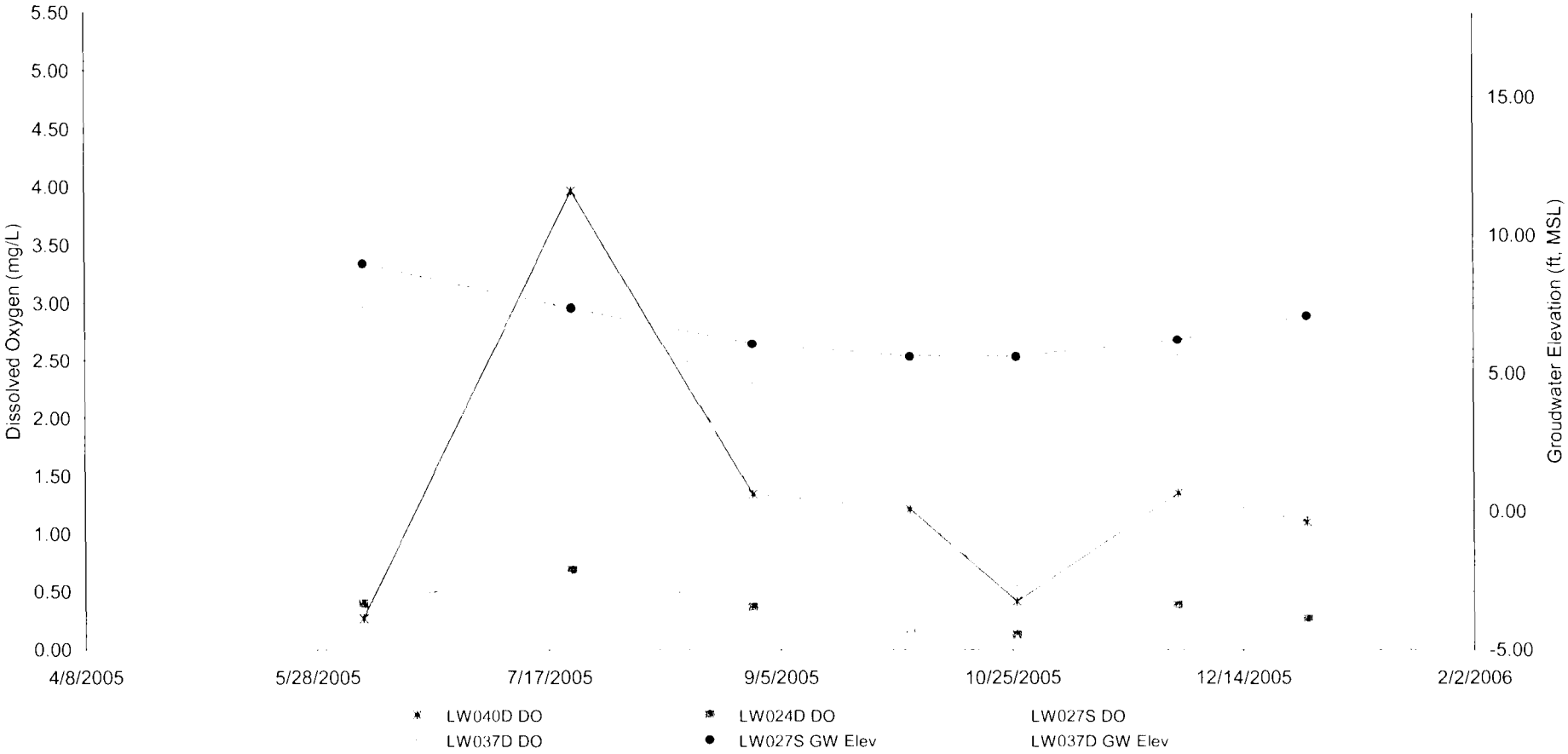
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Dissolved Oxygen vs. Time June-December 2005, Flow Path 1**	Figure A-6

BZTO104(e)015712



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Dissolved Oxygen vs. Time June-December 2005, Flow Path 2**	Figure A-7

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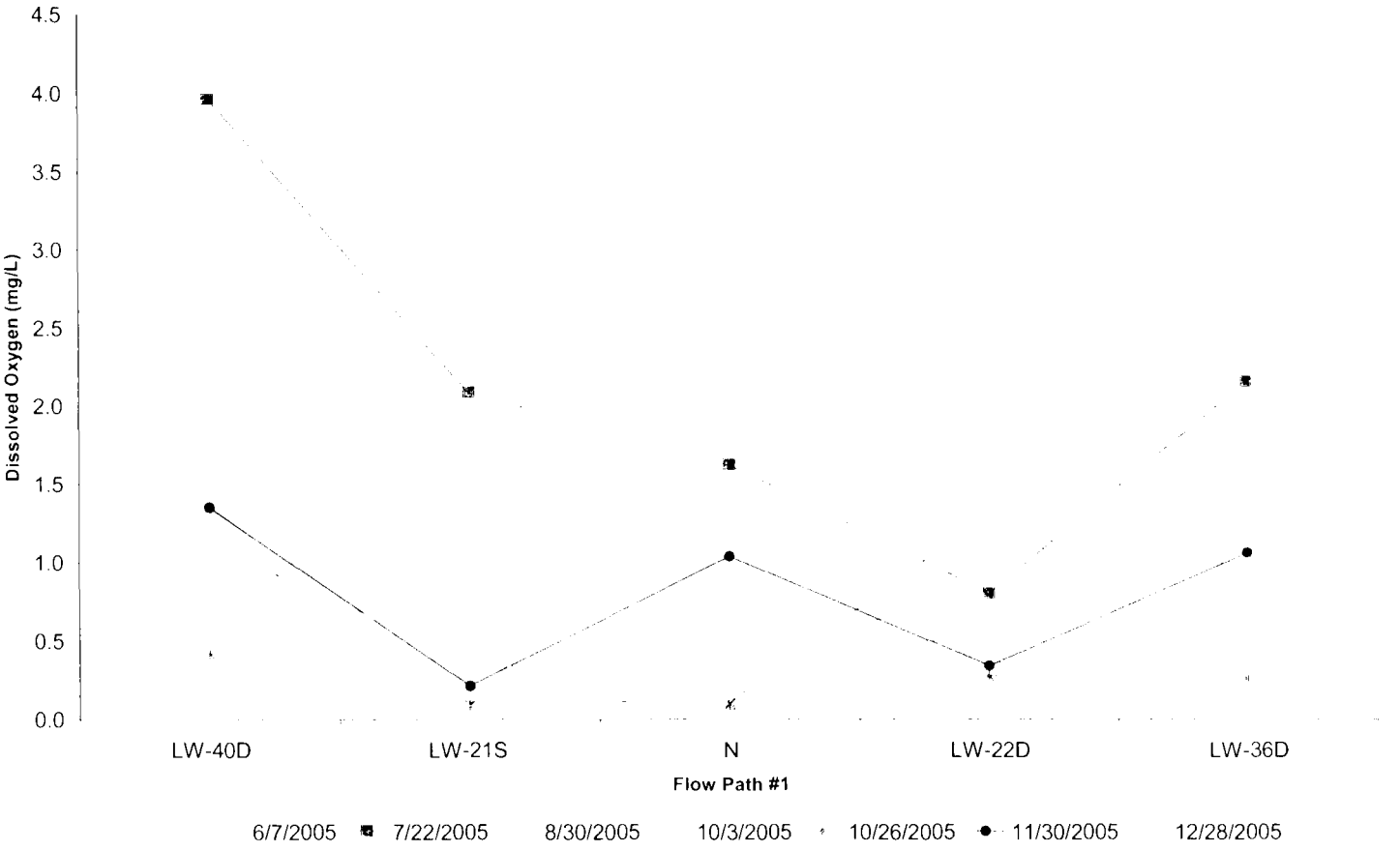

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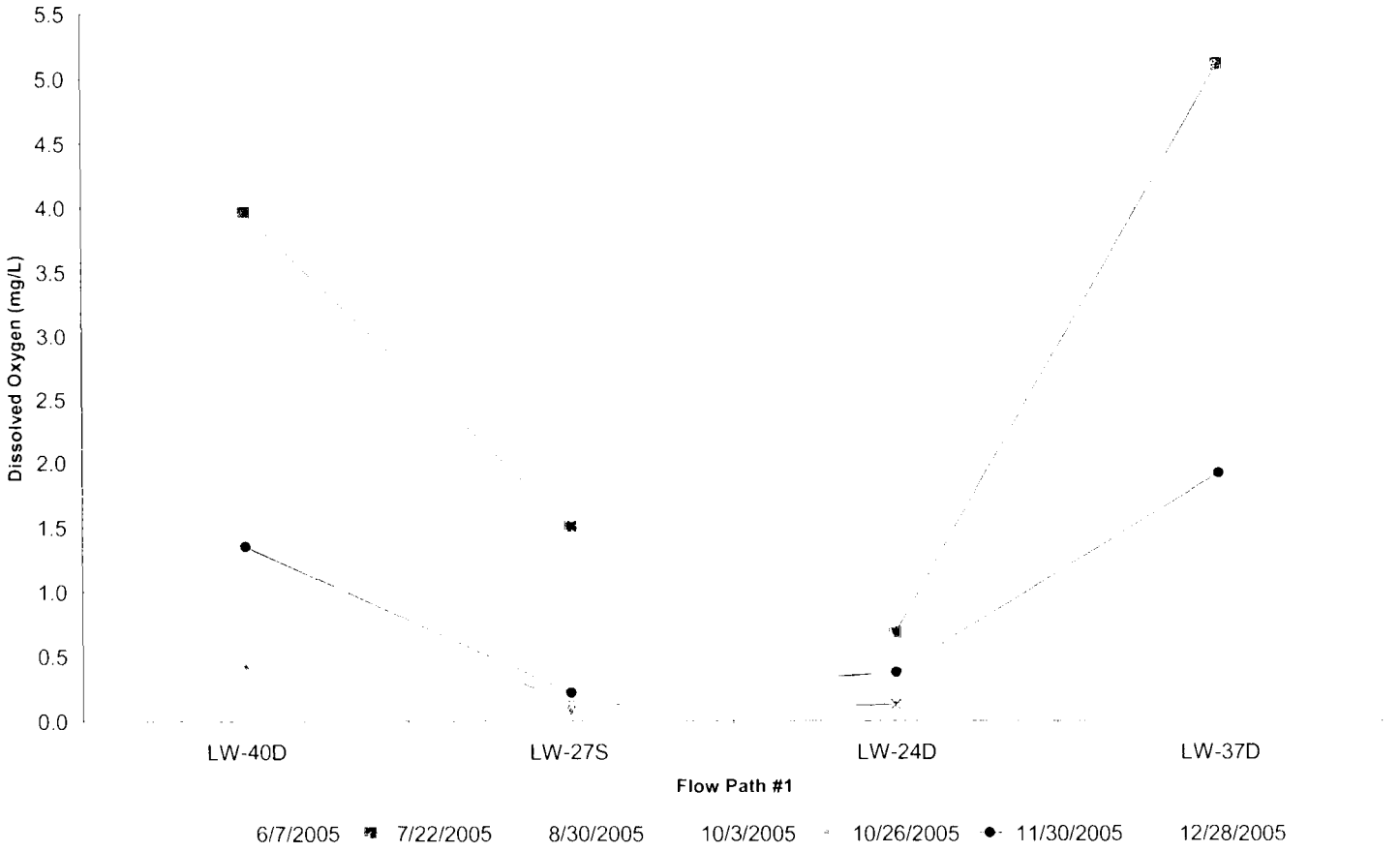
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Dissolved Oxygen Trends Flow Path 1**	Figure A-8



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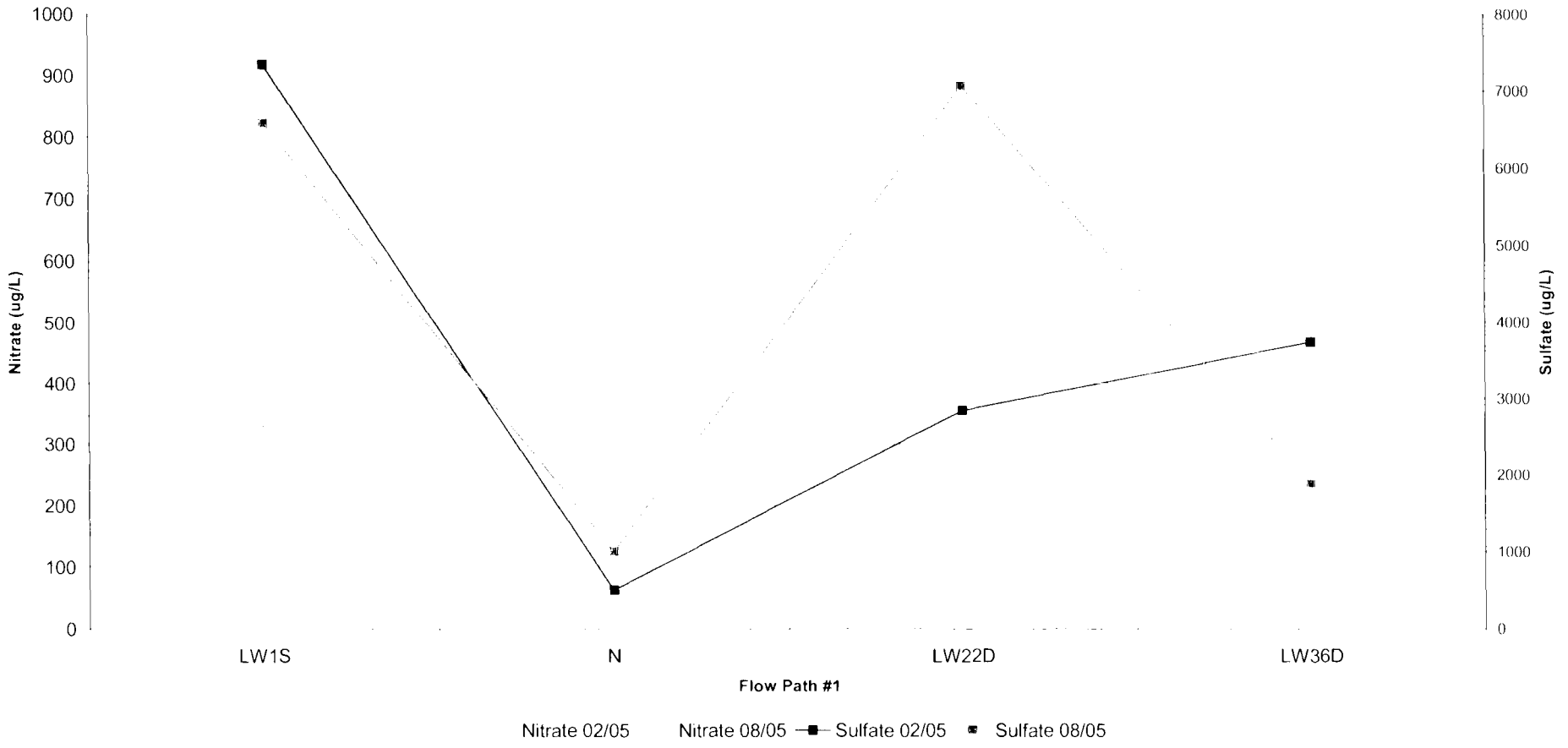
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Dissolved Oxygen Trends Flow Path 2**	Figure A-9

BZTO104(e)015715



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Nitrate and Sulfate Trends Flow Path 1**	Figure A-10

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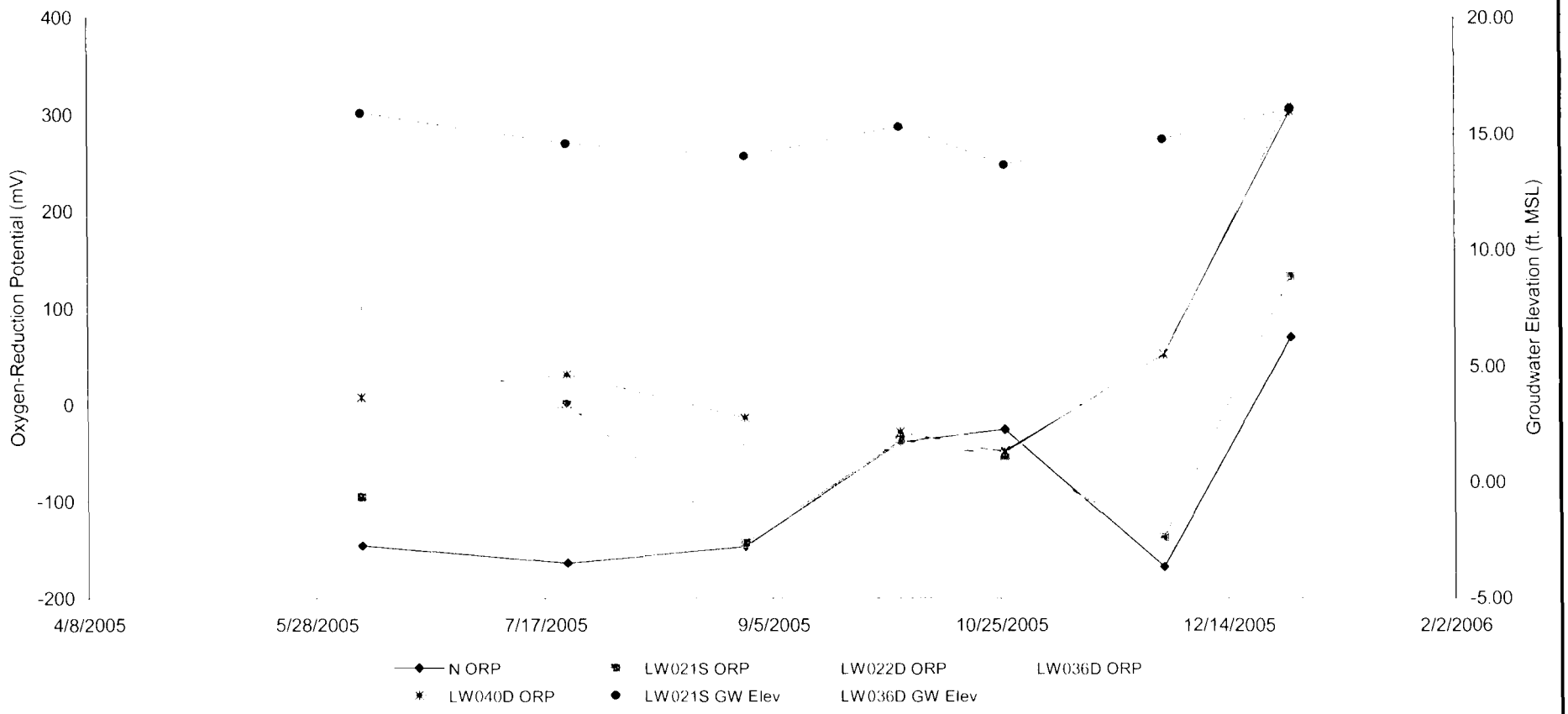

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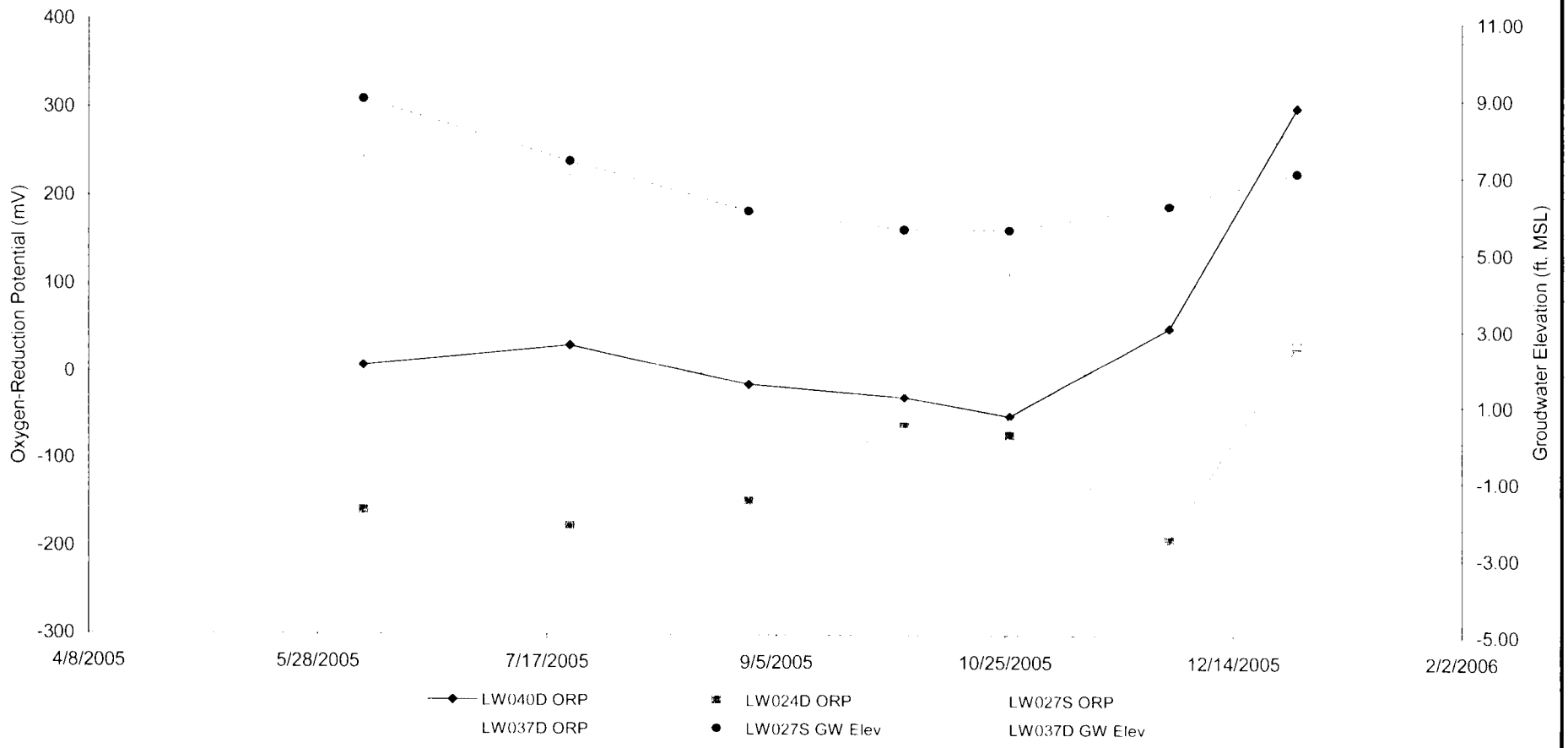
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Oxygen-Reduction Potential vs. Time June-December 2005, Flow Path 1**	Figure A-11

BZTO104(e)015717



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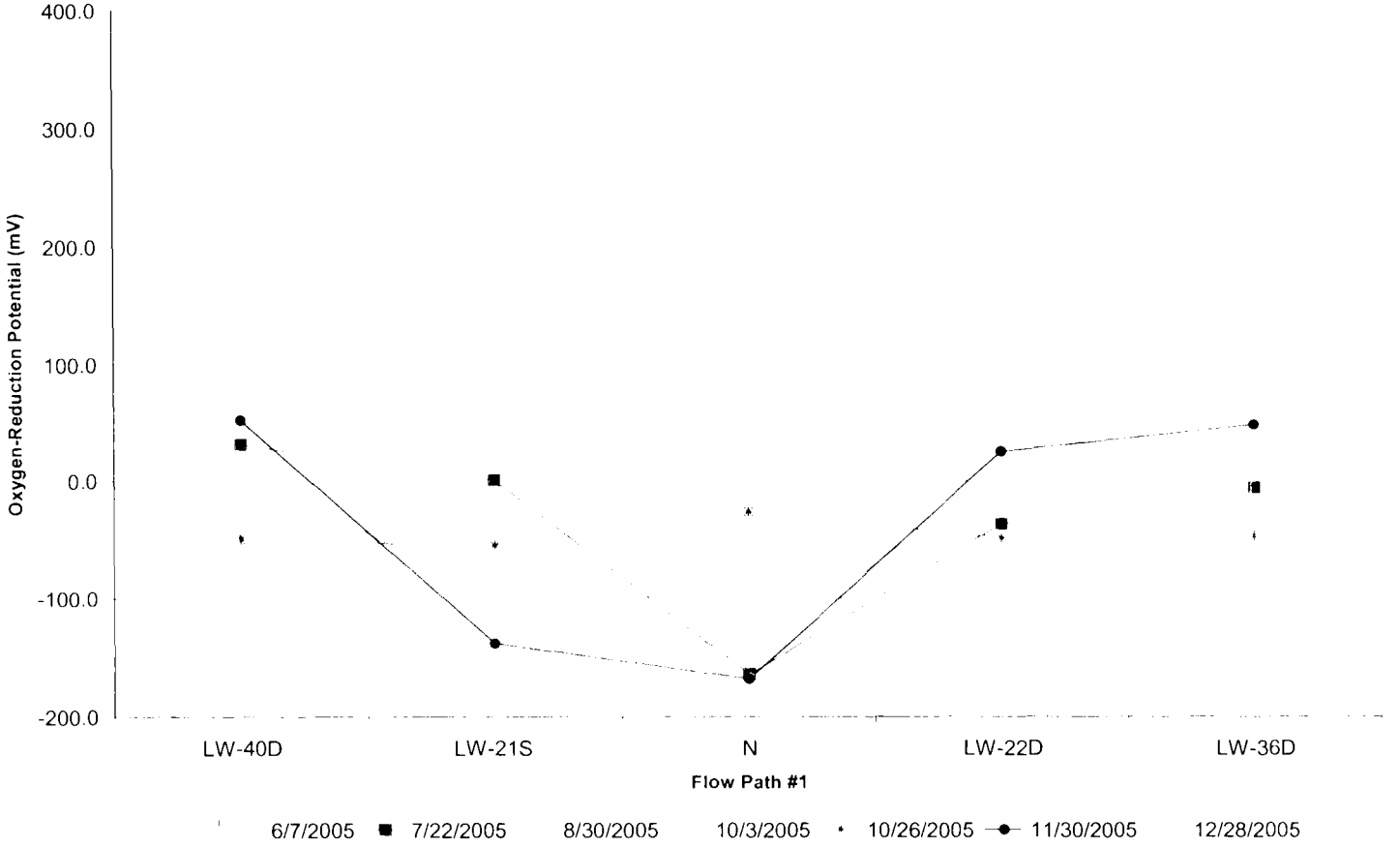
Oxygen-Reduction Potential vs. Time June-December 2005, Flow Path 2

Figure
A-12



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Oxygen-Reduction Potential Trends Flow Path 1**	Figure A-13

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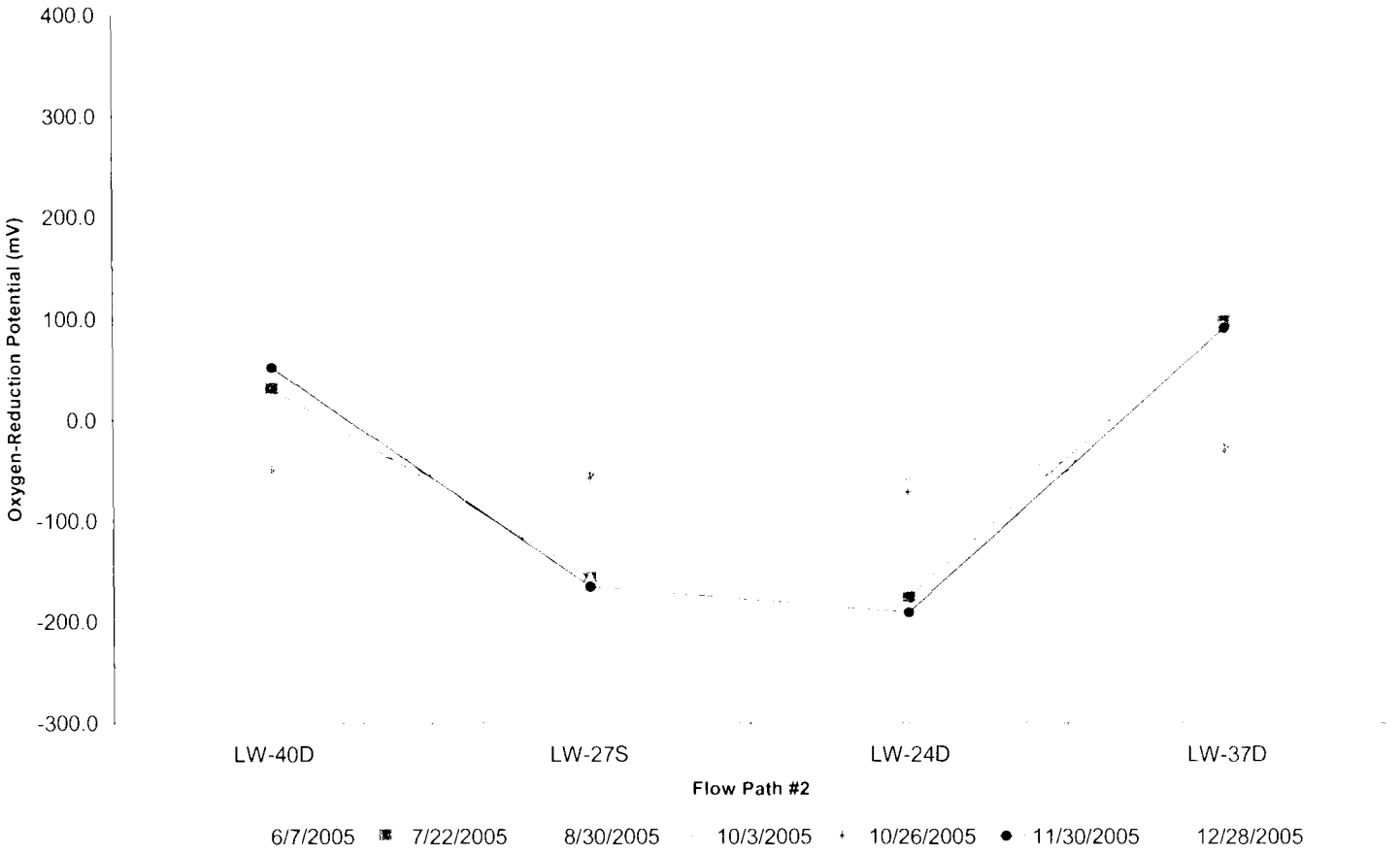

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Oxygen-Reduction Potential Trends Flow Path 2**	Figure A-14

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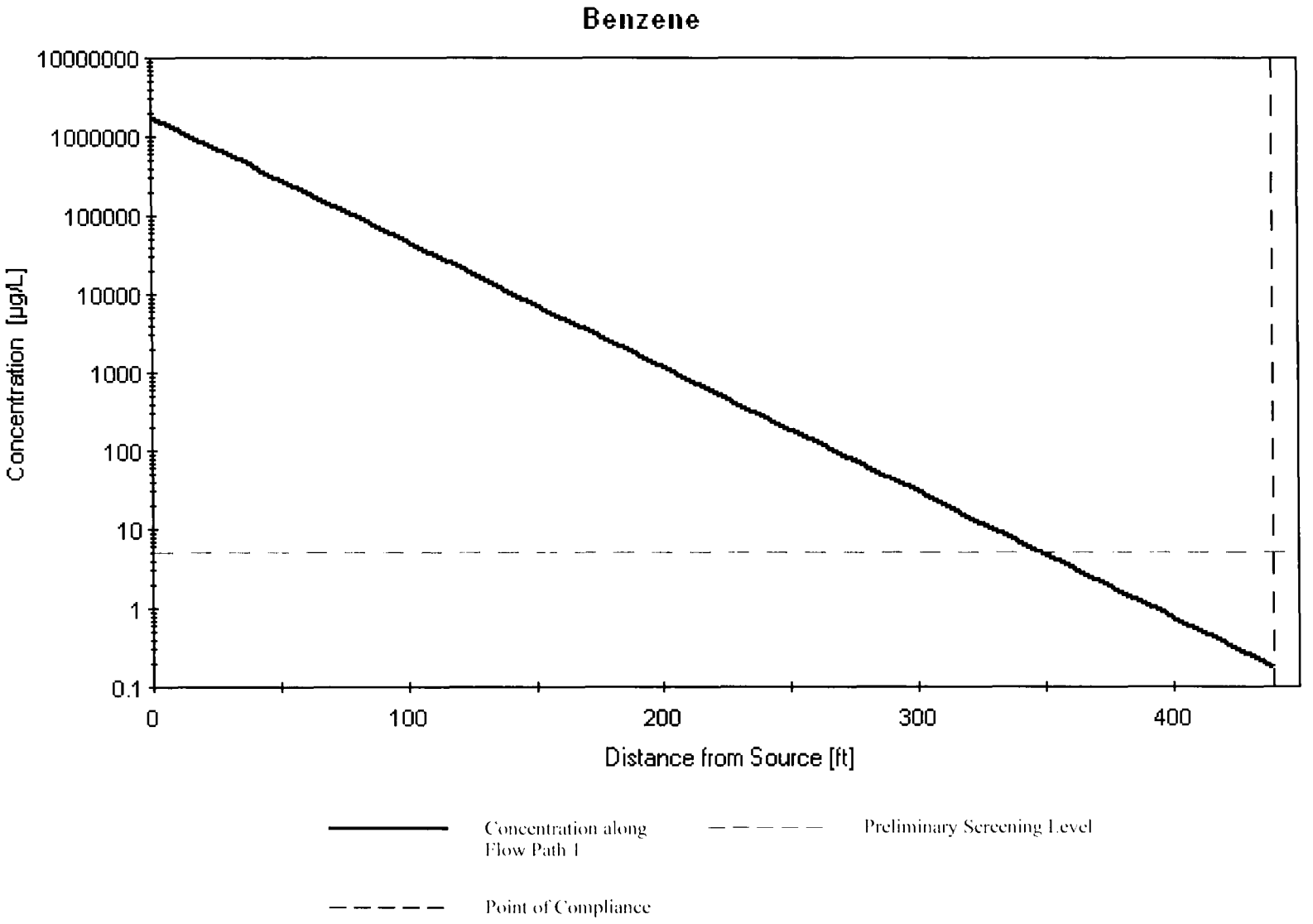

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Benzene Well LW021S as Source Zone**	Figure A-15

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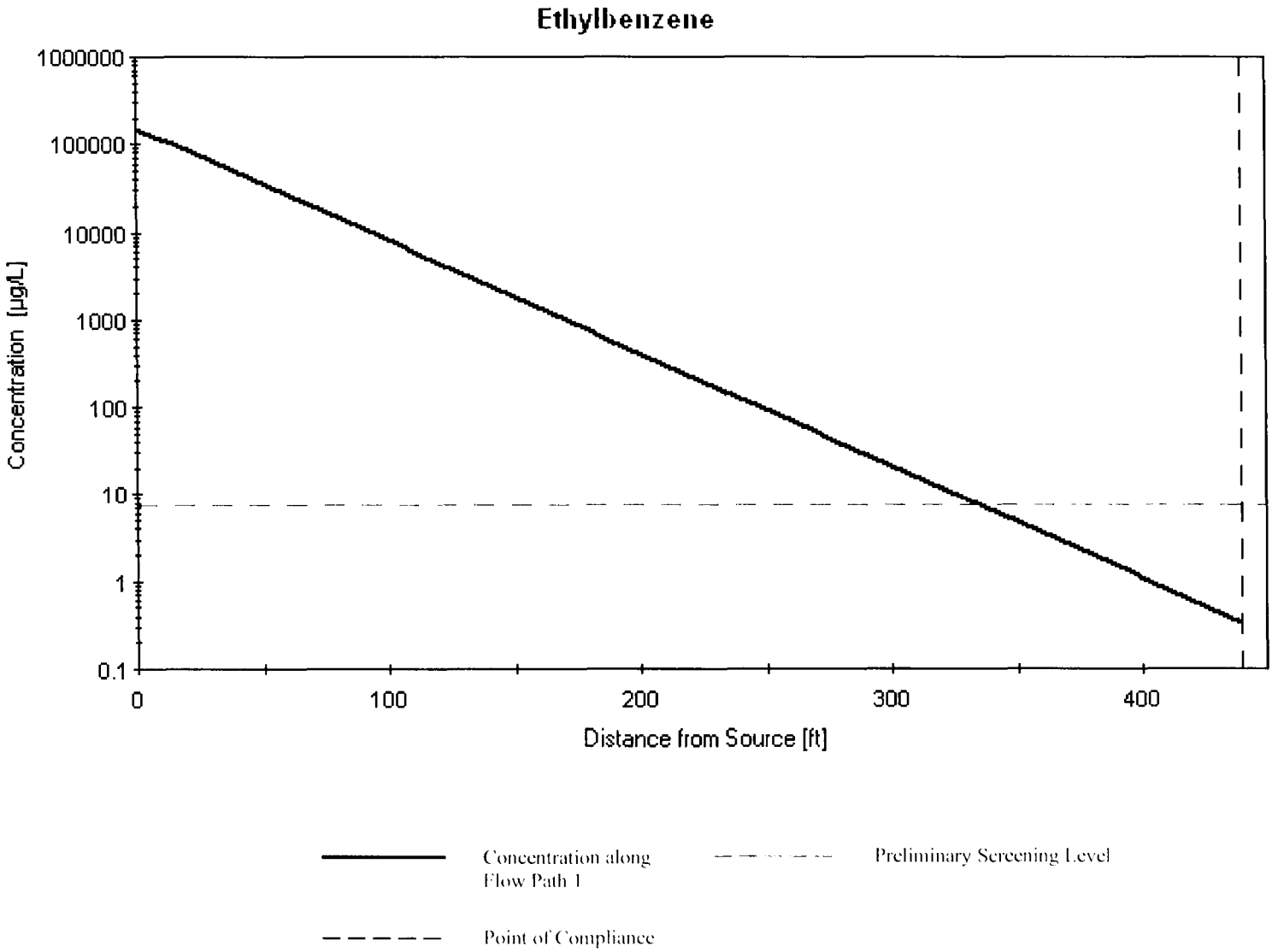

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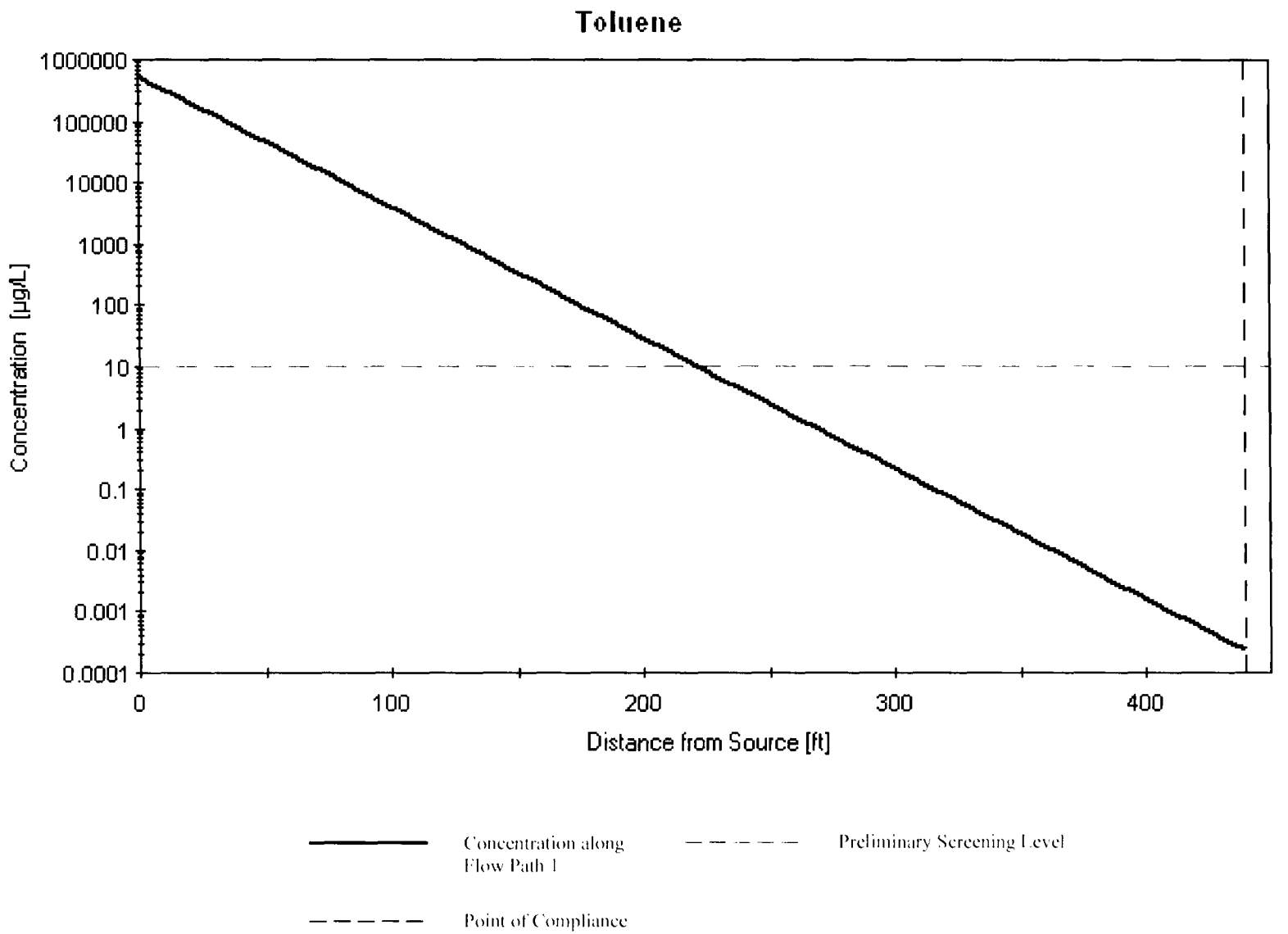
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Ethylbenzene Well LW021S as Source Zone**	Figure A-16



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Toluene Well LW021S as Source Zone**	Figure A-17

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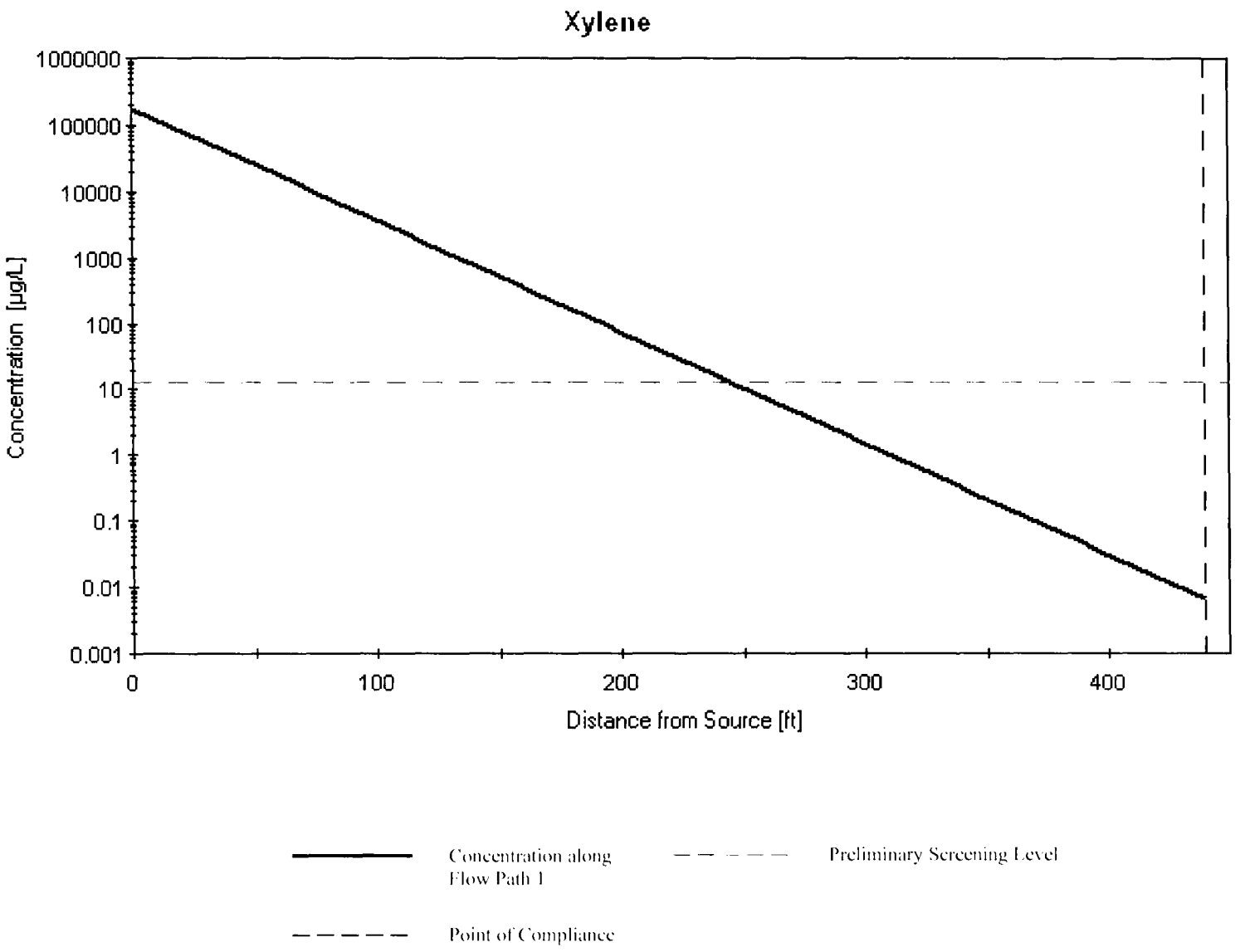

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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Xylene Well LW021S as Source Zone**	Figure A-18

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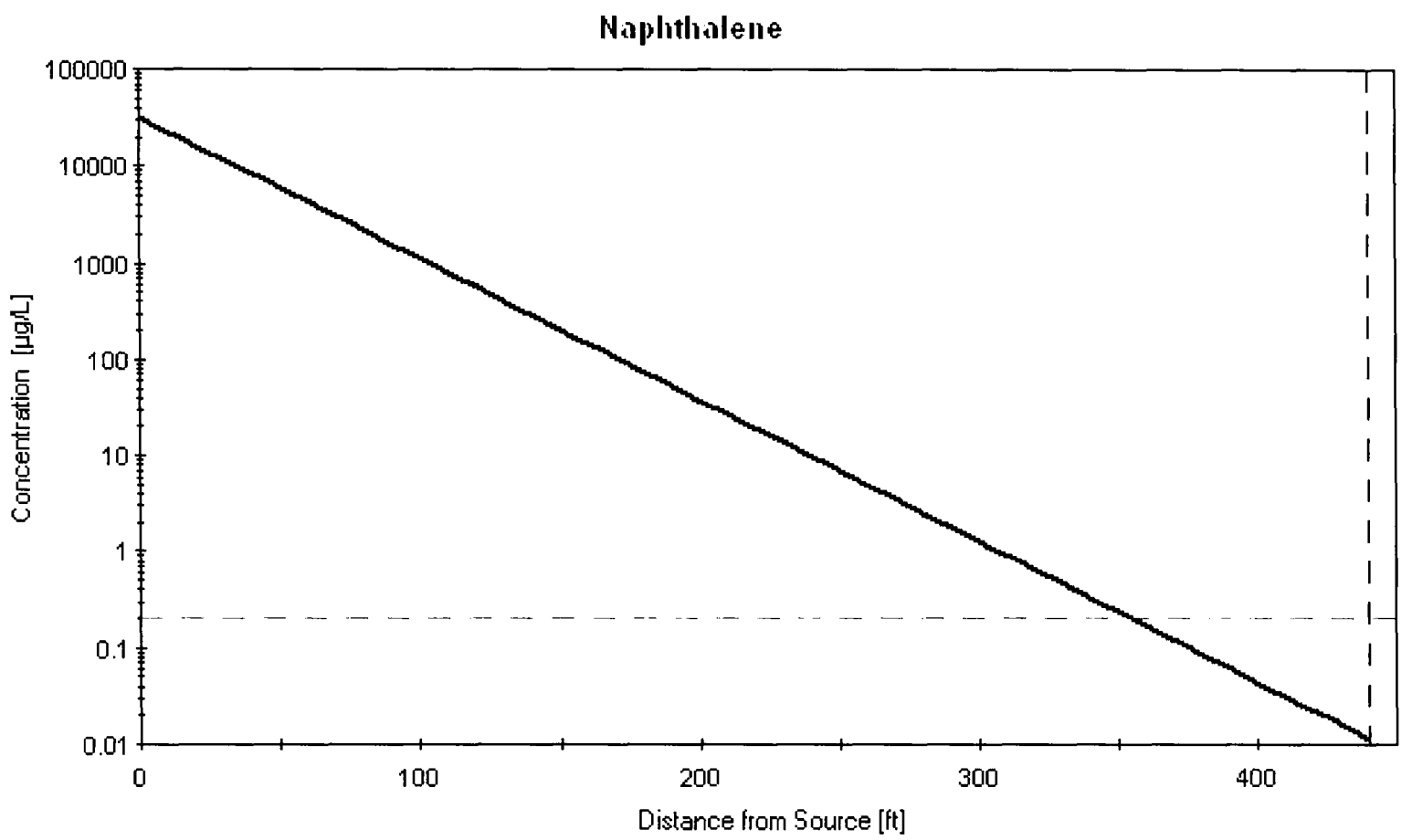

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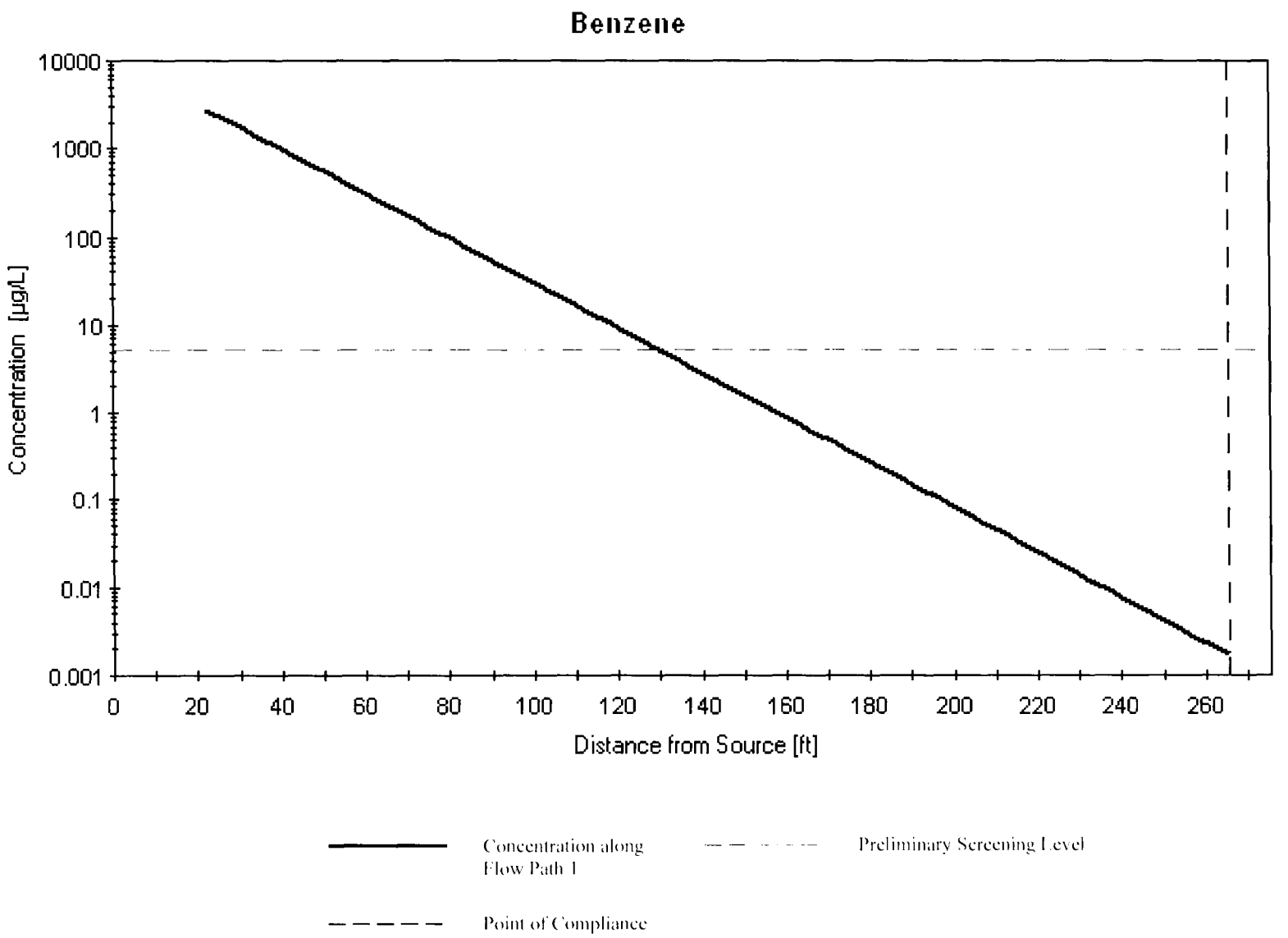
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Naphthalene Well LW021S as Source Zone**	Figure A-19



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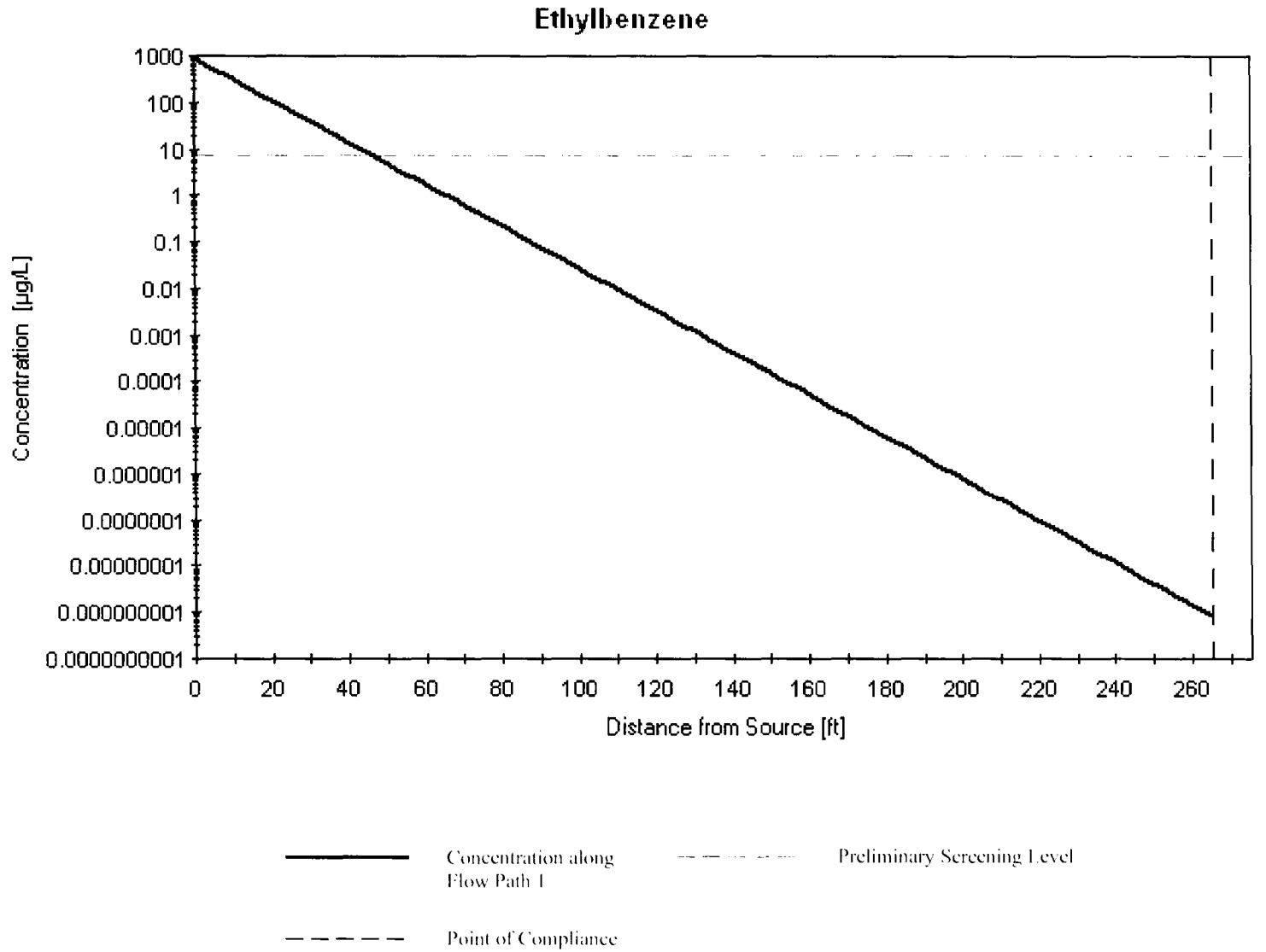
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Benzene Well N as Source Zone**	Figure A-20

BZTO104(e)015726



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Ethylbenzene Well N as Source Zone**	Figure A-21

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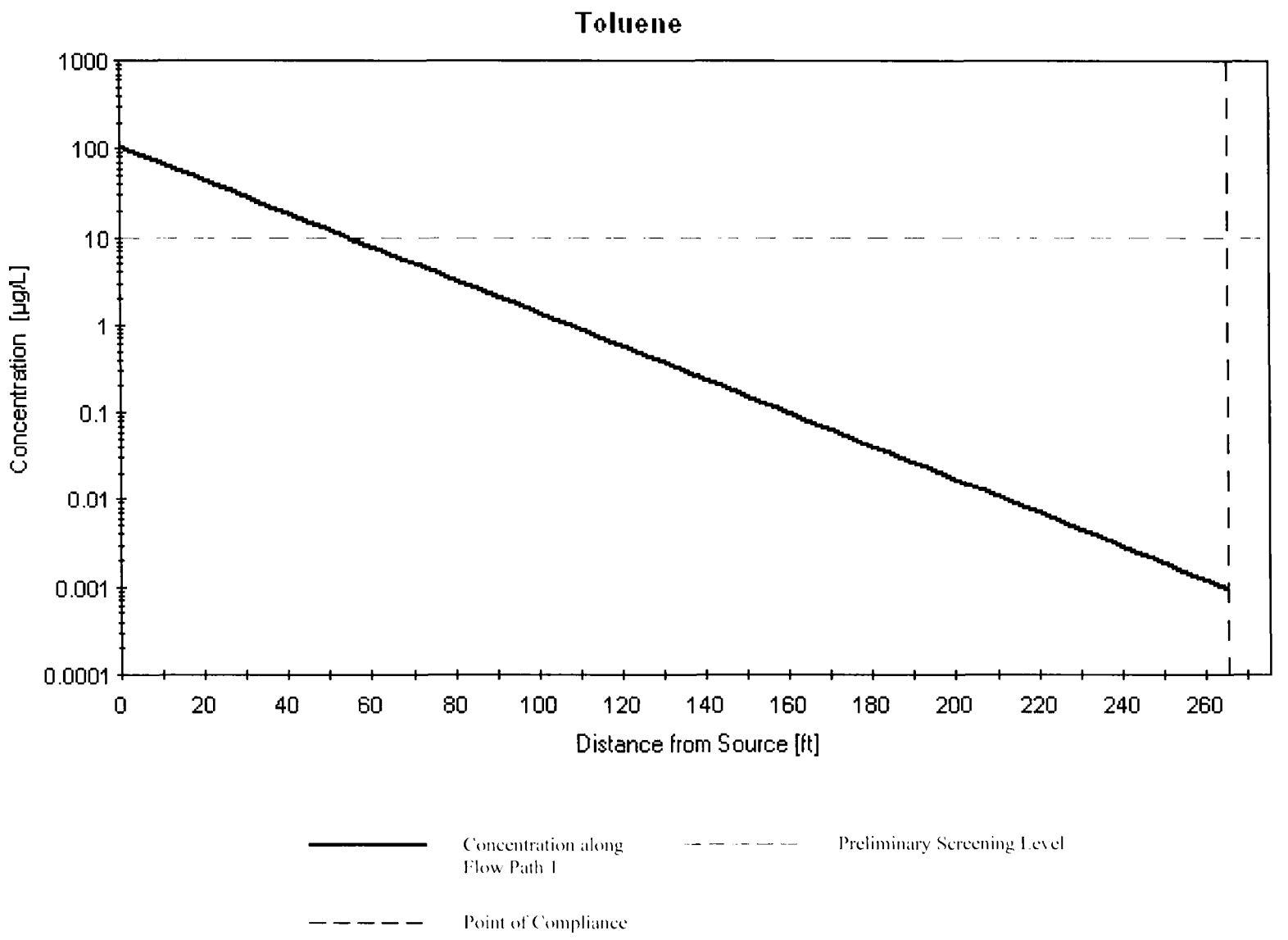

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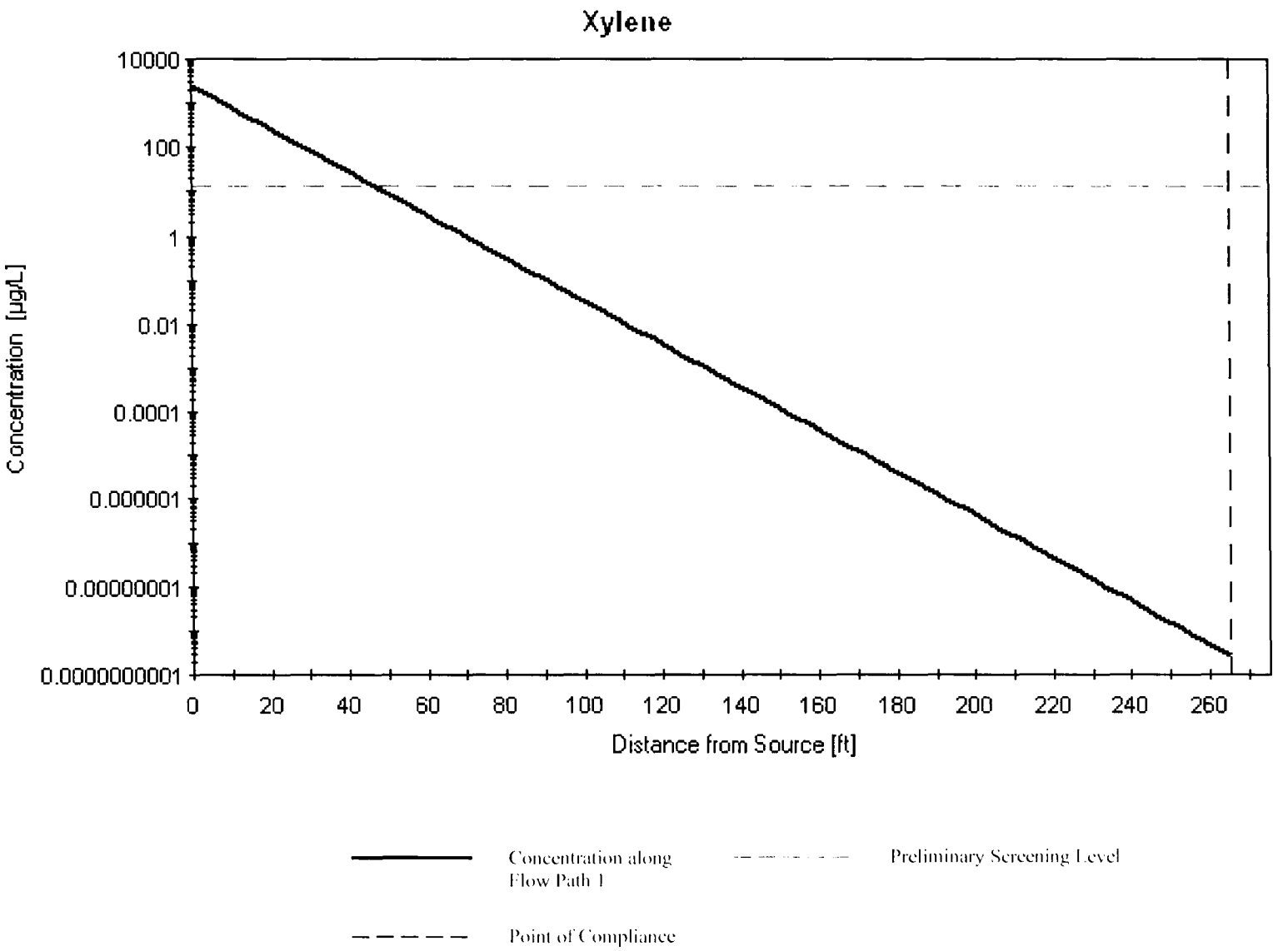
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Toluene Well N as Source Zone**	Figure A-22



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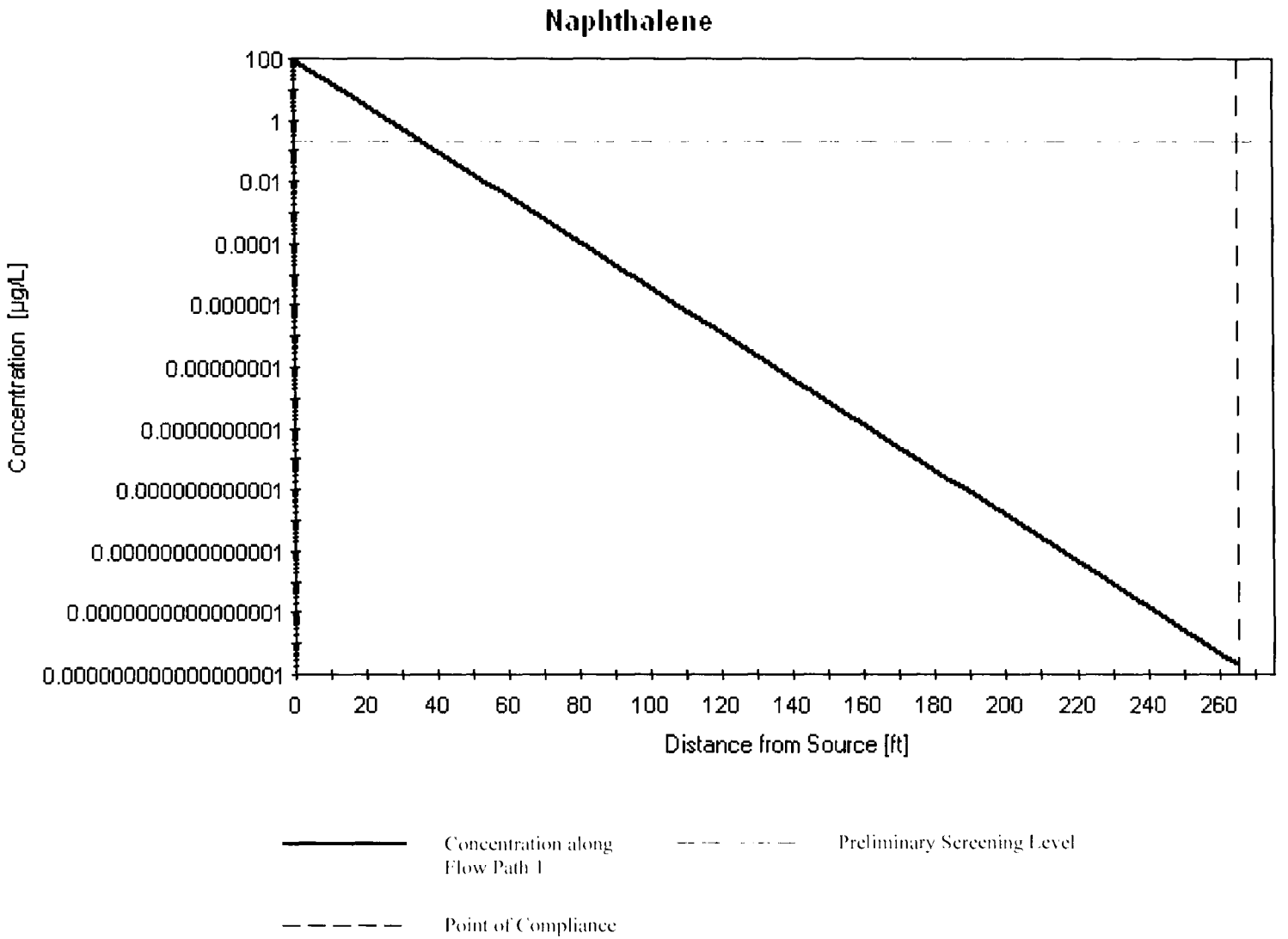
Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Xylene Well N as Source Zone**	Figure A-23

BZTO104(e)015729



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Source Control Evaluation Time Oil NW Terminal Portland, Oregon	**Distance of Stabilization – Naphthalene Well N as Source Zone**	Figure A-24

BZTO104(e)015730

APPENDIX B

Fate and Transport Model Results

Facility Name: Time Oil Northwest Terminal
Site Name:
Additional Description: LW-021S as source zone

Length: feet
Time: days
Mass: pounds

Hydrogeologic Data and Contaminant Transport Calculations

	Maximum	Average	Minimum		NAPL Source
Hydr. Conductivity [ft/d]	156.0	82.3	44.0	NAPL Source Length [ft]	50.0
Hydraulic Gradient [ft/ft]	0.0158	0.009	0.0014	NAPL Source Width [ft]	50.0
Total Porosity [-]		0.4		Contaminated Aquifer Thickness [ft]	4.6
Effective Porosity [-]		0.3			
Groundwater Vel. [ft/d]	8.216	2.469	0.205		

Contaminant Source Specifications

Source Component	Conc Profile	NAPL Constituent
Total BTEX	True	True
Benzene	True	True
Toluene	True	True
Ethylbenzene	True	True
Xylene	True	True
Naphthalene	True	True
Other Aromatics	False	True
Aliphatics	False	True

Dispersion Parameters

Estimated Plume Length [ft]	406.0
Longitudinal Dispersivity [ft]	16.19
Dispersivity Ratio [-]	20.0
Transverse Dispersivity [ft]	0.81

Sorption Parameters

Fraction Org. Carbon [-]

Maximum	0.0065
Average	0.001
Minimum	0.0008

BZTO104(e)015732

	Total BTEX	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene
Koc [L/kg]	300	83	300	1100	830	1300
Retardation Factor [-]						
Maximum	11.34	3.86	11.34	38.9	29.59	45.79
Average	2.59	1.44	2.59	6.83	5.4	7.89
Minimum	2.34	1.37	2.34	5.9	4.7	6.79

Contaminant Concentration Profiles (8/21/2005)

Well Name	Distance [ft]	Total BTEX [µg/L]	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	Xylene [µg/L]	Naphthalene [µg/L]
LW-21S	0	2612000.	1750000.	535000.	152000.	175000.	31700.
N	174	3902.	419.	107.	898.	2478.	91.2
P	196.5	2859.2	2780.	BD	BD	79.2	BD
Q	220	741.2	706.	13.9	7.1	14.2	BD
LW-22D	347.5	BD	BD	BD	BD	BD	BD
LW-36D	439.5	BD	BD	BD	BD	BD	BD

Redox Indicator Concentration Profiles (8/21/2005)

Well Name	Distance [ft]	Oxygen [mg/L]	Nitrate [mg/L]	Iron(II) [mg/L]	Sulfate [mg/L]	Redox Condition
N	174	0.17	BD	NS	BD	SO4/CO2-red.
P	196.5	0.08	BD	NS	BD	SO4/CO2-red.
Q	220	0.06	BD	NS	BD	SO4/CO2-red.
LW-22D	347.5	0.14	BD	NS	7.06	SO4/CO2-red.
LW-36D	439.5	0.13	BD	NS	1.88	SO4/CO2-red.

Attenuation Rates

	Total BTEX	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene
NAC (Single Zone) [1/ft]	0.0355	0.0356	0.0481	0.0286	0.038	0.0328
Decay Rate [1/d]						
Maximum	0.459	0.4617	0.703	0.3445	0.5035	0.4123
Average	0.1379	0.1388	0.2113	0.1035	0.1513	0.1239
Minimum	0.0115	0.0115	0.0176	0.0086	0.0126	0.0103

Time of Stabilization(TOS) and Max Source Conc. Calculations

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Distance to POC [ft]	439.5									
			Source Reduction			Time of Stabilization [years]				
	RCC		Conc [µg/L]			Breakthrough Time			Time to Equilibrium	
Contaminant	[µg/L]	Well	Current	Target	Maximum	Average	Minimum	Maximum	Average	Minimum
Total BTEX	50000.0	1	2612000	No Reduction Required						
Benzene	5.1	1	1750000	No Reduction Required						
Toluene	9.8	1	535000	No Reduction Required						
Ethylbenzene	7.3	1	152000	No Reduction Required						
Xylene	13.0	1	175000	No Reduction Required						
Naphthalene	0.2	1	31700	No Reduction Required						

Time of Remediation(TOR) Calculations

NAPL Component	Mass Fraction[-]	Solubility [mg/L]	Molecular Wght[g/mole]
Total BTEX	0.00	0.0	0.0
Benzene	0.01	1750.0	78.1
Toluene	0.08	535.0	92.1
Ethylbenzene	0.05	152.0	106.2
Xylene	0.12	175.0	106.2
Naphthalene	0.01	31.7	128.2

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Facility Name: Time Oil Northwest Terminal
Site Name:
Additional Description: N as source zone

Length: feet
Time: days
Mass: pounds

Hydrogeologic Data and Contaminant Transport Calculations

	Maximum	Average	Minimum		NAPL Source
Hydr. Conductivity [ft/d]	156.0	82.3	44.0	NAPL Source Length [ft]	50.0
Hydraulic Gradient [ft/ft]	0.0158	0.009	0.0014	NAPL Source Width [ft]	50.0
Total Porosity [-]		0.4		Contaminated Aquifer Thickness [ft]	2.3
Effective Porosity [-]		0.3			
Groundwater Vel. [ft/d]	8.216	2.469	0.205		

Contaminant Source Specifications

Source Component	Conc Profile	NAPL Constituent
Total BTEX	True	True
Benzene	True	True
Toluene	True	True
Ethylbenzene	True	True
Xylene	True	True
Naphthalene	True	True
Other Aromatics	False	True
Aliphatics	False	True

Dispersion Parameters

Estimated Plume Length [ft]	232.7
Longitudinal Dispersivity [ft]	12.04
Dispersivity Ratio [-]	20.0
Transverse Dispersivity [ft]	0.60

Sorption Parameters

Fraction Org. Carbon [-]

Maximum	0.0065
Average	0.001
Minimum	0.0008

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	Total BTEX	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene
Koc [L/kg]	300	83	300	1100	830	1300
Retardation Factor [-]						
Maximum	11.34	3.86	11.34	38.9	29.59	45.79
Average	2.59	1.44	2.59	6.83	5.4	7.89
Minimum	2.34	1.37	2.34	5.9	4.7	6.79

Contaminant Concentration Profiles (8/21/2005)

Well Name	Distance [ft]	Total BTEX [µg/L]	Benzene [µg/L]	Toluene [µg/L]	Ethylbenzene [µg/L]	Xylene [µg/L]	Naphthalene [µg/L]
N	0	3902.	419.	107.	898.	2478.	91.2
P	22.5	2861.2	2780.	1.	1.	79.2	2.
Q	46	741.2	706.	13.9	7.1	14.2	BD
LW-22D	173.5	BD	BD	BD	BD	BD	BD
LW-36D	265.5	BD	BD	BD	BD	BD	BD

Redox Indicator Concentration Profiles (8/21/2005)

Well Name	Distance [ft]	Oxygen [mg/L]	Nitrate [mg/L]	Iron(II) [mg/L]	Sulfate [mg/L]	Redox Condition
N	0	0.17	BD	NS	BD	SO4/CO2-red.
P	22.5	0.08	BD	NS	BD	SO4/CO2-red.
Q	46	0.06	BD	NS	BD	SO4/CO2-red.
LW-22D	173.5	0.14	BD	NS	7.06	SO4/CO2-red.
LW-36D	265.5	0.13	BD	NS	1.88	SO4/CO2-red.

Attenuation Rates

	Total BTEX	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene
NAC (Single Zone) [1/ft]	0.0362	0.0583	0.0432	0.1038	0.1119	0.1698
Decay Rate [1/d]						
Maximum	0.4278	0.8149	0.5394	1.9185	2.158	4.2453
Average	0.1285	0.2449	0.1621	0.5765	0.6485	1.2758
Minimum	0.0107	0.0204	0.0135	0.0479	0.0539	0.1061

Time of Stabilization(TOS) and Max Source Conc. Calculations

Distance to POC [ft]	265.5

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			Source Reduction			Time of Stabilization [years]					
	RCC		Conc [µg/L]			Breakthrough Time			Time to Equilibrium		
Contaminant	[µg/L]	Well	Current	Target	Maximum	Average	Minimum	Maximum	Average	Minimum	
Total BTEX	1.0	1	3902	No Reduction Required							
Benzene	5.1	2	2780	No Reduction Required							
Toluene	9.8	1	107	No Reduction Required							
Ethylbenzene	7.3	1	898	No Reduction Required							
Xylene	13.0	1	2478	No Reduction Required							
Naphthalene	0.2	1	91	No Reduction Required							

Time of Remediation(TOR) Calculations

	Mass	Solubility	Molecular
NAPL Component	Fraction[-]	[mg/L]	Wght[g/mole]
Total BTEX	0.00	0.0	0.0
Benzene	0.01	1750.0	78.1
Toluene	0.08	535.0	92.1
Ethylbenzene	0.05	152.0	106.2
Xylene	0.12	175.0	106.2
Naphthalene	0.01	31.7	128.2

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86-102
(E) H

RE: Summary of Relevant Oregon RODs

Copies	Description
1	Summary of Relevant Oregon Sites' Records of Decisions

Message:

For your information, enclosed is a summary of Records of Decisions (RODs) for sites in Oregon that have similar contaminants of concern as the Time Oil Northwest Terminal. Please call if you have questions or would like copies of the RODs.

LANDAU ASSOCIATES, INC.

By:
Rhonda Moon
for Rebekah Brooks
Senior Hydrogeologist

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SUMMARY OF RELEVANT OREGON SITES' RECORDS OF DECISION

Site ID	Date of ROD [a]	Soil Cleanup Goals	Basis of Soil Cleanup Goals	Soil Remedy Components	Groundwater Cleanup Goals	Basis of Groundwater Cleanup Goals	Groundwater Remedy Components
McCormick & Baxter Creosoting Company	March 1996 Amended March 1998 jointly with EPA Region 10	Arsenic: 8 mg/kg PCP: 50 mg/kg cPAHs: 1 mg/kg Dioxins/Furans: $4x10^{-5}$ mg/kg TEQ	Health-based standards based on future industrial land use at the site.	1. Excavation of soil followed by off-site treatment (if TCLP hazardous waste criteria are exceeded) and disposal at a RCRA-permitted hazardous waste facility. 2. Capping of virtually entire site. 3. Institutional controls (deed notices, land use restrictions, cap maintenance, etc.). Note: Soil remedy leaves contaminated soil under cap with concentrations exceeding the cleanup goals.	Total PAHs: 43 mg/L PCP: 5 mg/L Dioxins/Furans: $2x10^{-7}$ mg/L TEQ Arsenic (III): 1 mg/L Chromium (III): 1 mg/L Copper: 1 mg/L Zinc: 1 mg/L	Protection of aquatic organisms.	1. Pure-phase NAPL and contaminated groundwater extraction. 2. Onsite groundwater treatment and discharge. 3. Offsite NAPL treatment and disposal. 4. Groundwater and surface water monitoring. 5. Institutional controls (groundwater use restrictions).
L.D. McFarland Wood Treating Facility	May 1998	NA	NA	1. Institutional controls (land use restrictions and surface paving/gravel maintenance). No soil cleanup levels established; remedy leaves up to 47 mg/kg PCP, 6500 mg/kg total PAHs, and 2.18 ug/kg TEQ dioxins/furans at depths up to 10 ft BGS.	PCP: 0.001 mg/L 2,4,5-Trichlorophenol: 0.730 mg/L 2,4,6-Trichlorophenol: 0.008 mg/L 2,4-Dichlorophenol: 0.110 mg/L Naphthalene: 0.150 mg/L Benzo(a)anthracene: 0.0001 mg/L Chrysene: 0.0002 mg/L Dioxins/Furans: $3.0x10^{-8}$ mg/L TEQ	Restoration of groundwater to drinking water standards. Cleanup goals are based on MCLs or health-based standards.	1. Pure-phase LNAPL and contaminated groundwater extraction. 2. Onsite groundwater treatment. 3. In-situ air sparging where PCP concentrations are greater than 100 ug/L and no LNAPL is present. 4. Natural attenuation where PCP concentrations are 1-100 ug/L. 5. Long-term groundwater and surface water monitoring. 6. Institutional controls (groundwater use and land use restrictions).
Union Pacific Railroad Site	March 1996	NA	NA	1. In-situ bioremediation. 2. Institutional controls (site access controls, land use restrictions, spill control plan, etc.). No soil cleanup level established; remedy leaves up to 8 mg/kg PCP in surface soil (0-4 inches BGS) and up to 3000 ug/kg CPAHs in subsurface soil (0-15 ft BGS)	Arsenic: 0.05 mg/L Chromium: 0.10 mg/L Copper: 1.3 mg/L PCP: 0.001 mg/L Benzo(a)anthracene: 0.0001 mg/L Chrysene: 0.0002 mg/L Benzo(a)pyrene: 0.0002 mg/L Benzo(b and k)fluoranthene: 0.0002 mg/L Dibenzo(a,h)anthracene: 0.0003 mg/L Indeno(123-cd)pyrene: 0.0004 mg/L Naphthalene: 0.15 mg/L	Restoration of groundwater to drinking water standards. Cleanup goals are based on MCLs or health-based standards.	1. Pure-phase NAPL and contaminated groundwater extraction. 2. Onsite groundwater treatment and reinjection to subsurface. 3. Long-term groundwater monitoring. 4. Institutional controls (restrictions on use of groundwater at the site).
Mountain Fir Lumber Co., Inc. Site	December 1997 Amended April 1998	Dioxins/Furans: $1.9x10^{-5}$ mg/kg TEQ PCP: 8.9 mg/kg PCBs: 7.5 mg/kg cPAHs (oiled roads) Benzo(a)pyrene: 0.9 mg/kg Benzo(a)anthracene: 9 mg/kg Benzo(b)fluoranthene: 9 mg/kg Dibenz(a,h)anthracene: 0.9 mg/kg Indeno(123-cd)pyrene: 9 mg/kg cPAHs (all other areas) Benzo(a)pyrene: 0.1 mg/kg Benzo(a)anthracene: 1 mg/kg Benzo(b)fluoranthene: 1 mg/kg Dibenz(a,h)anthracene: 0.1 mg/kg Indeno(123-cd)pyrene: 1 mg/kg Lead: 2,000 mg/kg	Health-based standards based on future industrial land use at the site. Optional standards based on future residential land use with no institutional control requirements were also presented in the ROD, but are not shown here.	1. Soil flushing. 2. Capping. 3. Institutional controls (land use restrictions and cap maintenance). Note: Soil remedy leaves contaminated soil under cap with concentrations exceeding the cleanup goals.	Onsite Cleanup Goals PCP: 0.0626 mg/L Total Trichlorophenol: 3.07 mg/L 2,4,6-Trichlorophenol: 0.027 mg/L Offsite Cleanup Goals PCP: 0.0002 mg/L Total Trichlorophenol: 0.331 mg/L 2,4,6-Trichlorophenol: 0.0042 mg/L	Cleanup goals based on restoration of groundwater to drinking water quality based on acceptable risk levels for industrial exposure (onsite) and residential exposure (offsite).	1. Groundwater extraction. 2. Onsite groundwater treatment. 3. Natural attenuation where PCP concentrations are less than 10 ug/L. 4. Institutional controls (groundwater use and land use restrictions).

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SUMMARY OF RELEVANT OREGON SITES' RECORDS OF DECISION

Site ID	Date of ROD [a]	Soil Cleanup Goals	Basis of Soil Cleanup Goals	Soil Remedy Components	Groundwater Cleanup Goals	Basis of Groundwater Cleanup Goals	Groundwater Remedy Components
Dant & Russell Site	Soil: August 1991 Groundwater: Recommended Remedial Action, May 1994	Arsenic: 30 mg/kg Chromium: 46 mg/kg PCP: 480 mg/kg Total cPAHs: 5 mg/kg Dioxins/Furans: $3x10^{-4}$ mg/kg TEQ	Health-based standards based on future industrial land use at the site.	1. Excavation of surface and subsurface soil. 2. Offsite disposal of excavated surface soil in hazardous waste landfill. 3. Onsite biological treatment of excavated subsurface soil. 4. Capping of treatment unit upon completion of treatment process. 5. Long-term inspection and maintenance. 6. Institutional controls (land use restrictions). Note: Potential exists for soil remedy to leave contaminated soil under cap with concentrations exceeding the cleanup goals depending on the effectiveness of the onsite biological treatment.	Arsenic: 0.05 mg/L Chromium: 0.10 mg/L Copper: 1.3 mg/L PCP: 0.001 mg/L Benzo(a)anthracene: 0.0001 mg/L Chrysene: 0.0002 mg/L Benzo(a)pyrene: 0.0002 mg/L Benzo(b and k)fluoranthene: 0.0002 mg/L Dibenzo(a,h)anthracene: 0.0003 mg/L Indeno(123-cd)pyrene: 0.0004 mg/L Naphthalene: 0.15 mg/L	Restoration of groundwater to drinking water standards. Cleanup goals are based on MCLs or health-based standards.	1. Excavation and onsite biological treatment of remaining source area soil. 2. Pure-phase DNAPL and contaminated groundwater extraction. 3. Onsite groundwater treatment and reinjection to subsurface. 4. Long-term groundwater monitoring. 5. Institutional controls (groundwater use restrictions at, and possibly near the site).

NA = Not Available

(a) All RODs issued by the Oregon Department of Environmental Quality, unless indicated otherwise.

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MEMORANDUM

8e: 102 (E) D

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Jerry Nintemann, Landau Associates

DATE January 15, 2001

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – 3RD QUARTER 2000
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 in Portland, Oregon for the third quarter of 2000. 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

Construction of the interim action system began in July 2000 and continued throughout the third quarter of 2000. Construction of the groundwater interim action system was substantially completed by the end of September 2000, following some system modifications based on the startup inspection conducted September 13-14, 2000. Some system components that were not included in the original system design but added by Time Oil's construction contractor (e.g., flow meter read-outs on the control panel) required additional work beyond the third quarter of 2000; these components were not critical for system operation. Except for short-term operation during the system startup inspection, the interim action system did not operate this quarter; however, it was prepared for additional startup activities at the end of September.

The groundwater interim action startup plan was submitted to the Oregon Department of Environmental Quality (DEQ) on July 14, 2000. Activities identified in the startup plan were performed in August and September 2000 after DEQ approval of the plan was received via e-mail on August 3, 2000. System startup activities conducted during the third quarter of 2000 included the installation of two deep zone monitoring wells, LW-17D and LW-18D, and system inspection during startup testing. Preparations were made at the end of the third quarter to conduct startup monitoring activities during lower zone pumping in October 2000.

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DATA COLLECTION AND RESULTS

Operation of the groundwater interim action system was not sustained for a substantial period of time during the third quarter of 2000; therefore, no groundwater level data were collected for the interim action in this period.

Groundwater samples were collected from three interim action wells (LW-13S, LW-17D, and LW-18D) during the third quarter 2000 sampling event conducted August 28-31, 2000. The pump in recovery well RW-2 was not ready for operation in August; therefore, RW-2 was sampled during the system startup inspection on September 13, 2000. Pentachlorophenol (PCP) was detected at concentrations of 0.89 µg/L in well LW-13S and 630 µg/L in recovery well RW-2. PCP was not detected at a detection limit of 0.25 µg/L in samples collected from wells LW-17D and LW-18D. Analytical reports and data validation results for these samples are included with the data presented in the *Third Quarter 2000 Groundwater Report* for the Northwest Terminal.

BZTO104(e)015742

Third Quarter 2000 Groundwater Report
Time Oil Northwest Terminal
Portland, Oregon

January 12, 2001

Prepared for

Time Oil Company
2737 West Commodore Way
Seattle, WA 98100-1233

Prepared by

LANDAU ASSOCIATES, INC.

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

BZTO104(e)015743

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BZTO104(e)015745

1.0 INTRODUCTION

This report provides the results of the third quarter 2000 groundwater sampling event, conducted as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal in August 2000. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report.

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. (Time Oil). The facility is located in the industrialized Rivergate area of north Portland, Oregon (Figure 1). Quarterly groundwater sampling has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of the groundwater monitoring points at the terminal are shown on Figure 2.

Modifications to the groundwater quality sampling and analysis requirements (Landau Associates 1998a,b, 1999a, 2000a, 2000b) were approved by the Oregon Department of Environmental Quality (DEQ) in letters dated May 15, 1998, May 18, 2000 (DEQ 1998, 2000a), by verbal authorization to Rebekah Brooks of Landau Associates on February 12, 1999 (Landau Associates 1999a), and by email on August 15, 2000 (DEQ 2000b). Modifications implemented since the second quarter 1998 event include:

- 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 analyses metals 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.

Modifications implemented since the first quarter 1999 event include:

- 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.

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Modifications implemented since second quarter 2000 sampling event included elimination of dioxin/furan analyses. The modifications implemented beginning this sampling event included reduction of sampling frequency of wells H, L, and LW-5S from quarterly to annually.

Groundwater level measurements conducted at the terminal for the third quarter 2000 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-1. Analyses conducted during this sampling event for each sampling location are summarized in Table A-2. A summary of groundwater quality data for the third quarter 2000 event is provided in Tables A-3 and A-4 for the shallow and deep wells, respectively. The data validation report for this data is provided in Appendix B. Laboratory data packages are provided in Appendix C.

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 be updated for each quarterly event and provided with the quarterly reports.

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2.0 THIRD QUARTER 2000 GROUNDWATER SAMPLING EVENT

The third quarter 2000 groundwater sampling event was conducted from August 28 through August 31, 2000 with the exception of RW-2. RW-2 was not accessible at the time of the quarterly event due to the construction of the groundwater interim action system, but was subsequently sampled on September 13, 2000 following system completion. The quarterly event included measurement of groundwater levels at all 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 where a sheen was observed; and collection of groundwater quality samples from each of the wells. The third quarter event included sampling of all monitoring wells in the quarterly sampling program, as agreed upon with DEQ and the two new monitoring wells (LW-17D, -18D) added in August 2000 as outlined in the *Startup Plan Groundwater Interim Action Report* (Landau Associates 2000c). 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.

2.1 GROUNDWATER LEVEL MEASUREMENTS

Groundwater levels were measured for the third quarter 2000 event on August 29, 2000. The presence of product was also checked in each well. A trace amount of product was noted only in well P. 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-1. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided with the first and second quarter 1998 groundwater reports (Landau Associates 1998a,b) and the Phase II RI Report (Landau Associates 2000b).

For evaluation purposes, the groundwater level measurements were converted from depth-to-water readings to groundwater elevations using the survey information for each location. The water level elevations were then contoured using SURFER for Windows. Water level contours interpreted using SURFER kriging techniques are considered approximate and were modified by hand where the contours did not appear to represent hydrogeologic conditions based on the current conceptual model at the terminal. Water level contour maps for the upper and lower water-bearing zones are shown on Figures 3 and 4, respectively.

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2.1.1 MEASUREMENT PROCEDURES

Groundwater levels and product thicknesses were measured 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-1.

Water level measurements for the third quarter 2000 event were obtained beginning at about 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. Deep wells closest to the river were measured first, followed by measurements in wells with increasing distance from the 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 1998c), aquifer test report (Landau Associates 1999b), and previous quarterly measurements.

2.1.2 UPPER WATER-BEARING ZONE

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper water-bearing zone. Water level contours for the upper zone are presented on Figure 3. The contours indicate that groundwater flow in the upper zone across the terminal is generally to the south-southwest toward the Willamette River, with a localized shift to the south in an area south of the former PCP mixing area. A change in the groundwater flow pattern in the upper zone also appears to occur on the east property, such that the groundwater flow direction in this area appears to be radial away from an area at the north property boundary near LW-103S. Groundwater flow patterns and direction in the upper zone appear to vary little between the quarterly events. A discussion of water level trends in the upper zone is provided in Section 2.2.5.

2.1.3 LOWER WATER-BEARING ZONE

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower water-bearing zone. Water level contours for the lower zone are presented on Figure 4. The contours indicate that groundwater flow in the lower zone trends generally to the

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west-southwest, with variable flow occurring in the area between well J2 and LW-10D and a small depression occurring in the area of RW-2. Groundwater flow patterns and direction in the lower zone vary noticeably between the quarterly events, possibly in response to variability in river stage influence and heterogeneity in lower zone aquifer materials. A discussion of water level trends in the lower zone is provided in Section 2.2.5.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the third quarter 2000 event on August 28 through August 31, 2000. Eleven shallow wells and seventeen deep wells were sampled. Monitoring well LW-9S and LW-10S were reported as dry and not sampled as part of the third quarter 2000 sampling event. Except as shown in Table A-2, all groundwater samples were analyzed for the following constituents: semivolatile organic compounds (EPA method 8270); chlorinated phenols (EPA method 8040); volatile organic compounds (EPA method 8260); total petroleum hydrocarbons (TPH) for diesel (OTPH-D); six priority pollutant metals (EPA methods 6010/7000 series); chloride (EPA Method 325.2), total dissolved solids (EPA Method 160.1), and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, TPH for gasoline and the heavy oil range (OTPH-G and OTPH-D extended) were analyzed in samples from wells B1, LW-8S, LW-11S, RW-1 and RW-2; and ethanol (EPA Method 8015) was analyzed in samples from wells B1, LW-8S, LW-11S, and RW-1. Laboratory analyses were conducted by Analytical Resources, Inc. (Seattle, Washington). A summary of analyses conducted for each sampling location is provided in Table A-2.

Analytical results for the third quarter 2000 event are provided in Table A-3 for the shallow wells and in Table A-4 for the deep wells, and 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 the same constituent was analyzed by different analytical methods (e.g., methods 8040 and 8270 for PCP).

2.2.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2) which were purged and sampled with a Grundfos pump. The sample from RW-2 was collected using the in-line sampling port for the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three casing volumes of water had been removed and specific conductance and

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temperature had stabilized or until the well purged dry. Four replicate measurements of field parameters (pH, specific conductance, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing during sampling for volatile organic compounds, a pumping rate was maintained below about 100 ml/min. All sampling was conducted in accordance with the Phase I/II RI/FS work plan and appropriate provisions of the quality assurance project plan and project health and safety plan (Landau Associates 1996). A more detailed description of groundwater sampling procedures is provided in the draft Phase II RI report submitted to DEQ on April 6, 2000 (Landau Associates 2000b).

2.2.2 Upper Water-Bearing Zone

The groundwater quality results from the upper water-bearing zone indicate the following:

- Except for low arsenic concentrations, analytical results for wells D and LW-1S were nondetect.

- Pentachlorophenol (PCP) was detected in six shallow wells (B1, LW-2S, LW-4S, LW-11S, LW-13S, and RW-1) with concentrations ranging from 0.43 µg/L at well B1 to 7,200 µg/L at well LW-4S using EPA method 8040. PCP concentrations ranged from nondetect (at a detection limit of 5.0 µg/L) to 9,400 (estimated) µg/L for the same wells using method 8270.

- Other chlorinated phenol constituents were detected at shallow wells LW-2S, LW-4S, LW-11S, and RW-1 including: 2,3,4,5-tetrachlorophenol (detected in four wells at concentrations ranging from 1.0 to 130 µg/L); 2,3,5,6- and 2,3,4,6-tetrachlorophenol (detected in four wells at concentrations ranging from 28 to 1100 µg/L); 2,3,6-trichlorophenol (6.1 µg/L at LW-4S and 0.53 µg/L at RW-1); and 2,4,6-trichlorophenol (detected in three wells at concentrations ranging from 0.68 to 2.3 µg/L).

- Naphthalene, a noncarcinogenic polynuclear aromatic hydrocarbon (PAH), was detected in samples from seven shallow wells (B1, LW-2S, LW-4S, LW-7S, LW-8S, LW-11S, and RW-1) at concentrations ranging from 1.4 to 40 µg/L, using method 8270. Naphthalene was detected in the same wells (except B1, LW-2S and RW-1) at concentrations ranging from 18 to 110 µg/L using method 8260.

- All other semivolatile results were reported as nondetected with the following exceptions: phenol (15 µg/L at RW-1); 2-chlorophenol (1.2 µg/L at LW-4S); 2-methylphenol (3.6 µg/L at B1); 4-methylphenol (detected in four wells at concentrations ranging from 1.6 to 47 µg/L) (47 µg/L at B1, 3.6 µg/L at LW-4S, 3.5 µg/L at LW-11S, and 1.6 µg/L at RW-1); benzoic acid (73 µg/L at B1 and 44 µg/L at LW-4S); 2,4-dichlorophenol (48 µg/L at LW-4S and 3.1 µg/L at RW-1); 4-chloro-3-methylphenol (7.3 µg/L at LW-4S and 2.6 µg/L at LW-11S); 2-methylnaphthalene (detected in five wells at concentrations ranging from 3.4 to 30 µg/L); 2,4,6-trichlorophenol (6.8 µg/L at RW-1); and di-n-butylphthalate (1.3 µg/L at B1 and 3.9 µg/L at LW-4S).

- Several volatile compounds were detected in the shallow wells at low concentrations, including:

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- Acetone (detected in three wells at concentrations ranging from 11 to 410 µg/L)
- Benzene (1,100 µg/L at B1 and 29 µg/L at LW-8S)
- Toluene (detected in four wells at concentrations ranging from 9.2 to 3,600 µg/L)
- Ethylbenzene (detected in seven wells at concentrations ranging from 1.6 to 300 µg/L)
- m-, p-, and o-Xylene (detected in seven wells at total xylene concentrations ranging from 11.1 to 1,410 µg/L)
- 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected in seven wells at individual concentrations ranging from 3.0 to 500 µg/L)
- Isopropylbenzene and n-propylbenzene (detected in seven and eight wells, respectively, at individual concentrations ranging from 1.5 to 120 µg/L)
- tert-Butylbenzene (5.5 µg/L at LW-8S and 1.5 µg/L at LW-11S)
- sec-Butylbenzene (detected in six wells at concentrations ranging from 2.3 to 25 µg/L)
- 4-Isopropyltoluene (detected in five wells at concentrations ranging from 1.1 µg/L to 19 µg/L)
- n-Butylbenzene (detected in four wells at concentrations ranging from 2.8 to 14 µg/L)

• TPH-diesel range concentrations were detected in seven shallow wells, ranging from 0.32 mg/L to 15 mg/L.

• TPH-motor oil range was analyzed at wells B1, LW-8S, and RW-1, at nondetected concentrations reported at all locations.

• TPH-gasoline range was analyzed at wells B1, LW-8S, LW-11S, and RW-1 at reported concentrations ranging from 13 to 36 mg/L.

• At least one priority pollutant metal was detected in each shallow well as follows:

- Arsenic (detected in all wells where analyzed, except well K) was observed at concentrations ranging from 0.004 to 0.023 mg/L)
- Chromium (detected only in LW-2S at 0.005 mg/L)
- Copper (detected in three wells at concentrations ranging from 0.004 to 0.016 mg/L)
- Lead (detected only in well LW-2S at 0.003 mg/L)
- Nickel (detected in two wells, B1 and K at the detection limit of 0.01 mg/L)
- Zinc (detected in three wells at concentrations ranging from 0.006 to 0.016 mg/L).

• Ethanol was reported nondetected as at all four wells sampled for this analysis.

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The analytical results from the shallow wells indicate that the highest concentrations of PCP in the upper zone during the third quarter 2000 event were observed in well LW-4S (7,200 µg/L by method 8040) and well RW-1 (6,300 µg/L by method 8040). As shown on Figure 5, PCP concentrations have increased significantly in well LW-4S since February 2000, when concentrations were near the detection limit. PCP concentrations have also increased in RW-1 since this time, but were slightly lower than the previous quarter (May 2000) result (Figure 7). The PCP concentration at well LW-2S (200 µg/L by method 8270), the upper zone well located within the former PCP mixing area, was the lowest concentration at this well to date (Figure 6). The most elevated concentrations of other semivolatile compounds (naphthalene and 2-methylnaphthalene) were detected in wells B1 and LW-8S. The most elevated concentrations of volatile compounds were generally observed at wells B1, LW-4S, LW-8S, LW-11S, and RW-1. The most elevated concentrations of metal constituents were detected in wells LW-2S, -4S, and -8S. The most elevated concentrations of TPH compounds were observed at wells B1 and RW-1.

2.2.3 Lower Water-Bearing Zone

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for some low metal concentrations (and TPH-diesel fuel), analytical results for wells J2, LW-1D, LW-3D and LW-10D were nondetect.

- PCP was detected at two deep wells LW-4D and RW-2, at concentrations 0.30 µg/L and 630 µg/L, respectively, using EPA method 8040. PCP concentrations were 8.9 µg/L and 490 (estimated) µg/L for the same wells using method 8270. Groundwater from wells LW-17D and LW-18D was also analyzed for PCP and was reported as nondetect at both locations.

- Other chlorinated phenols were detected in well RW-2 as follows: 2,3,5,6- and 2,3,4,6-tetrachlorophenol (45 µg/L); 2,3,4,5-tetrachlorophenol (7.8 µg/L); and 2,4,6-trichlorophenol (2.5 µg/L).

- Naphthalene was detected in two deep wells LW-4D and RW-2 at concentrations of 11 and 16 µg/L, respectively, using method 8270 and at concentrations of 26 and 30 µg/L, respectively, using method 8260.

- Other semivolatile results were reported as nondetect for deep wells with the following exceptions:

  - Phenol (detected in three wells at concentrations from 8.4 to 170 µg/L)

  - 4-Methylphenol (detected in well RW-2 at 6.0 µg/L)

  - benzoic acid (detected at well LW-4D at 11 µg/L)

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- 2,4-dichlorophenol (detected at well RW-2 at 8.7 µg/L)
- 2-methylnaphthalene (detected in three wells at concentrations ranging from 7.7 to 44 µg/L)
- 2,4,5-trichlorophenol (detected at well RW-2 at 16 µg/L using method 8270, but was nondetect at a detection limit of 10 µg/L using method 8040)
- acenaphthene (detected at well O at 1.9 µg/L)
- Fluorene (detected in well O at a concentration of 2.9 µg/L)
- Di-n-butylphthalate (detected in wells B2 and RW-2 at concentrations at 1.3 to 2.0 µg/L)
- Bis(2-ethylhexyl)phthalate (detected in well G1A at 1.7 µg/L)
- Di-n-octyl phthalate (detected in well RW-2 at 1.2 µg/L).

- Several volatile compounds were detected at low concentrations, including:
  - Acetone (detected in four wells at concentrations ranging from 8.4 to 45 µg/L)
  - 2-Butanone (detected in well RW-2 at 28 µg/L)
  - Benzene (detected in well O at 18 µg/L and well R at 120 µg/L)
  - Toluene (detected in three wells at concentrations ranging from 1.8 µg/L to 6.3 µg/L)
  - Ethylbenzene (detected in wells LW-4D and RW-2 at concentrations of 39 and 28 µg/L, respectively)
  - m-, p-, and o-Xylene (detected in four wells, at total xylene concentrations ranging from 1.3 to 133 µg/L)
  - 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (at least one of the compounds detected in five wells at individual concentrations ranging from 3.3 to 270 µg/L)
  - Isopropylbenzene and n-propylbenzene (at least one of the compounds detected in nine wells at individual concentrations ranging from 1.1 to 100 µg/L)
  - tert-Butylbenzene (detected in three wells at concentrations ranging from 3.2 to 4.0 µg/L)
  - sec-Butylbenzene (detected in eight wells at concentrations ranging from 1.2 to 20 µg/L)
  - 4-Isopropyltoluene (detected in four wells at concentrations ranging from 1.1 to 12 µg/L)
  - n-Butylbenzene (detected in four wells at concentrations ranging from 2.0 to 17 µg/L).
- TPH-diesel range concentrations were detected in seven deep wells at concentrations ranging from 0.26 to 3.8 mg/L.

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- TPH-gasoline was analyzed only at RW-2 and detected at concentration of 7.7 mg/L.
- At least one priority pollutant metal was detected in each deep well tested, as follows:
  - Arsenic (detected in all deep wells tested, ranging at concentrations from 0.004 to 0.037 mg/L)
  - Chromium (detected in five wells, ranging at concentrations from 0.005 to 0.034 mg/L)
  - Copper (detected in eight wells at concentrations ranging from 0.002 to 0.045 mg/L)
  - Lead (detected in seven wells at concentrations ranging from 0.001 to 0.012 mg/L)
  - Nickel (detected in four wells at concentrations ranging from 0.01 to 0.03 mg/L)
  - Zinc (detected in all deep wells, except J2 and LW-12D, ranging at concentrations from 0.007 to 0.076 mg/L).

The analytical results from the deep wells indicate that the highest concentration of PCP was detected in well RW-2 (630 µg/L by method 8040 and 490 µg/L by method 8270) during the third quarter 2000 event. This result is comparable to the PCP concentrations detected at RW-2 during the February 2000 quarterly event, and is the highest PCP detection to date for the method 8040 results at this location (Figure 9). PCP concentrations at wells LW-4D, LW-11D, LW-12D1, and G1A, continue to remain at near or below detection limits after decreasing from elevated levels in mid to late-1999 (late 1997 for GIA). The most elevated concentrations of semivolatile (naphthalene and 2-methylnaphthalene) compounds were observed in wells LW-4D, and RW-2. The most elevated concentrations of most volatile compounds observed in wells O, R, G1A, LW-4D and RW-2. The most elevated concentrations of metals were detected in wells G1A and LW-11D.

2.2.4 DEEP SAND UNIT

Well LW-12D2 is the only well currently installed in the deep sand unit underlying the lower water-bearing zone. Only two detections were noted in well LW-12D2: Di-n-butylphthalate at 1.1 µg/L and arsenic at 0.022 mg/L.

2.2.5 WATER LEVEL AND CONTAMINANT TRENDS

Water levels and concentrations of selected constituents were evaluated by generating time versus water level and time versus concentration plots for the Phase II RI quarterly events. Plots of water levels and PCP concentrations (EPA method 8270) versus time for wells LW-2S, RW-1, and LW-11S in the

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upper zone, wells RW-2 and G1A in the lower zone, and nested wells LW-4S and LW-4D are provided on Figures 5 through 10.

The upper zone well plots indicate that water levels show typical seasonal fluctuations with seasonal lows during the fall months (October-November) and seasonal highs during the winter and early spring months (January-March) (Figures 5 through 8) . These plots show PCP concentrations in the upper water-bearing zone moderately following the water levels in that zone over time in wells LW-2S and LW-11S; however, figures 5 and 7 indicate that no correlation is apparent between the two in RW-1 and LW-4S.

In the lower zone, water levels trend similarly with seasonal fluctuations in the Willamette River as shown by the plot of G1A and the river on Figure 10; however, there appears to be no correlation between PCP concentrations and water levels (Figures 5, 9, and 10).

As discussed previously, PCP concentrations within the previously defined PCP plume area in the upper zone at LW-2S and LW-11S continue to decrease over time, while PCP concentrations on the downgradient size of the plume area at wells RW-1 and LW-4S continue to increase, particularly during the last two quarterly events. These concentration trends, as well as the low detection of PCP (less than 1 µg/L) at LW-13S, indicate that the plume may be shifting slightly to the south-southwest. Upper zone wells LW-10S (located at the south property boundary) and well LW-9S (located between the PCP plume extent and the Willamette River) continue to be dry, indicating that the upper zone may be discontinuous where the confining unit between the upper and lower zones thins or is not observed in these areas. In the lower zone, PCP was only detected at two wells; LW-4D at a slightly higher concentration than the previous quarter (8.9 µg/L) (Figure 5) and at RW-2, where PCP concentrations have generally increased since December 1999 (Figure 9).

To evaluate concentration trends of other constituents over the quarterly sampling periods, the concentrations of four additional chemicals (2,3,4,6 and 2,3,5,6-tetrachlorophenol, total xylenes, and naphthalene) were plotted over time with PCP at wells LW-2S and LW-4D (Figures 11 and 12). (For consistency in the plots over time, concentrations using EPA method 8270 were used for PCP and concentrations using EPA method 8260 were used for total xylenes and naphthalene.) Both plots indicate that the PCP and tetrachlorophenol concentrations appear to be correlated and trend similarly to the xylene and naphthalene concentrations (which also appear correlated to each other) during 1997 and most of 1999 and 2000, but trend differently in 1998 and during this third quarter event. The differences in the trends appear less pronounced in LW-2S than in LW-4D. Contaminant trends will continue to be evaluated for future quarterly events; a more detailed evaluation was presented in the Phase II RI report (Landau Associates 2000b).

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3.0 FUTURE GROUNDWATER TASKS

The fourth quarter 2000 groundwater sampling event was conducted November 6-10, 2000. The groundwater analytical program for the fourth quarter 2000 event included all previous modifications by DEQ. The results of the fourth quarter 2000 event will be provided in the *Fourth Quarter 2000 Groundwater Report.*

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4.0 USE OF THIS REPORT

This quarterly 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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Project Manager

And

For Christy L. Johnson
Senior Staff Engineer

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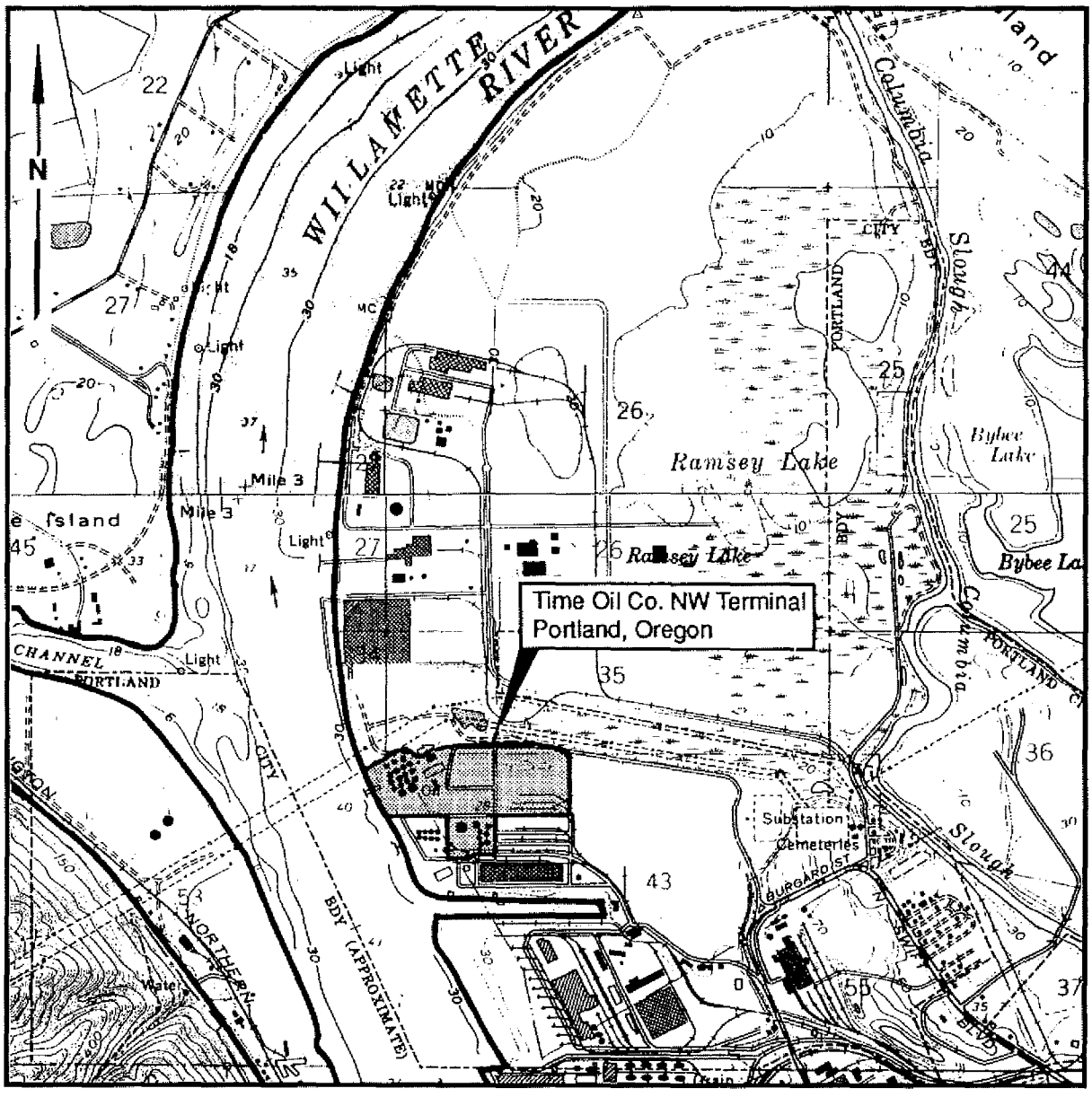
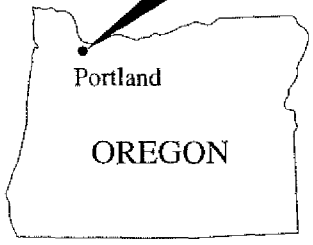


SITE LOCATION
(see enlarged map area above)



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Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure **1**

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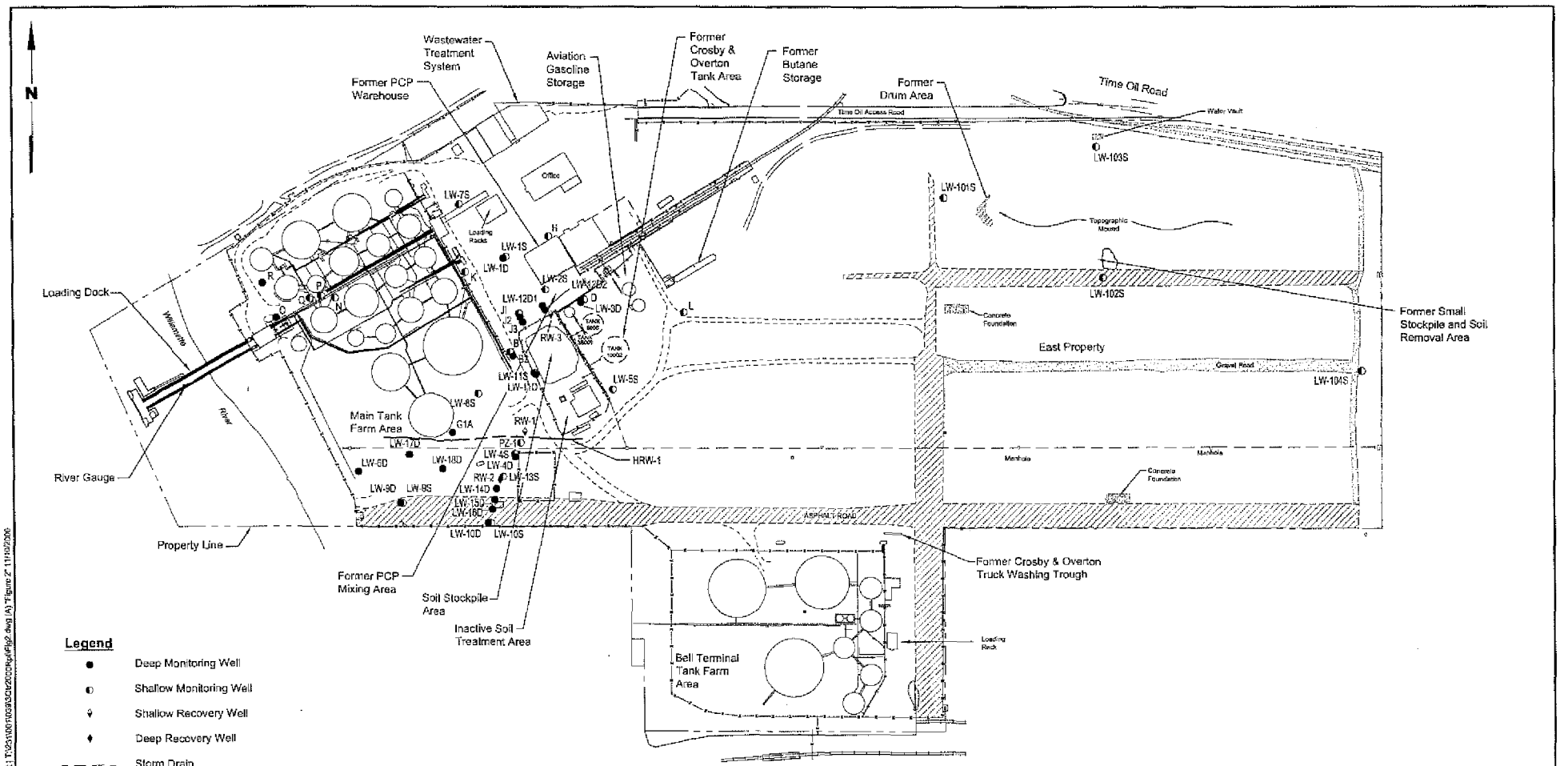

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Time Oil NW Terminal Portland, OR	**Monitoring Well and Recovery Well Locations**	Figure 2

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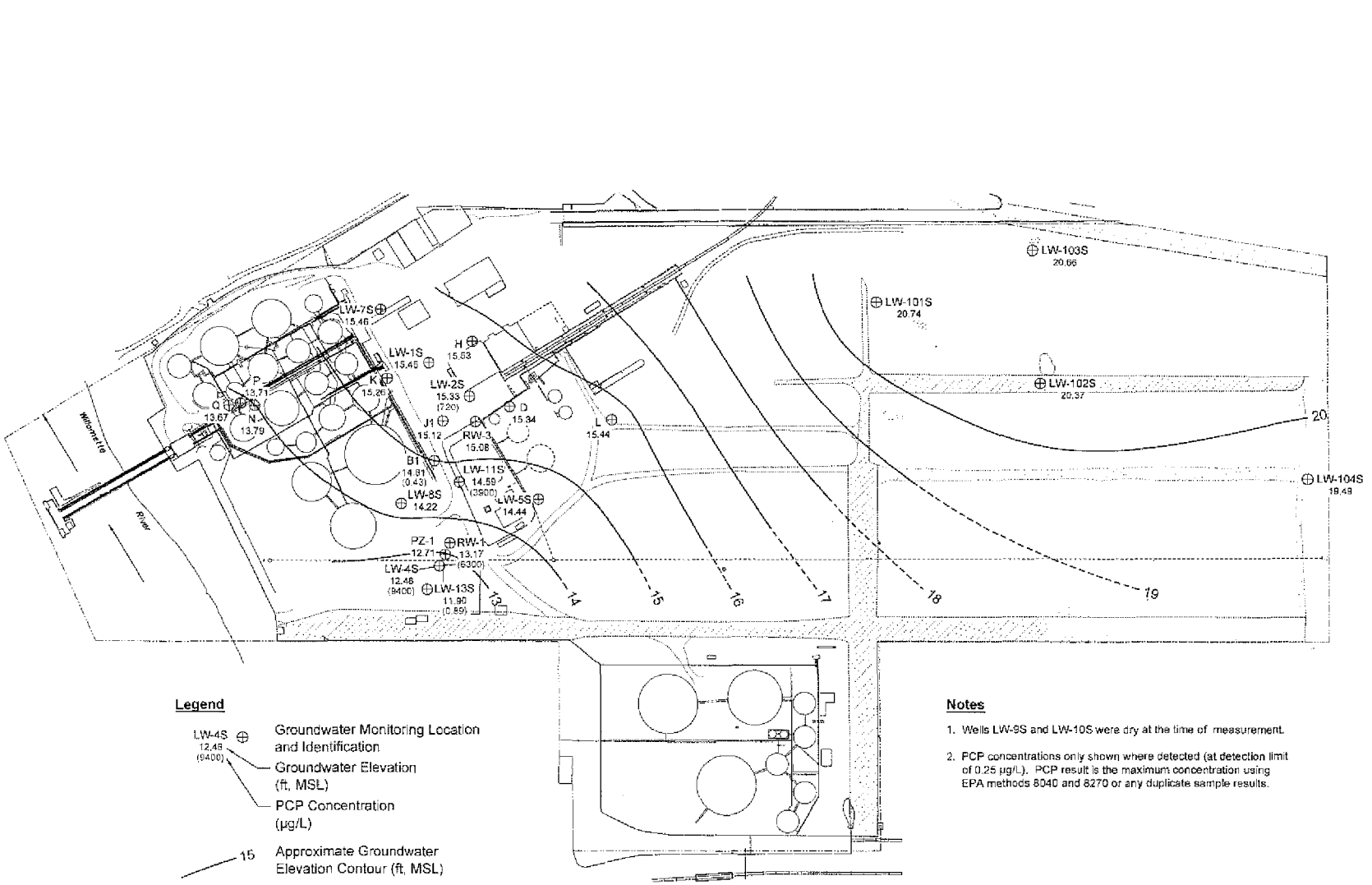

Legend

LW-4S 12.48 (9400) — Groundwater Monitoring Location and Identification; Groundwater Elevation (ft, MSL); PCP Concentration (µg/L)

15 — Approximate Groundwater Elevation Contour (ft, MSL)

0 200 400
Scale in Feet

Notes

1. Wells LW-9S and LW-10S were dry at the time of measurement.
2. PCP concentrations only shown where detected (at detection limit of 0.25 µg/L). PCP result is the maximum concentration using EPA methods 8040 and 8270 or any duplicate sample results.

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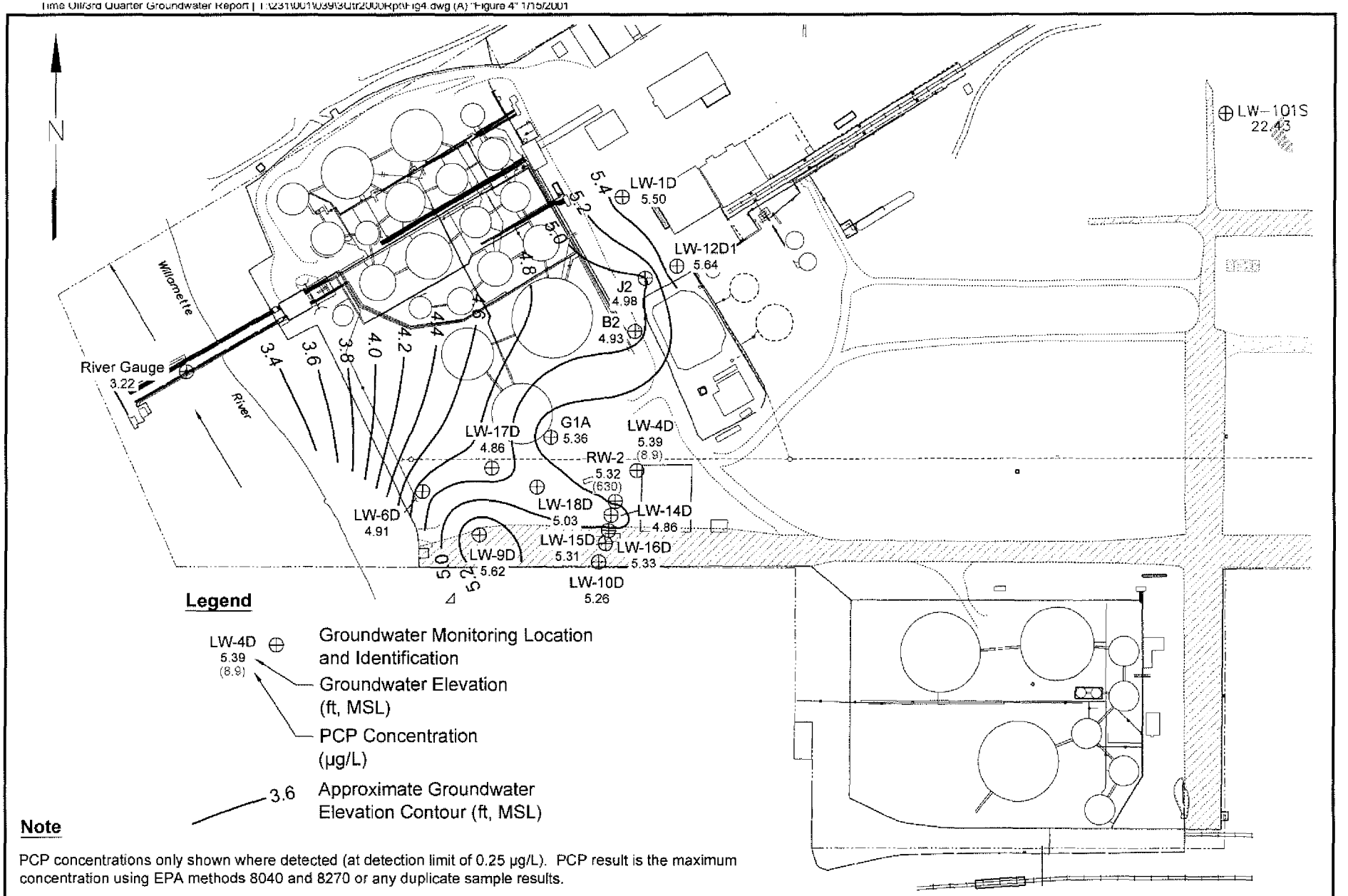
Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Upper Zone, Third Quarter 2000 Event**	Figure 3

Time Oil/3rd Quarter Groundwater Report | T:\231\001\039\3Qtr2000Rpt\Fig3.dwg [A] "Figure 3" 1/15/2001

BZTO104(e)015762



Landau Associates

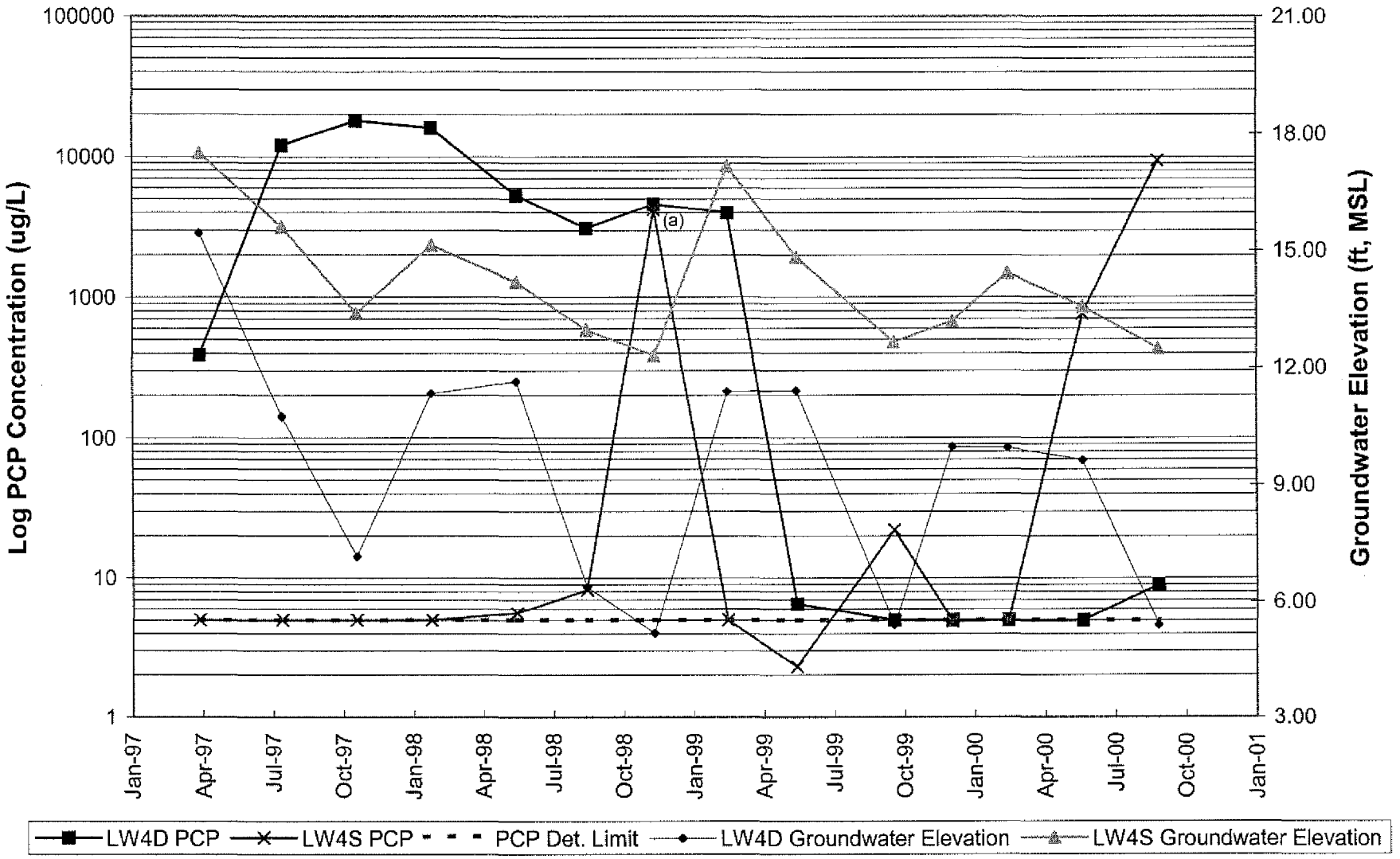
Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours
Lower Zone, Third Quarter 2000 Event

Figure
4

BZTO104(e)015763

1/3/01 S:\WPROC\231\001\131\Figure 5.doc



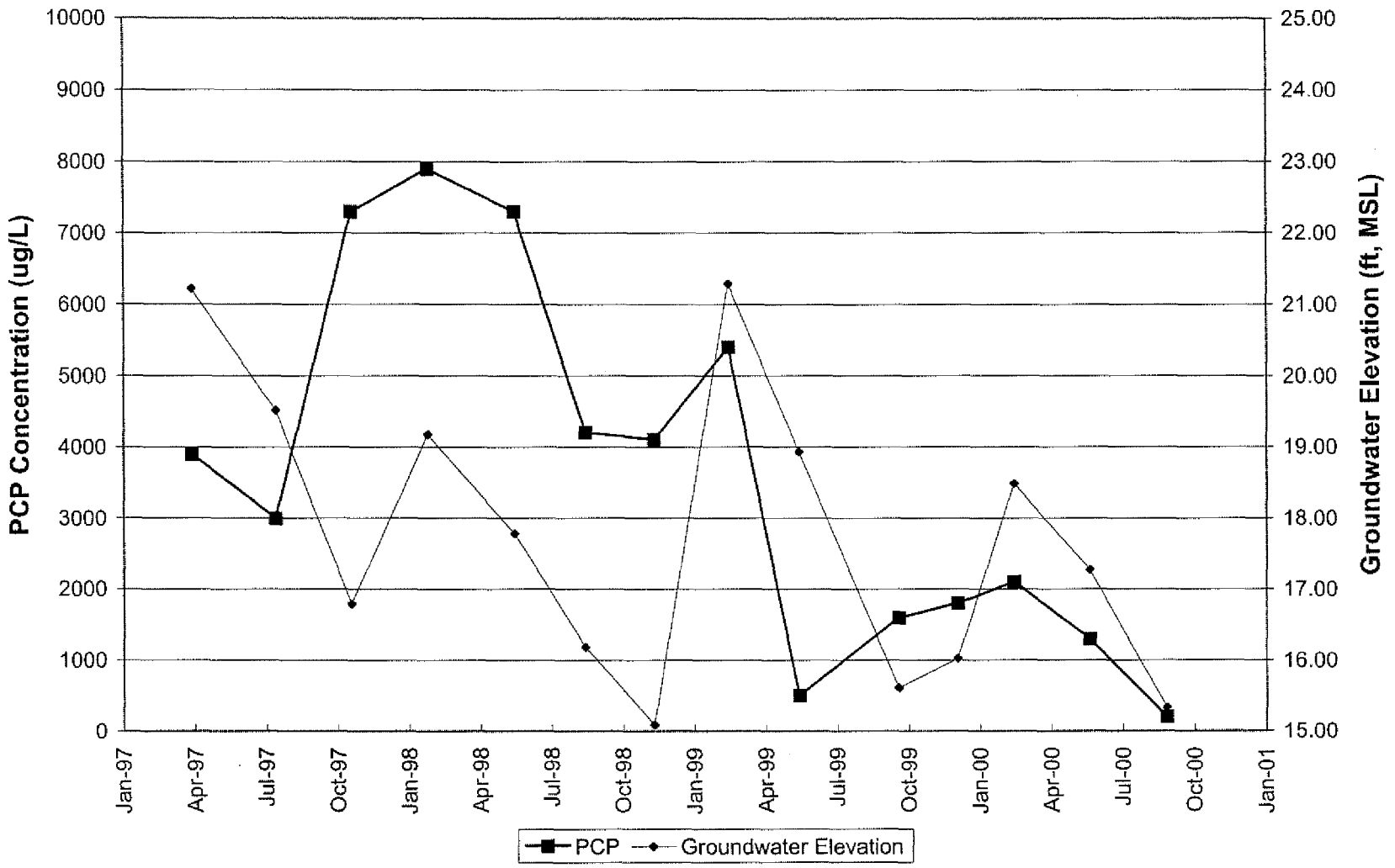
Note: (a) Concentration of PCP at well LW4S during the November 1998 event appears anomalous.

Landau Associates

Time Oil NW Terminal Portland, Oregon	**LW-4D and LW-4S PCP Concentrations and Groundwater Elevations**	Figure 5

BZT0104(e)015764

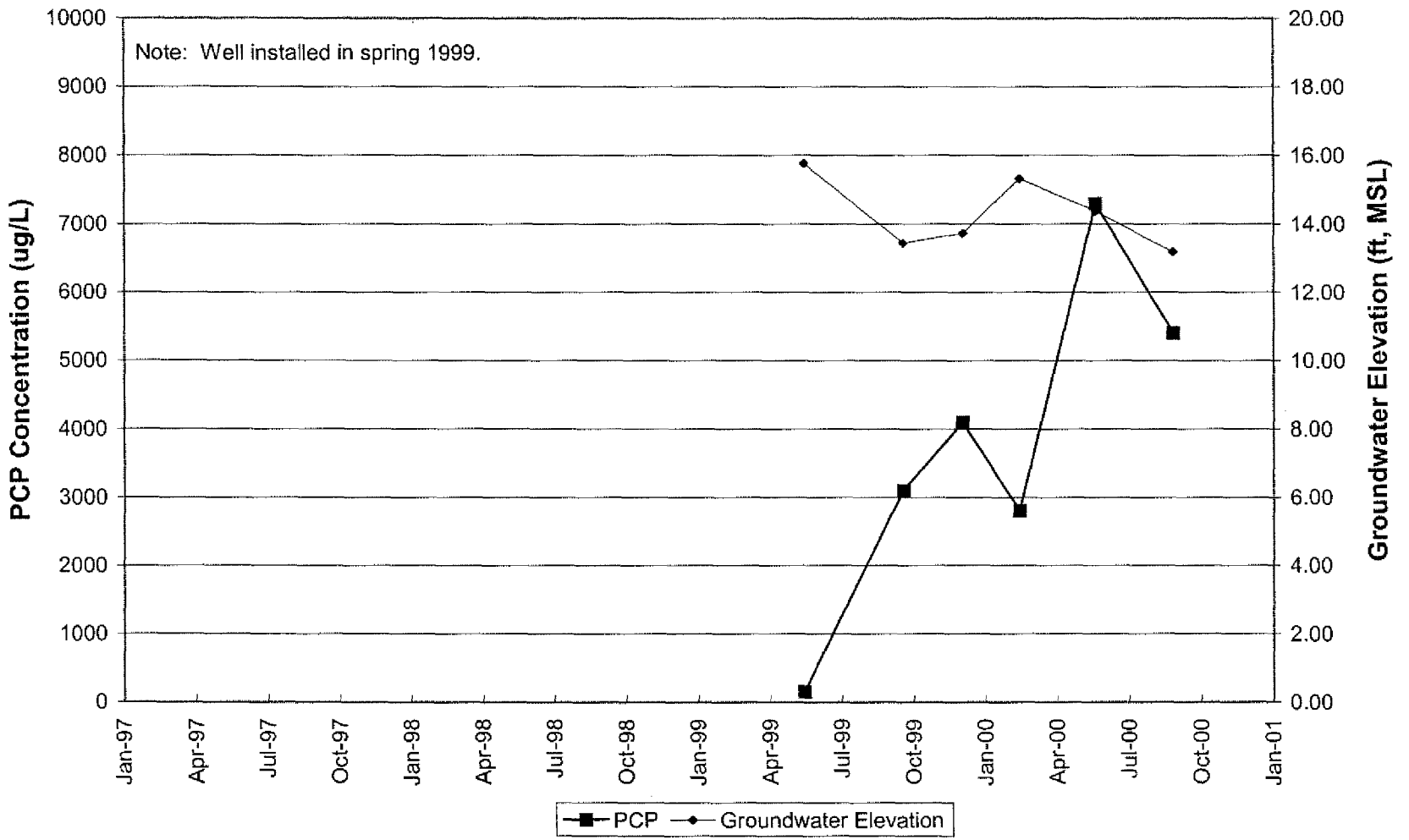
1/3/01 S:\WPROC\231\001\131\Figure 6.doc



Landau Associates

Time Oil NW Terminal Portland, Oregon	**LW-2S** **PCP Concentrations and Groundwater Elevations**	Figure 6

BZTO104(e)015765



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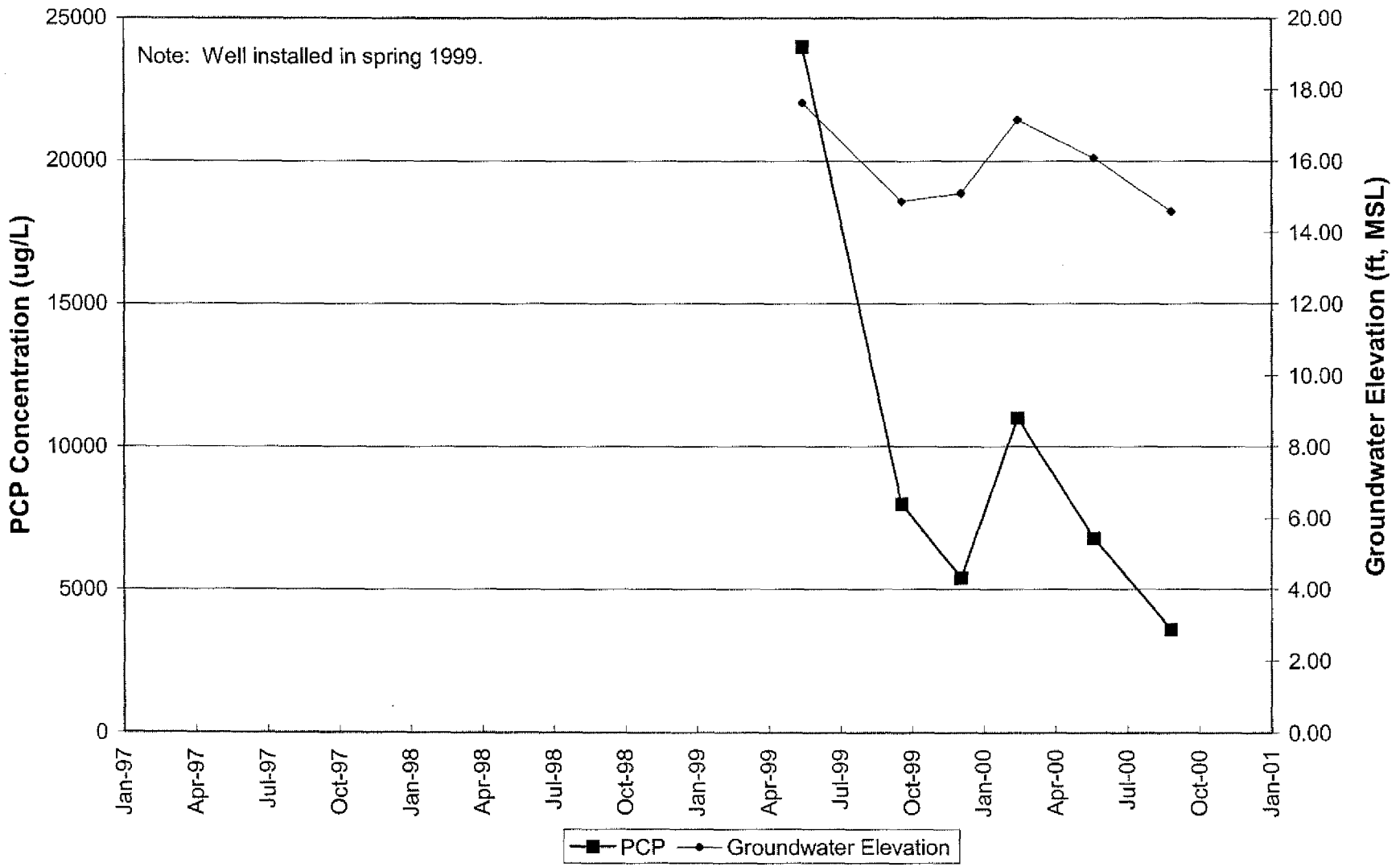
Time Oil NW Terminal Portland, Oregon	**RW-1** **PCP Concentrations and Groundwater Elevations**	Figure 7

BZTO104(e)015766

1/3/01 S:\WPROC\231\001\131\Figure 8.doc

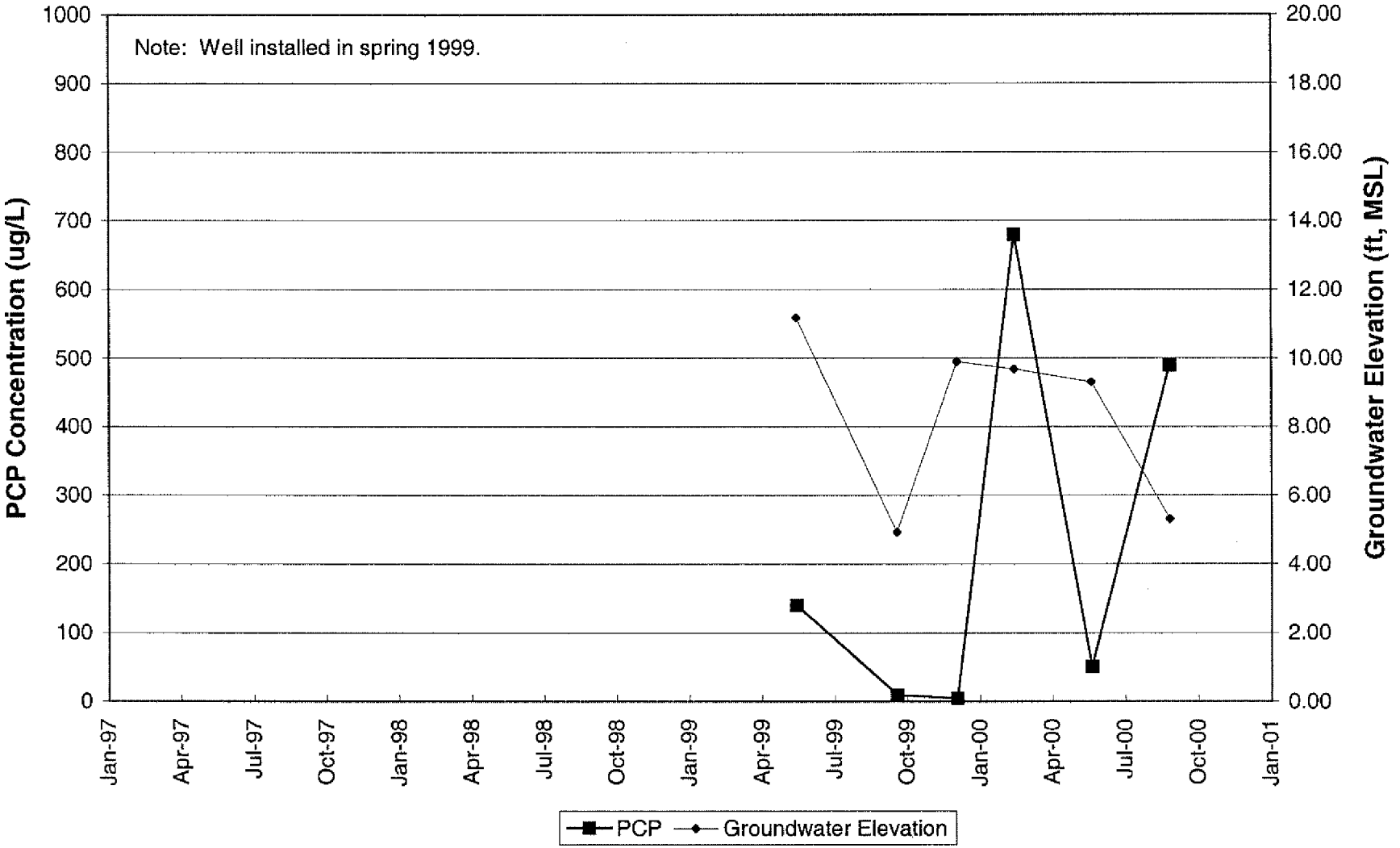


Landau Associates

Time Oil NW Terminal Portland, Oregon	**LW-11S** **PCP Concentrations and Groundwater Elevations**	Figure 8

BZTO104(e)015767

1/5/01 S:\WPROC\231\001\131\Figure 9.doc



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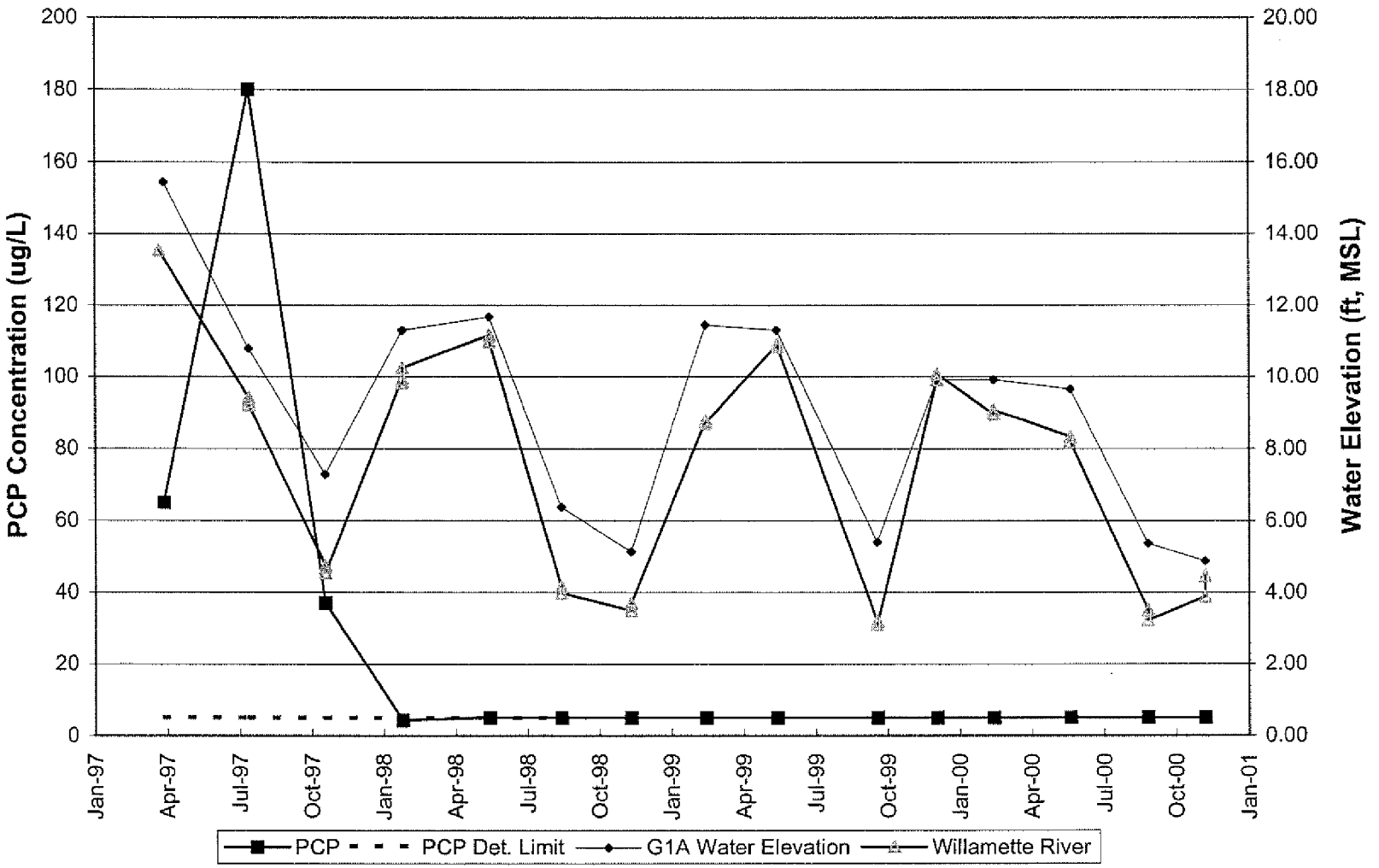
Time Oil NW Terminal
Portland, Oregon

RW-2
PCP Concentrations and Groundwater Elevations

Figure
9

BZTO104(e)015768

1/3/01 S:\WPROC\231\001\131\Figure 10.doc



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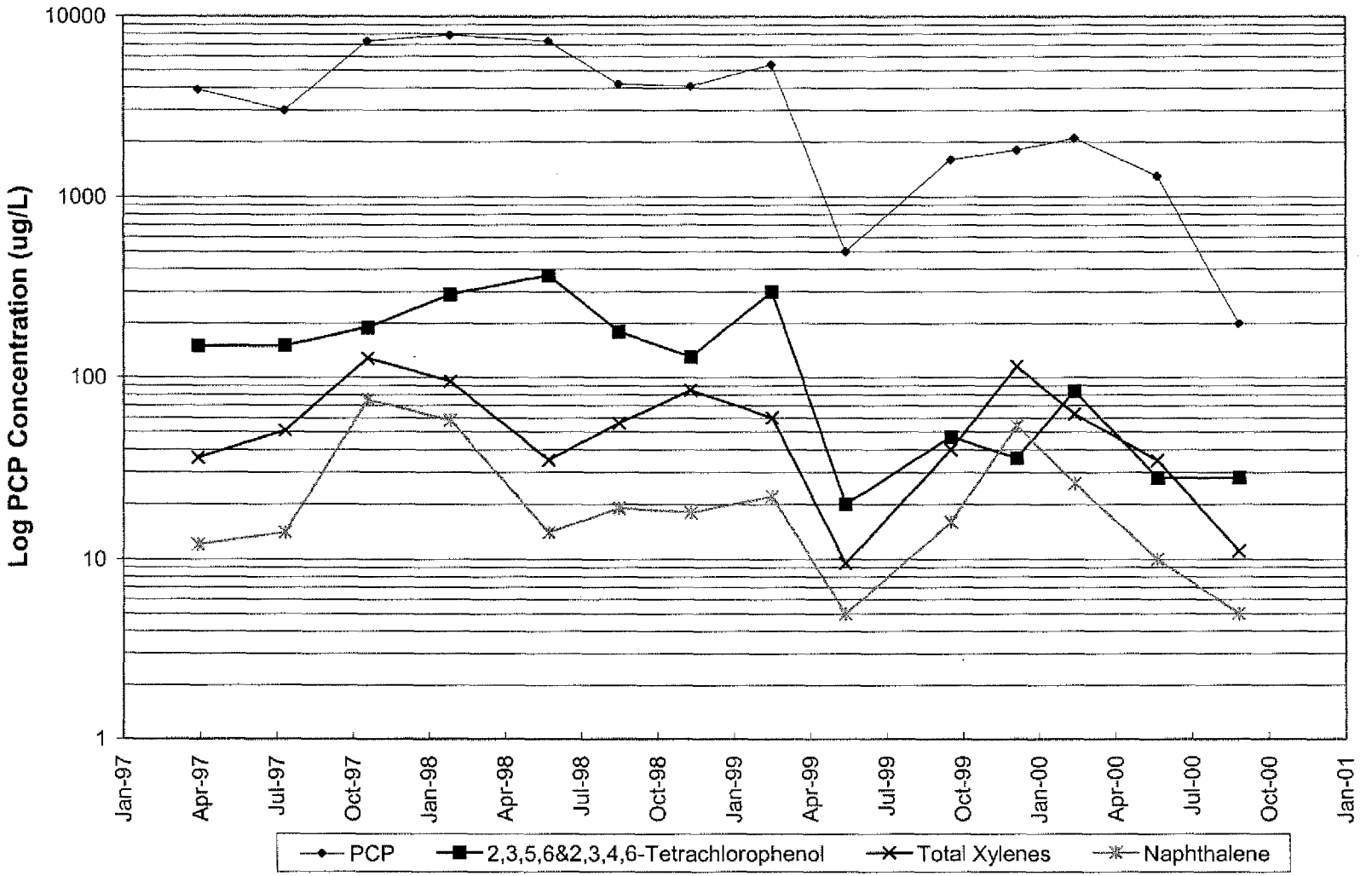
Time Oil NW Terminal Portland, OR	**G1A and Willamette River PCP Concentrations and Water Elevations**	Figure 10

BZTO104(e)015769

1/3/01 S:\WPROC\231\001\131\Figure 11.doc

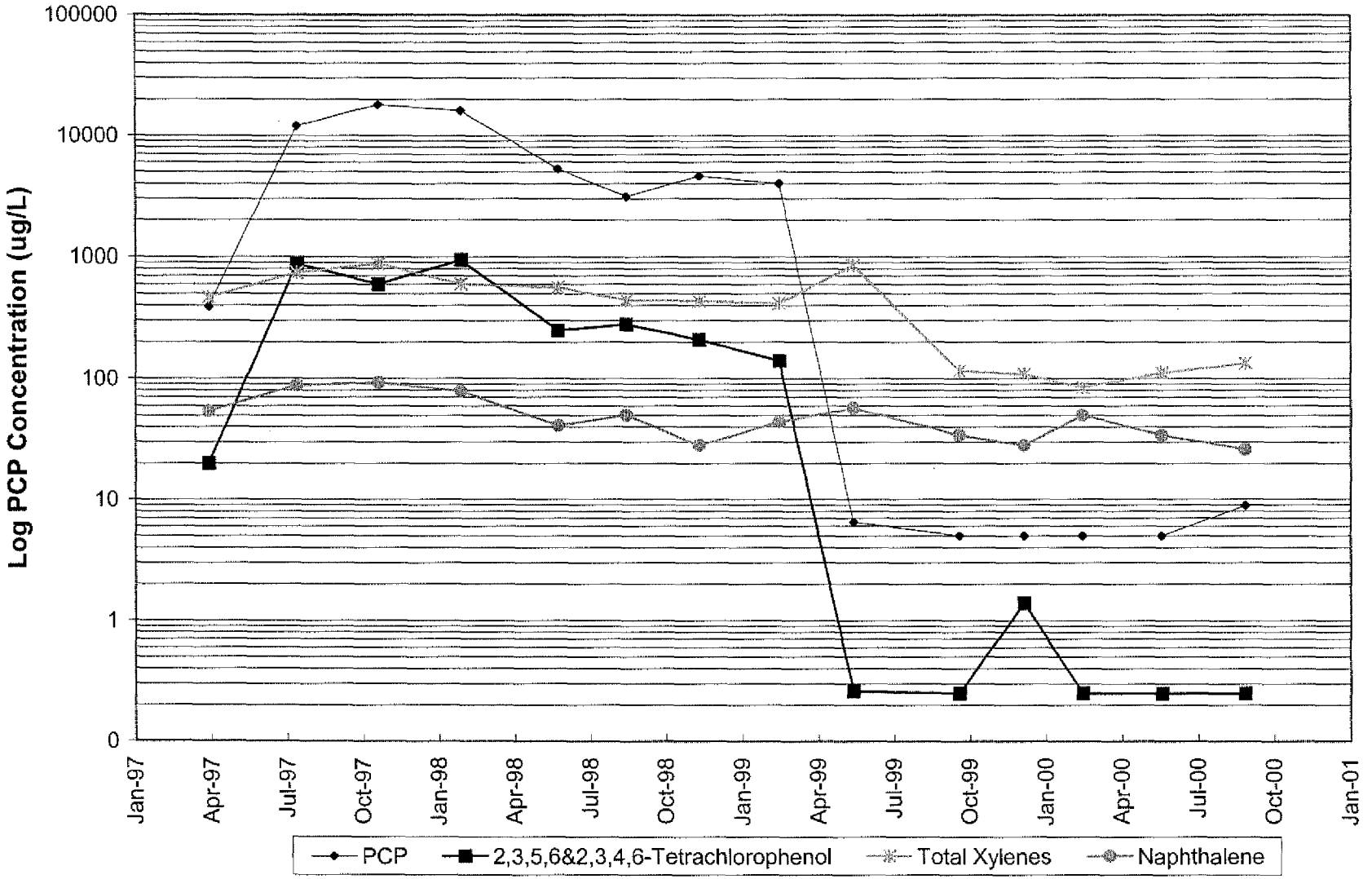


Landau Associates

Time Oil NW Terminal Portland, Oregon	**LW-2S** **Selected Constituents**	Figure 11

BZTO104(e)015770

1/3/01 S:\WPROC\231\001\131\Figure 12.dcc



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Time Oil NW Terminal Portland, Oregon	**LW-4D** **Selected Constituents**	Figure 12

BZTO104(e)015771

APPENDICES

APPENDIX A

Groundwater Level Measurements and Quality Data

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
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	----	
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	----	
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	----	
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?
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	----	
F*	08/18/98	08:10	NA	14.77	NA		
G *	03/25/97	11:57	30.24	14.49	15.75	----	
G *	03/31/97	09:13	30.24	14.01	16.23	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	----	
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	----	
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	----	
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	----	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	No product measured
N	11/09/00	12:26	31.40	18.23	13.19	0.03	
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	
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	----	Small film of product
LW1S	03/31/97	11:12	27.96	6.65	21.31	----	
LW1S	07/16/97	08:15	27.96	8.34	19.62	----	
LW1S	10/21/97	16:53	27.96	11.02	16.94	----	
LW1S	01/27/98	13:00	27.96	8.75	19.21	----	
LW1S	05/18/98	17:40	27.96	9.15	18.81	----	
LW1S	08/17/98	10:54	27.96	11.67	16.29	----	
LW1S	11/13/98	10:02	27.96	12.76	15.20	----	
LW1S	02/16/99	13:24	27.96	6.60	21.36	----	
LW1S	05/18/99	15:38	27.96	8.92	19.04	----	
LW1S	09/21/99	12:10	27.96	12.20	15.76	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW1S	12/06/99	14:33	27.96	11.86	16.10	----	
LW1S	02/16/00	10:50	27.96	9.42	18.54	----	
LW1S	05/23/00	17:18	27.96	10.52	17.44	----	
LW1S	08/29/00	13:58	27.96	12.51	15.45	----	
LW1S	11/09/00	13:17	27.96	13.26	14.70	----	
LW2S	03/25/97	12:22	29.56	8.06	21.50	----	
LW2S	03/31/97	11:27	29.56	8.34	21.22	----	
LW2S	07/16/97	08:33	29.56	10.05	19.51	----	
LW2S	10/21/97	17:04	29.56	12.77	16.79	----	
LW2S	01/27/98	13:25	29.56	10.39	19.17	----	
LW2S	05/18/98	18:02	29.56	11.78	17.78	----	
LW2S	08/17/98	10:56	29.56	13.38	16.18	----	
LW2S	11/13/98	10:32	29.56	14.47	15.09	----	
LW2S	02/16/99	13:42	29.56	8.27	21.29	----	
LW2S	05/18/99	15:45	29.56	10.63	18.93	----	
LW2S	09/21/99	12:34	29.56	13.95	15.61	----	
LW2S	12/06/99	15:11	29.56	13.54	16.02	----	
LW2S	02/16/00	10:38	29.56	11.08	18.48	----	
LW2S	05/23/00	17:24	29.56	12.29	17.27	----	
LW2S	08/29/00	14:12	29.56	14.23	15.33	----	
LW2S	11/09/00	13:04	29.56	15.00	14.56	----	
LW4S	03/31/97	09:20	30.26	12.77	17.49	----	
LW4S	07/16/97	07:40	30.26	14.66	15.60	----	
LW4S	10/21/97	16:25	30.26	16.88	13.38	----	
LW4S	01/27/98	12:00	30.26	15.13	15.13	----	
LW4S	05/18/98	17:32	30.26	16.08	14.18	----	
LW4S	08/17/98	11:07	30.26	17.30	12.96	----	
LW4S	11/13/98	09:56	30.26	17.96	12.30	----	
LW4S	02/16/99	13:16	30.26	13.10	17.16	----	
LW4S	05/18/99	15:03	30.26	15.43	14.83	----	
LW4S	09/21/99	11:44	30.26	17.61	12.65	----	
LW4S	12/06/99	14:19	30.26	17.08	13.18	----	
LW4S	02/16/00	10:31	30.26	15.84	14.42	----	
LW4S	05/23/00	16:55	30.26	16.71	13.55	----	
LW4S	08/29/00	13:39	30.26	17.78	12.48	----	
LW4S	11/09/00	12:53	30.26	18.17	12.09	----	
LW5S	03/25/97	12:29	30.79	10.57	20.22	----	
LW5S	03/31/97	11:35	30.79	10.84	19.95	----	
LW5S	07/16/97	08:53	30.79	12.29	18.50	----	
LW5S	10/21/97	15:16	30.79	15.00	15.79	----	
LW5S	01/27/98	13:36	30.79	12.90	17.89	----	
LW5S	05/18/98	18:05	30.79	14.19	16.60	----	
LW5S	08/17/98	11:09	30.79	15.54	15.25	----	
LW5S	11/13/98	10:38	30.79	16.55	14.24	----	
LW5S	02/16/99	13:16	30.79	10.59	20.20	----	
LW5S	05/18/99	16:01	30.79	13.12	17.67	----	
LW5S	09/21/99	12:40	30.79	16.00	14.79	----	
LW5S	12/06/99	14:47	30.79	15.64	15.15	----	
LW5S	02/16/00	09:56	30.79	13.54	17.25	----	
LW5S	05/23/00	17:51	30.79	14.80	15.99	----	
LW5S	08/29/00	14:37	30.79	16.35	14.44	----	
LW5S	11/09/00	13:45	30.79	16.98	13.81	----	
LW7S	03/31/97	11:05	28.10	6.75	21.35	----	
LW7S	07/16/97	08:05	28.10	8.62	19.48	----	
LW7S	10/21/97	16:45	28.10	11.26	16.84	----	
LW7S	01/27/98	12:47	28.10	8.85	19.25	----	
LW7S	05/18/98	17:48	28.10	10.34	17.76	----	
LW7S	08/17/98	10:48	28.10	11.85	16.25	----	
LW7S	11/13/98	10:12	28.10	12.90	15.20	----	Strong gasoline odor
LW7S	02/16/99	13:53	28.10	6.81	21.29	----	
LW7S	05/18/99	15:23	28.10	9.14	18.96	----	
LW7S	09/21/99	12:03	28.10	12.37	15.73	----	
LW7S	12/06/99	14:27	28.10	12.00	16.10	----	
LW7S	02/16/00	10:46	28.10	9.60	18.50	----	
LW7S	05/23/00	17:09	28.10	10.70	17.40	----	
LW7S	08/29/00	13:53	28.10	12.64	15.46	----	
LW7S	11/09/00	13:14	28.10	13.36	14.74	----	
LW8S	05/18/99	14:55	31.28	14.84	16.44	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW8S	09/21/99	12:24	31.28	16.94	14.34	----	
LW8S	12/06/99	14:40	31.28	16.63	14.65	----	
LW8S	02/16/00	10:16	31.28	15.18	16.10	----	
LW8S	05/23/00	17:42	31.28	15.88	15.40	----	
LW8S	08/29/00	14:26	31.28	17.06	14.22	----	
LW8S	11/09/00	13:32	31.28	17.55	13.73	----	
LW9S	05/18/99	14:57	31.04	19.58	11.46	----	Water level appears to be more representative of lower zone
LW9S	09/21/99	11:36	31.04	dry	----	----	
LW9S	12/06/99	14:13	31.04	19.64	----	----	Water in endcap
LW9S	02/16/00	10:24	31.04	19.59	----	----	Water in endcap
LW9S	05/23/00	16:39	31.04	dry	----	----	
LW9S	08/29/00	13:28	31.04	dry	----	----	
LW9S	11/09/00	12:42	31.04	dry	----	----	
LW10S	05/18/99	14:59	30.75	17.24	13.51	----	
LW10S	09/21/99	11:38	30.75	19.13	11.62	----	
LW10S	12/06/99	14:14	30.75	18.54	12.21	----	
LW10S	02/16/00	10:26	30.75	17.62	13.13	----	
LW10S	05/23/00	16:41	30.75	18.25	12.50	----	
LW10S	08/29/00	13:30	30.75	dry	----	----	
LW10S	11/09/00	12:45	30.75	dry	----	----	
LW11S	05/18/99	15:10	29.10	11.47	17.63	----	
LW11S	09/21/99	11:51	29.10	14.23	14.87	----	
LW11S	12/06/99	15:05	29.10	14.00	15.10	----	
LW11S	02/16/00	11:01	29.10	11.94	17.16	----	
LW11S	05/23/00	11:01	29.10	13.01	16.09	----	
LW11S	08/29/00	14:55	29.10	14.51	14.59	----	
LW11S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well.
LW13S	05/23/00	16:51	30.17	17.23	12.94	----	
LW13S	08/29/00	13:37	30.17	18.27	11.90	----	
LW13S	11/09/00	12:51	30.17	18.75	11.42	----	
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	----	
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	----	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	
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	----	
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	----	
PZ-1	05/23/00	17:47	28.04	14.21	13.83	----	
PZ-1	08/29/00	14:30	28.04	15.33	12.71	----	
PZ-1	11/09/00	12:55	28.04	15.68	12.36	----	
Deep Wells:							
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	----	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	
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	----	
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	----	
O	08/29/00	12:56	32.03	26.49	5.54	----	
O	11/09/00	12:18	32.03	27.01	5.02	----	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW1D	03/31/97	11:11	28.31	12.71	15.60	----	
LW1D	07/16/97	08:12	28.31	17.65	10.66	----	
LW1D	10/21/97	16:55	28.31	21.29	7.02	----	
LW1D	01/27/98	13:07	28.31	17.06	11.25	----	
LW1D	05/18/98	17:39	28.31	16.53	11.78	----	
LW1D	08/17/98	10:30	28.31	21.82	6.49	----	
LW1D	11/13/98	10:01	28.31	22.77	5.54	----	
LW1D	02/16/99	13:21	28.31	17.30	11.01	----	
LW1D	05/18/99	15:36	28.31	16.76	11.55	----	
LW1D	09/21/99	12:12	28.31	22.91	5.40	----	
LW1D	12/06/99	14:34	28.31	18.00	10.31	----	
LW1D	02/16/00	10:49	28.31	18.16	10.15	----	
LW1D	05/23/00	17:19	28.31	18.62	9.69	----	
LW1D	08/29/00	13:59	28.31	22.81	5.50	----	
LW1D	11/09/00	13:20	28.31	22.98	5.33	----	
LW3D	03/31/97	11:45	30.80	19.38	11.42	----	Time estimated
LW3D	07/16/97	08:38	30.80	28.09	2.71	----	
LW3D	10/21/97	17:07	30.80	23.36	7.44	----	
LW3D	01/27/98	13:30	30.80	21.66	9.14	----	
LW3D	05/18/98	17:35	30.80	19.21	11.59	----	
LW3D	08/17/98	10:24	30.80	24.62	6.18	----	
LW3D	11/13/98	09:03	30.80	25.56	5.24	----	
LW3D	02/16/99	13:44	30.80	20.00	10.80	----	
LW3D	05/18/99	15:58	30.80	19.42	11.38	----	Purged dry at 11:00
LW3D	09/21/99	10:40	30.80	25.76	5.04	----	
LW3D	12/06/99	14:45	30.80	20.69	10.11	----	
LW3D	02/16/00	09:54	30.80	20.98	9.82	----	
LW3D	05/23/00	14:40	30.80	21.16	9.64	----	Purged dry at 13:10
LW3D	08/29/00	14:36	30.80	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW3D	11/09/00		30.80	----	----	----	Well sampled 11/8/00 - water level not representative
LW4D	03/31/97	09:18	30.17	14.73	15.44	----	
LW4D	07/16/97	07:42	30.17	19.43	10.74	----	
LW4D	10/21/97	16:27	30.17	23.02	7.15	----	
LW4D	01/27/98	11:56	30.17	18.84	11.33	----	
LW4D	05/18/98	17:33	30.17	18.54	11.63	----	
LW4D	08/17/98	10:18	30.17	23.81	6.36	----	
LW4D	11/13/98	09:57	30.17	24.99	5.18	----	
LW4D	02/16/99	13:17	30.17	18.79	11.38	----	
LW4D	05/18/99	15:04	30.17	18.77	11.40	----	Completed sampling at 13:40
LW4D	09/21/99	11:41	30.17	24.78	5.39	----	
LW4D	12/06/99	14:18	30.17	20.21	9.96	----	
LW4D	02/16/00	10:30	30.17	20.23	9.94	----	
LW4D	05/23/00	16:54	30.17	20.55	9.62	----	
LW4D	08/29/00	13:38	30.17	24.78	5.39	----	
LW4D	11/09/00	12:52	30.17	25.19	4.98	----	
LW6D	03/25/97	11:52	30.84	16.51	14.33	----	
LW6D	03/31/97	09:05	30.84	15.53	15.31	----	Faint odor
LW6D	07/16/97	07:30	30.84	20.74	10.10	----	
LW6D	10/21/97	16:16	30.84	24.05	6.79	----	
LW6D	01/27/98	11:38	30.84	19.94	10.90	----	
LW6D	05/18/98	17:28	30.84	19.36	11.48	----	
LW6D	08/17/98	10:05	30.84	24.92	5.92	----	
LW6D	11/13/98	09:50	30.84	25.94	4.90	----	
LW6D	02/16/99	13:11	30.84	20.40	10.44	----	
LW6D	05/18/99	14:53	30.84	19.81	11.03	----	
LW6D	09/21/99	11:32	30.84	25.92	4.92	----	
LW6D	12/06/99	14:09	30.84	20.86	9.98	----	
LW6D	02/16/00	10:20	30.84	21.27	9.57	----	
LW6D	05/23/00	16:35	30.84	21.64	9.20	----	
LW6D	08/29/00	13:20	30.84	25.93	4.91	----	
LW6D	11/09/00	12:35	30.84	26.21	4.63	----	
LW9D	05/18/99	14:56	30.98	20.02	10.96	----	
LW9D	09/21/99	11:34	30.98	25.23	5.75	----	
LW9D	12/06/99	14:11	30.98	21.04	9.94	----	
LW9D	02/16/00	10:23	30.98	21.17	9.81	----	
LW9D	05/23/00	16:39	30.98	21.15	9.83	----	
LW9D	08/29/00	13:27	30.98	25.36	5.62	----	
LW9D	11/09/00	12:43	30.98	25.96	5.02	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW10D	05/18/99	15:00	31.12	19.82	11.30	----	
LW10D	09/21/99	11:37	31.12	25.81	5.31	----	
LW10D	12/06/99	14:15	31.12	21.18	9.94	----	
LW10D	02/16/00	10:27	31.12	21.20	9.92	----	
LW10D	05/23/00	16:42	31.12	21.51	9.61	----	
LW10D	08/29/00	13:29	31.12	25.86	5.26	----	
LW10D	11/09/00	12:46	31.12	26.26	4.86	----	
LW11D	05/18/99	15:09	29.04	18.59	10.45	----	
LW11D	09/21/99	11:50	29.04	20.76	8.28	----	
LW11D	12/06/99	15:06	29.04	21.81	7.23	----	
LW11D	02/16/00	11:02	29.04	20.35	8.69	----	
LW11D	05/23/00	17:37	29.04	19.50	9.54	----	
LW11D	08/29/00	14:54	29.04	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW11D	11/09/00		29.04	----	----	----	Well sampled 11/8/00 - water level not representative
LW12D1	05/18/99	15:13	30.02	18.45	11.57	----	
LW12D1	09/21/99	11:54	30.02	24.44	5.58	----	
LW12D1	12/06/99	14:21	30.02	19.72	10.30	----	
LW12D1	02/16/00	10:35	30.02	19.89	10.13	----	
LW12D1	05/23/00	17:00	30.02	20.23	9.79	----	
LW12D1	08/29/00	13:45	30.02	24.38	5.64	----	
LW12D1	11/09/00	13:00	30.02	24.66	5.36	----	
LW12D2	05/18/99	15:14	29.24	18.23	11.01	----	
LW12D2	09/21/99	11:53	29.24	24.69	4.55	----	
LW12D2	12/06/99	14:22	29.24	19.40	9.84	----	
LW12D2	02/16/00	10:36	29.24	19.90	9.34	----	
LW12D2	05/23/00	16:59	29.24	20.38	8.86	----	
LW12D2	08/29/00	13:44	29.24	24.68	4.56	----	
LW12D2	11/09/00	13:01	29.24	24.56	4.68	----	
LW14D	05/23/00	16:50	30.54	21.26	9.28	----	
LW14D	08/29/00	13:35	30.54	25.68	4.86	----	
LW14D	11/09/00	12:49	30.54	25.90	4.64	----	
LW15D	05/23/00	16:49	30.85	21.26	9.59	----	
LW15D	08/29/00	13:34	30.85	25.54	5.31	----	
LW15D	11/09/00	12:48	30.85	25.98	4.87	----	
LW16D	05/23/00	16:48	28.4	18.79	9.61	----	
LW16D	08/29/00	13:32	28.4	23.07	5.33	----	
LW16D	11/09/00	12:47	28.4	23.59	4.81	----	
LW17D	08/29/00	13:21	27.82	22.96	4.86	----	
LW17D	11/09/00	12:36	27.82	23.17	4.65	----	
LW18D	08/29/00	13:25	27.82	22.79	5.03	----	
LW18D	11/09/00	12:40	27.82	22.91	4.91	----	
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	----	Groundwater interim action pumping began 10/6/00 in the lower zone at this well. Pump not running at time of measurement.
RW2	11/09/00	12:50	30.68	25.83	4.85	----	
Other:							
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
River Gauge	05/18/98	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	----	

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].

TABLE A-2
GROUNDWATER ANALYTICAL METHODS
THIRD QUARTER SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Semivolatiles (8270)	Volatiles (8260)	Chlorinated Phenols (8040)	TPH-D	TPH-D (extended)	TPH-G	PP Metals (6010/7000)	TDS	Chloride	Ethanol
B1	X	X	X	X	X	X	X	X	X	X
B2	X	X	X	X			X	X	X	
D	X	X	X	X			X	X	X	
G1A	X	X	X	X			X	X	X	
J1	X	X	X	X			X	X	X	
J2	X	X	X	X			X	X	X	
K							X			
O	X	X								
R	X	X								
LW1S	X	X	X	X			X	X	X	
LW1D	X	X	X	X			X	X	X	
LW2S	X	X	X	X			X	X	X	
LW3D	X	X	X	X			X	X	X	
LW4S	X	X	X	X			X	X	X	
LW4D	X	X	X	X			X	X	X	
LW6D	X	X	X	X			X	X	X	
LW7S	X	X	X	X			X	X	X	
LW8S	X	X	X	X	X	X	X	X	X	X
LW9S										
LW9D	X	X	X	X			X	X	X	
LW10S										
LW10D	X	X	X	X			X	X	X	
LW11D	X	X	X	X			X	X	X	
LW12D1	X	X	X	X			X	X	X	
LW12D2	X	X	X	X			X	X	X	
LW13S			X							
LW15D			X							
LW17D			X							
LW18D			X							
RW1	X	X	X	X	X	X	X	X	X	X
RW2	X	X	X	X	X	X	X	X	X	

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS									
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	Dup of LW8S W
Laboratory Identification:	CB68E	CB49D	CB49G	CB49K	CB49C	CB49I	CB68C	CB49A	CB68F	CB68H
Date Collected:	8/29/00	8/28/00	8/29/00	8/28/00	8/28/00	8/29/00	8/30/00	8/28/00	8/30/00	8/30/00
CHLORINATED PHENOLS (µg/L)										
EPA Method SW8040/SW8270AF MOD.										
Pentachlorophenol	0.43	0.25 U	0.25 U	NA	0.25 U	720	7200	0.25 U	0.25 U	0.25 U
2,4,5-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.25 U	2.2	0.25 U	0.25 U	0.25 U
2,3,6-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.25 U	6.1	0.25 U	0.25 U	0.25 U
2,4,5-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.74 U	37 U	0.25 U	0.25 U	0.25 U
2,3,4-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.25 U	2.9	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	28	730	0.25 U	0.25 U	0.25 U
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	1.0	130	0.25 U	0.25 U	0.25 U
SEMIVOLATILES (µg/L)										
EPA Method SW8270										
Phenol	3.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	200 U (b)	2.0 U	2.0 U	2.0 U
Bis-(2-Chloroethyl) Ether	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	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.2 M	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	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
1,4-Dichlorobenzene	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
Benzyl Alcohol	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
1,2-Dichlorobenzene	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
2-Methylphenol	3.6	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
2,2'-Oxybis(1-Chloropropane)	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
4-Methylphenol	47	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.6 M	1.0 U	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	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	2.0 U
Hexachloroethane	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	2.0 U
Nitrobenzene	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
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
2-Nitrophenol	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
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
Benzoic Acid	73	10 U	10 U	NA	10 U	10 U	44	10 U	10 U	10 U
bis(2-Chloroethoxy) Methane	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
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	48	3.0 U	3.0 U	3.0 U
1,2,4-Trichlorobenzene	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
Naphthalene	27	1.0 U	1.0 U	NA	1.0 U	1.4	21	12	40	38
4-Chloroaniline	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
Hexachlorobutadiene	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	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	7.3 M	2.0 U	2.0 U	2.0 U
2-Methylnaphthalene	9.6	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	3.7	30	30
Hexachlorocyclopentadiene	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
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
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

BZTO104(e)015785

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification:	LW11S	LW13S	RW1
Laboratory Identification:	CB49J	CB68A	CB68G
Date Collected:	8/28/00	8/30/00	8/30/00
CHLORINATED PHENOLS (µg/L)			
EPA Method SW8040/SW8270AF MOD.			
Pentachlorophenol	3900	0.69	6300
2,4,6-Trichlorophenol	0.68	0.25 U	2.3
2,3,6-Trichlorophenol	0.25 U	0.25 U	0.53
2,4,5-Trichlorophenol	0.72 U	0.25 U	22 U
2,3,4-Trichlorophenol	0.32 U	0.25 U	0.79
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	250	0.25 U	1100
2,3,4,5-Tetrachlorophenol	2.5	0.25 U	24
SEMIVOLATILES (µg/L)			
EPA Method SW8270			
Phenol	2.0 U	NA	15
Bis-(2-Chloroethyl) Ether	2.0 U	NA	2.0 U
2-Chlorophenol	1.0 U	NA	1.0 U
1,3-Dichlorobenzene	1.0 U	NA	1.0 U
1,4-Dichlorobenzene	1.0 U	NA	1.0 U
Benzyl Alcohol	5.0 U	NA	5.0 U
1,2-Dichlorobenzene	1.0 U	NA	1.0 U
2-Methylphenol	2.0 U	NA	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	NA	1.0 U
4-Methylphenol	3.5	NA	1.6 M
N-Nitroso-Di-N-Propylamine	2.0 U	NA	2.0 U
Hexachloroethane	2.0 U	NA	2.0 U
Nitrobenzene	1.0 U	NA	1.0 U
Isophorone	1.0 U	NA	1.0 U
2-Nitrophenol	5.0 U	NA	5.0 U
2,4-Dimethylphenol	3.0 U	NA	3.0 U
Benzoic Acid	10 U	NA	10 U
bis(2-Chloroethoxy) Methane	1.0 U	NA	1.0 U
2,4-Dichlorophenol	3.0 U	NA	3.1 M
1,2,4-Trichlorobenzene	1.0 U	NA	1.0 U
Naphthalene	13	NA	12
4-Chloroaniline	3.0 U	NA	3.0 U
Hexachlorobutadiene	2.0 U	NA	2.0 U
4-Chloro-3-methylphenol	2.6 M	NA	2.0 U
2-Methylnaphthalene	4.9	NA	3.4
Hexachlorocyclopentadiene	5.0 U	NA	5.0 U
2,4,6-Trichlorophenol	5.0 U	NA	6.8
2,4,5-Trichlorophenol	5.0 U	NA	5.0 U

BZTO104(e)015786

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS									
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	Dup of LW8S W
Laboratory Identification:	CB68E	CB49D	CB49G	CB49K	CB49C	CB49I	CB68C	CB49A	CB68F	CB68H
Date Collected:	8/29/00	8/28/00	8/29/00	8/28/00	8/28/00	8/29/00	8/30/00	8/28/00	8/30/00	8/30/00
2-Chloronaphthalene	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
2-Nitroaniline	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
Dimethylphthalate	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
Acenaphthylene	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
3-Nitroaniline	6.0 U	6.0 U	6.0 U	NA	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	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitrophenol	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
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
2,6-Dinitrotoluene	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
2,4-Dinitrotoluene	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
Diethylphthalate	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
4-Chlorophenyl-phenylether	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
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
4-Nitroaniline	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
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	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
4-Bromophenyl-phenylether	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
Hexachlorobenzene	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
Pentachlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	200	9400 J (c)	5.0 U	5.0 U	5.8
Phenanthrene	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
Carbazole	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
Anthracene	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
Di-n-Butylphthalate	1.3	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.9	1.0 U	1.0 U	1.0 U
Fluoranthene	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
Pyrene	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
Butylbenzylphthalate	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
3,3'-Dichlorobenzidine	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
Benzo(a)anthracene	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
bis(2-Ethylhexyl)phthalate	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
Chrysene	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
Di-n-Octyl phthalate	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
Benzo(b)fluoranthene	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
Benzo(k)fluoranthene	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
Benzo(a)pyrene	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
Indeno(1,2,3-cd)pyrene	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
Dibenz(a,h)anthracene	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
Benzo(g,h,i)perylene	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

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification:	LW11S	LW13S	RW1
Laboratory Identification:	CB49J	CB68A	CB68G
Date Collected:	8/28/00	8/30/00	8/30/00
2-Chloronaphthalene	1.0 U	NA	1.0 U
2-Nitroaniline	5.0 U	NA	5.0 U
Dimethylphthalate	1.0 U	NA	1.0 U
Acenaphthylene	1.0 U	NA	1.0 U
3-Nitroaniline	5.0 U	NA	5.0 U
Acenaphthene	1.0 U	NA	1.0 U
2,4-Dinitrophenol	10 U	NA	10 U
4-Nitrophenol	5.0 U	NA	5.0 U
Dibenzofuran	1.0 U	NA	1.0 U
2,6-Dinitrotoluene	5.0 U	NA	5.0 U
2,4-Dinitrotoluene	5.0 U	NA	5.0 U
Diethylphthalate	1.0 U	NA	1.0 U
4-Chlorophenyl-phenylether	1.0 U	NA	1.0 U
Fluorene	1.0 U	NA	1.0 U
4-Nitroaniline	5.0 U	NA	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	NA	10 U
N-Nitrosodiphenylamine	1.0 U	NA	1.0 U
4-Bromophenyl-phenylether	1.0 U	NA	1.0 U
Hexachlorobenzene	1.0 U	NA	1.0 U
Pentachlorophenol	3600	NA	5400
Phenanthrene	1.0 U	NA	1.0 U
Carbazole	1.0 U	NA	1.0 U
Anthracene	1.0 U	NA	1.0 U
Di-n-Butylphthalate	1.0 U	NA	1.0 U
Fluoranthene	1.0 U	NA	1.0 U
Pyrene	1.0 U	NA	1.0 U
Butylbenzylphthalate	1.0 U	NA	1.0 U
3,3'-Dichlorobenzidine	5.0 U	NA	5.0 U
Benzo(a)anthracene	1.0 U	NA	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	NA	1.0 U
Chrysene	1.0 U	NA	1.0 U
Di-n-Octyl phthalate	1.0 U	NA	1.0 U
Benzo(b)fluoranthene	1.0 U	NA	1.0 U
Benzo(k)fluoranthene	1.0 U	NA	1.0 U
Benzo(a)pyrene	1.0 U	NA	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	NA	1.0 U
Dibenz(a,h)anthracene	1.0 U	NA	1.0 U
Benzo(g,h,i)perylene	1.0 U	NA	1.0 U

BZTO104(e)015788

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS									
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	Dup of LW8S W
Laboratory Identification:	CB68E	CB49D	CB49G	CB49K	CB49C	CB49I	CB68C	CB49A	CB68F	CB68H
Date Collected:	8/29/00	8/28/00	8/29/00	8/28/00	8/28/00	8/29/00	8/30/00	8/28/00	8/30/00	8/30/00
VOLATILES (µg/L)										
EPA Method SW8260										
Chloromethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	50 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
Acetone	410	5.0 U	5.0 U	NA	5.0 U	5.0 U	83	56 U	5.0 UJ	12 J
Carbon Disulfide	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Chloroform	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	9.3 U	5.0 U	5.0 U
1,1,1-Trichloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Vinyl Acetate	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Benzene	1100	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	29	29
trans-1,3-Dichloropropene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Bromoform	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
2-Hexanone	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Toluene	3600	1.0 U	1.0 U	NA	1.0 U	1.0 U	9.2	1.0 U	1.0 U	1.0 U
Chlorobenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	300	1.0 U	1.0 U	NA	1.0 U	1.6	94	40	130	120
Styrene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	50 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	990	1.0 U	1.0 U	NA	1.0 U	3.0	110	15	200	200

BZTO104(e)015789

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification:	LW11S	LW13S	RW1
Laboratory Identification:	CB49J	CB68A	CB68G
Date Collected:	8/28/00	8/30/00	8/30/00
VOLATILES (µg/L)			
EPA Method SW8260			
Chloromethane	1.0 U	NA	6.0 U
Bromomethane	1.0 U	NA	6.0 U
Vinyl Chloride	1.0 U	NA	6.0 U
Chloroethane	1.0 U	NA	6.0 U
Methylene Chloride	2.0 U	NA	12 U
Acetone	11	NA	30 U
Carbon Disulfide	1.0 U	NA	6.0 U
1,1-Dichloroethene	1.0 U	NA	6.0 U
1,1-Dichloroethane	1.0 U	NA	6.0 U
trans-1,2-Dichloroethene	1.0 U	NA	6.0 U
cis-1,2-Dichloroethene	1.0 U	NA	6.0 U
Chloroform	1.0 U	NA	6.0 U
1,2-Dichloroethane	1.0 U	NA	6.0 U
2-Butanone	5.0 U	NA	30 U
1,1,1-Trichloroethane	1.0 U	NA	6.0 U
Carbon Tetrachloride	1.0 U	NA	6.0 U
Vinyl Acetate	5.0 U	NA	30 U
Bromodichloromethane	1.0 U	NA	6.0 U
1,2-Dichloropropane	1.0 U	NA	6.0 U
cis-1,3-Dichloropropene	1.0 U	NA	6.0 U
Trichloroethene	1.0 U	NA	6.0 U
Dibromochloromethane	1.0 U	NA	6.0 U
1,1,2-Trichloroethane	1.0 U	NA	6.0 U
Benzene	1.0 U	NA	6.0 U
trans-1,3-Dichloropropene	1.0 U	NA	6.0 U
Bromoform	1.0 U	NA	6.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	NA	30 U
2-Hexanone	5.0 U	NA	30 U
Tetrachloroethene	1.0 U	NA	6.0 U
1,1,2,2-Tetrachloroethane	1.0 U	NA	6.0 U
Toluene	15	NA	14
Chlorobenzene	1.0 U	NA	6.0 U
Ethylbenzene	69	NA	120
Styrene	1.0 U	NA	6.0 U
Trichlorofluoromethane	1.0 U	NA	6.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	NA	12 U
m,p-Xylene	120	NA	150

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS									
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	Dup of LW8S W
Laboratory Identification:	CB68E	CB49D	CB49G	CB49K	CB49C	CB49I	CB68C	CB49A	CB68F	CB68H
Date Collected:	8/29/00	8/28/00	8/29/00	8/28/00	8/28/00	8/29/00	8/30/00	8/28/00	8/30/00	8/30/00
o-Xylene	420	1.0 U	1.0 U	NA	1.0 U	8.1	210	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Acrolein	1200 U	50 U	50 U	NA	50 U	50 U	250 U	57 U	50 U	50 U
Methyl Iodide	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Bromoethane	50 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
1,1-Dichloropropene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	75 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	15 U	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	37	1.0 U	1.0 U	NA	1.0 U	16	140	3.0	81	81
1,2,4-Trimethylbenzene	160	1.0 U	1.0 U	NA	1.0 U	66	500	3.0	130	120
Hexachlorobutadiene	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	25 U	1.0 U	1.5	NA	1.0 U	2.2	48	18	120	120
n-Propylbenzene	31	1.0 U	3.3	NA	1.0 U	5.8	79	28	100	98
Bromobenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	25 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.0 U	1.0 U	5.5	5.5
sec-Butylbenzene	25 U	1.0 U	1.0 U	NA	1.0 U	3.9	25	2.3	20	20
4-Isopropyltoluene	25 U	1.0 U	1.0 U	NA	1.0 U	3.6	19	1.1	1.0 U	1.0 U
n-Butylbenzene	25 U	1.0 U	1.0 U	NA	1.0 U	3.7 M	13 U	2.8	14	13
1,2,4-Trichlorobenzene	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
Naphthalene	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	31	18	110	100
1,2,3-Trichlorobenzene	120 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification:	LW11S	LW13S	RW1
Laboratory Identification:	CB49J	CB68A	CB68G
Date Collected:	8/28/00	8/30/00	8/30/00
o-Xylene	120	NA	240
1,2-Dichlorobenzene	1.0 U	NA	6.0 U
1,3-Dichlorobenzene	1.0 U	NA	6.0 U
1,4-Dichlorobenzene	1.0 U	NA	6.0 U
Acrolein	50 U	NA	300 U
Methyl Iodide	1.0 U	NA	6.0 U
Bromoethane	2.0 U	NA	12 U
Acrylonitrile	5.0 U	NA	30 U
1,1-Dichloropropene	1.0 U	NA	6.0 U
Dibromomethane	1.0 U	NA	6.0 U
1,1,1,2-Tetrachloroethane	1.0 U	NA	6.0 U
1,2-Dibromo-3-chloropropane	5.0 U	NA	30 U
1,2,3-Trichloropropane	3.0 U	NA	18 U
trans-1,4-Dichloro-2-butene	5.0 U	NA	30 U
1,3,5-Trimethylbenzene	53	NA	64
1,2,4-Trimethylbenzene	180	NA	320
Hexachlorobutadiene	5.0 U	NA	30 U
Ethylene Dibromide	1.0 U	NA	6.0 U
Bromochloromethane	1.0 U	NA	6.0 U
2,2-Dichloropropane	1.0 U	NA	6.0 U
1,3-Dichloropropane	1.0 U	NA	6.0 U
Isopropylbenzene	22	NA	47
n-Propylbenzene	32	NA	61
Bromobenzene	1.0 U	NA	6.0 U
2-Chlorotoluene	1.0 U	NA	6.0 U
4-Chlorotoluene	1.0 U	NA	6.0 U
tert-Butylbenzene	1.5 M	NA	6.0 U
sec-Butylbenzene	8.8	NA	16
4-Isopropyltoluene	5.9	NA	8.6
n-Butylbenzene	7.0 M	NA	7.7 U
1,2,4-Trichlorobenzene	5.0 U	NA	30 U
Naphthalene	22	NA	30 U
1,2,3-Trichlorobenzene	5.0 U	NA	30 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS									
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	Dup of LW8S W
Laboratory Identification:	CB68E	CB49D	CB49G	CB49K	CB49C	CB49I	CB68C	CB49A	CB68F	CB68H
Date Collected:	8/29/00	8/28/00	8/29/00	8/28/00	8/28/00	8/29/00	8/30/00	8/28/00	8/30/00	8/30/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)										
Method OR-DEQ										
TPH-Diesel Range	1.4 (a)	0.25 U	0.25 U	NA	0.25 U	1.8 (a)	15 (a)	0.32 (a)	1.6 (a)	1.6 (a)
TPH-Motor Oil Range	0.50 U	NA	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U
TPH-Gasoline Range	36	NA	NA	NA	NA	NA	NA	NA	13	13
PRIORITY POLLUTANT METALS (mg/L)										
Arsenic (7060)	0.007	0.016	0.010	0.001 U	0.010	0.011	0.004	0.015	0.022	0.023
Chromium (6010)	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U	0.005 U	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	0.002 U	0.004	0.002 U	0.007	0.016	0.002 U	0.002 U	0.002 U
Lead (7421)	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.003	0.001 U	0.001 U	0.001 U	0.001 U
Nickel (6010)	0.01	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
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.006	0.006 U	0.016	0.006 U	0.006 U	0.006 U	0.007
CONVENTIONALS										
Total Dissolved Solids (mg/L) (EPA 160.1)	170	230	160	NA	160	180	420	190	210	210
Chloride (mg/L) (EPA 325.2)	1.7	3.1	2.0	NA	3.5	2.8	4.6	2.9	2.2	2.3
FIELD PARAMETERS										
pH (avg)	6.13	6.47	6.58	5.63	6.49	6.59	5.70	6.36	4.89	4.89
Temperature (° C) (avg)	17.7	15.4	15.6	16.0	16.0	15.5	15.1	15.5	15.2	15.3
Conductivity (mS/cm) (avg)	243	357	248	161	196	268	433	299	330	330
Dissolved oxygen (mg/L) (avg)	1.51	1.56	1.62	1.78	1.80	1.73	1.36	1.66	1.12	1.13
Turbidity (NTU)	40	6	5	6	13	335	42	89	36	35
ETHANOL (mg/L)	5.0 U	NA	NA	NA	NA	NA	NA	NA	5.0 U	5.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS		
Sample Identification:	LW11S	LW13S	RW1
Laboratory Identification:	CB49J	CB68A	CB68G
Date Collected:	8/28/00	8/30/00	8/30/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)			
Method OR-DEQ			
TPH-Diesel Range	5.9 (a)	NA	13 (a)
TPH-Motor Oil Range	NA	NA	2.0 U
TPH-Gasoline Range	14	NA	26
PRIORITY POLLUTANT			
METALS (mg/L)			
Arsenic (7060)	0.007	NA	0.006
Chromium (6010)	0.005 U	NA	0.005 U
Copper (6010)	0.002 U	NA	0.002 U
Lead (7421)	0.001 U	NA	0.001 U
Nickel (6010)	0.01 U	NA	0.01 U
Zinc (6010)	0.006 U	NA	0.006 U
CONVENTIONALS			
Total Dissolved Solids (mg/L) (EPA 160.1)	220	NA	240
Chloride (mg/L) (EPA 325.2)	6.5	NA	13
FIELD PARAMETERS			
pH (avg)	6.27	5.57	5.69
Temperature (° C) (avg)	15.1	13.5	14.8
Conductivity (mS/cm) (avg)	346	149	314
Dissolved oxygen (mg/L) (avg)	1.37	3.67	0.87
Turbidity (NTU)	28	31	24
ETHANOL (mg/L)	5.0 U	NA	5.0 U

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS										
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D	LW10D
Laboratory Identification:	CB68B	CB49H	CB85C	CB85D	CB85G	CB49B	CB49E	CB68D	CB85E	CB85F	CB85H
Date Collected:	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/28/00	8/29/00	8/30/00	8/30/00	8/30/00	8/31/00
CHLORINATED PHENOLS (µg/L)											
EPA Method SW8040											
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.30	0.25 U	0.25 U	0.25
2,4,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25
2,3,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25
2,4,5-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.41 U	0.25 U	0.25 U	0.25
2,3,4-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25
SEMIVOLATILES (µg/L)											
EPA Method SW8270											
Phenol	2.0 U	2.0 U	2.0 U	8.4	2.0 U	2.0 U	2.0 U	110	2.0 U	2.0 U	2.0
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	2.0 U	2.0
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	1.0 U	1.0
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	1.0 U	1.0
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0
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	5.0 U	5.0
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	1.0 U	1.0
2-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	2.0 U	2.0
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	1.0 U	1.0
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
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	2.0 U	2.0
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	2.0 U	2.0
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	1.0 U	1.0
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
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	5.0 U	5.0
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
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	11	10 U	10 U	10
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	1.0 U	1.0
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	3.0 U	3.0
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	1.0 U	1.0
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11	1.0 U	1.0 U	1.0
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	3.0 U	3.0
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	2.0 U	2.0
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	2.0 U	2.0
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	7.7	1.0 U	1.0 U	18	1.0 U	1.0 U	1.0
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	5.0 U	5.0
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
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
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	1.0 U	1.0

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

		DEEP WELLS						
Sample Identification:		LW11D	LW12D1	LW12D2	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:		CB49F	CB85I	CB85J	CB85A	CB85B	CD97A	CD97B
Date Collected:		8/29/00	8/31/00	8/31/00	8/31/00	8/31/00	9/13/00	9/13/00
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040								
Pentachlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	580	630
2,4,6-Trichlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	2.3	2.5
2,3,6-Trichlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.48 U	0.51 U
2,4,5-Trichlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	10 U	11 U
2,3,4-Trichlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	42	45
2,3,4,5-Tetrachlorophenol	U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	7.0	7.6
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	U	2.0 U	2.0 U	2.0 U	NA	NA	170 J	150 J
Bis-(2-Chloroethyl) Ether	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
2-Chlorophenol	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	UJ	1.0 U	1.0 UJ	1.0 UJ	NA	NA	1.0 U	1.0 U
Benzyl Alcohol	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2-Methylphenol	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Methylphenol	U	1.0 U	1.0 U	1.0 U	NA	NA	6.0 J	5.3 J
N-Nitroso-Di-N-Propylamine	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
Hexachloroethane	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
Nitrobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Isophorone	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2-Nitrophenol	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
2,4-Dimethylphenol	U	3.0 U	3.0 U	3.0 U	NA	NA	3.0 U	3.0 U
Benzoic Acid	U	10 U	10 U	10 U	NA	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2,4-Dichlorophenol	U	3.0 U	3.0 U	3.0 U	NA	NA	8.7 J	8.1 J
1,2,4-Trichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Naphthalene	U	1.0 U	1.0 U	1.0 U	NA	NA	16	16
4-Chloroaniline	U	3.0 U	3.0 U	3.0 U	NA	NA	3.0 U	3.0 U
Hexachlorobutadiene	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
2-Methylnaphthalene	U	1.0 U	1.0 U	1.0 U	NA	NA	44	41
Hexachlorocyclopentadiene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
2,4,5-Trichlorophenol	U	5.0 U	5.0 U	5.0 U	NA	NA	16 J	14 J
2-Chloronaphthalene	U	1.0 U	1.0 U	1.0 U	NA	NA	16 U	15 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS										
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D	LW10D
Laboratory Identification:	CB68B	CB49H	CB85C	CB85D	CB85G	CB49B	CB49E	CB68D	CB85E	CB85F	CB85H
Date Collected:	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/28/00	8/29/00	8/30/00	8/30/00	8/30/00	8/31/00
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	5.0 U	5.0
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	1.0 U	1.0
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	1.0 U	1.0
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	6.0 U	6.0
Acenaphthene	1.0 U	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	1.0
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
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	5.0 U	5.0
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
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	5.0 U	5.0
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	5.0 U	5.0
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	1.0 U	1.0
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	1.0 U	1.0
Fluorene	1.0 U	1.0 U	2.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0
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	5.0 U	5.0
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	8.9	5.0 U	5.0 U	5.0
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
Di-n-Butylphthalate	2.0	1.0 U	1.0 U	1.4 U	1.9 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	5.0 U	5.0
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	1.0 U	1.0
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0
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	1.0 U	1.0
Di-n-Octyl 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
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

		DEEP WELLS						
Sample Identification:		LW11D	LW12D1	LW12D2	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:		CB49F	CB85I	CB85J	CB85A	CB85B	CD97A	CD97B
Date Collected:		8/29/00	8/31/00	8/31/00	8/31/00	8/31/00	9/13/00	9/13/00
2-Nitroaniline	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Dimethylphthalate	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Acenaphthylene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
3-Nitroaniline	U	6.0 U	6.0 U	6.0 U	NA	NA	6.0 U	6.0 U
Acenaphthene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2,4-Dinitrophenol	U	10 U	10 U	10 U	NA	NA	10 U	10 U
4-Nitrophenol	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Dibenzofuran	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Diethylphthalate	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Fluorene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Nitroaniline	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	U	10 U	10 U	10 U	NA	NA	10 U	10 U
N-Nitrosodiphenylamine	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Hexachlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Pentachlorophenol	U	5.0 U	5.0 U	5.0 U	NA	NA	490 J	440 J
Phenanthrene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Carbazole	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Anthracene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Di-n-Butylphthalate	U	1.0 U	1.0 U	1.1 U	NA	NA	1.3	1.8
Fluoranthene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Pyrene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Butylbenzylphthalate	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Benzo(a)anthracene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	2.9 U
Chrysene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.2
Benzo(b)fluoranthene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(a)pyrene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS										
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D	LW10D
Laboratory Identification:	CB68B	CB49H	CB85C	CB85D	CB85G	CB49B	CB49E	CB68D	CB85E	CB85F	CB85H
Date Collected:	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/28/00	8/29/00	8/30/00	8/30/00	8/30/00	8/31/00
Bromomethane	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 U	1.0 U	1.0
Vinyl Chloride	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 U	1.0 U	1.0
Chloroethane	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 U	1.0 U	1.0
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0
Acetone	5.0 U	5.0 U	45	22	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
Carbon Disulfide	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 U	1.0 U	1.0
1,1-Dichloroethene	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 U	1.0 U	1.0
1,1-Dichloroethane	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 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
Chloroform	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 U	1.0 U	1.0
1,2-Dichloroethane	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 U	1.0 U	1.0
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	21 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
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	5.0 U	1.0 U	1.0 U	1.0
Carbon Tetrachloride	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 U	1.0 U	1.0
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
Bromodichloromethane	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 U	1.0 U	1.0
1,2-Dichloropropane	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 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
Trichloroethene	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 U	1.0 U	1.0
Dibromochloromethane	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 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
Benzene	1.0 U	1.0 U	18	120	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
Bromoform	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 U	1.0 U	1.0
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	25 U	5.0 U	5.0 U	5.0
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
Tetrachloroethene	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 U	1.0 U	1.0
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	5.0 U	1.0 U	1.0 U	1.0
Toluene	1.0 U	1.0 U	1.8	6.3	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0
Chlorobenzene	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 U	1.0 U	1.0
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	39	1.0 U	1.0 U	1.0
Styrene	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 U	1.0 U	1.0
Trichlorofluoromethane	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 U	1.0 U	1.0
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	10 U	2.0 U	2.0 U	2.0
m,p-Xylene	1.0 U	1.0 U	1.3	5.8	1.0 U	1.0 U	1.0 U	120	1.0 U	1.0 U	1.0
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	13	1.0 U	1.0 U	1.0
1,2-Dichlorobenzene	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 U	1.0 U	1.0
1,3-Dichlorobenzene	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 U	1.0 U	1.0

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

		DEEP WELLS						
Sample Identification:		LW11D	LW12D1	LW12D2	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:		CB49F	CB85I	CB85J	CB85A	CB85B	CD97A	CD97B
Date Collected:		8/29/00	8/31/00	8/31/00	8/31/00	8/31/00	9/13/00	9/13/00
Bromomethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Vinyl Chloride	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Chloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Methylene Chloride	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
Acetone	U	8.4	5.0 U	5.0 U	NA	NA	24 M	27 M
Carbon Disulfide	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1-Dichloroethene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1-Dichloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Chloroform	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dichloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2-Butanone	U	5.0 U	9.5 U	5.0 U	NA	NA	24	28
1,1,1-Trichloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Carbon Tetrachloride	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Vinyl Acetate	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Bromodichloromethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dichloropropane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Trichloroethene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Dibromochloromethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Benzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
trans-1,3-Dichloropropene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Bromoform	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
2-Hexanone	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Tetrachloroethene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Toluene	U	1.0 U	1.0 U	1.0 U	NA	NA	2.1	2.2
Chlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Ethylbenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	28	27
Styrene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Trichlorofluoromethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
m,p-Xylene	U	1.0 U	1.0 U	1.0 U	NA	NA	78	76
o-Xylene	U	1.0 U	1.0 U	1.0 U	NA	NA	28	28
1,2-Dichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS										
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW5D	LW9D	LW10D
Laboratory Identification:	CB68B	CB49H	CB85C	CB85D	CB85G	CB49B	CB49E	CB68D	CB85E	CB85F	CB85H
Date Collected:	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/28/00	8/29/00	8/30/00	8/30/00	8/30/00	8/31/00
1,4-Dichlorobenzene	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 U	1.0 U	1.0
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	250 U	50 U	50 U	50
Methyl Iodide	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 U	1.0 U	1.0
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
1,1-Dichloropropene	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 U	1.0 U	1.0
Dibromomethane	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 U	1.0 U	1.0
1,1,1,2-Tetrachloroethane	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 U	1.0 U	1.0
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	15 U	3.0 U	3.0 U	3.0
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	19 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
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	50	1.0 U	1.0 U	1.0
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	3.8	1.0 U	1.0 U	270	1.0 U	1.0 U	1.0
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
Ethylene Dibromide	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 U	1.0 U	1.0
Bromochloromethane	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 U	1.0 U	1.0
2,2-Dichloropropane	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 U	1.0 U	1.0
1,3-Dichloropropane	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 U	1.0 U	1.0
Isopropylbenzene	1.0 U	1.0 U	26	33	100	1.0 U	1.0 U	62	16	3.0	1.0
n-Propylbenzene	1.0 U	1.0 U	15	18	92	1.0 U	1.0 U	76	1.0 U	2.7	1.0
Bromobenzene	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 U	1.0 U	1.0
2-Chlorotoluene	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 U	1.0 U	1.0
4-Chlorotoluene	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 U	1.0 U	1.0
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	4.0	1.0 U	1.0 U	5.0 U	3.5	1.0 U	1.0
sec-Butylbenzene	1.0 U	1.0 U	5.1	5.6	20	1.0 U	1.0 U	11	6.0	1.0 U	1.0
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	7.6	1.0 U	1.0 U	1.0
n-Butylbenzene	1.0 U	1.0 U	2.0	2.0 U	14 M	1.0 U	1.0 U	9.7 U	1.2 U	1.0 U	1.0
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0
Naphthalene	5.0 U	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	5.0
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

		DEEP WELLS						
Sample Identification:		LW11D	LW12D1	LW12D2	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:		CB49F	CB85I	CB85J	CB85A	CB85B	CD97A	CD97B
Date Collected:		8/29/00	8/31/00	8/31/00	8/31/00	8/31/00	9/13/00	9/13/00
1,4-Dichlorobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Acrolein	U	50 U	50 U	50 U	NA	NA	50 U	50 U
Methyl Iodide	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Bromoethane	U	2.0 U	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U
Acrylonitrile	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
1,1-Dichloropropene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Dibromomethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	U	3.0 U	3.0 U	3.0 U	NA	NA	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	U	4.4	3.3	1.0 U	NA	NA	100	100
1,2,4-Trimethylbenzene	U	6.7	17	1.0 U	NA	NA	180 M	190 M
Hexachlorobutadiene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Ethylene Dibromide	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Bromochloromethane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2,2-Dichloropropane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichloropropane	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
Isopropylbenzene	U	1.1	1.0 U	1.0 U	NA	NA	70	73
n-Propylbenzene	U	2.8	1.5	1.0 U	NA	NA	88	90
Bromobenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
2-Chlorotoluene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
4-Chlorotoluene	U	1.0 U	1.0 U	1.0 U	NA	NA	1.0 U	1.0 U
tert-Butylbenzene	U	1.0 U	1.0 U	1.0 U	NA	NA	3.2	3.4
sec-Butylbenzene	U	2.2	1.2	1.0 U	NA	NA	15	16
4-Isopropyltoluene	U	1.7	1.1	1.0 U	NA	NA	11	12
n-Butylbenzene	U	2.4 M	1.0 U	1.0 U	NA	NA	16 M	17 M
1,2,4-Trichlorobenzene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U
Naphthalene	U	5.0 U	5.0 U	5.0 U	NA	NA	28	30
1,2,3-Trichlorobenzene	U	5.0 U	5.0 U	5.0 U	NA	NA	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS										
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D	LW10D
Laboratory Identification:	CB68B	CB49H	CB85C	CB85D	CB85G	CB49B	CB49E	CB68D	CB85E	CB85F	CB85H
Date Collected:	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/28/00	8/29/00	8/30/00	8/30/00	8/30/00	8/31/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)											
Method OR-DEQ											
TPH-Diesel	0.25 U	0.26 (a)	NA	NA	2.1 (a)	0.25 U	0.25 U	3.3 (a)	1.2 (a)	0.25 U	0.25
TPH-D Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT											
METALS (mg/L)											
Arsenic (7060)	0.015	0.004	NA	NA	0.036	0.006	0.017	0.029	0.018	0.032	0.037
Chromium (6010)	0.005 U	0.005 U	NA	NA	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.013	0.034
Copper (6010)	0.002 U	0.002 U	NA	NA	0.015	0.002 U	0.002 U	0.002	0.002	0.013	0.045
Lead (7421)	0.001 U	0.001 U	NA	NA	0.004	0.001 U	0.001 U	0.001 U	0.002	0.005	0.012
Nickel (6010)	0.01 U	0.01 U	NA	NA	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.01	0.03
Zinc (6010)	0.011	0.006 U	NA	NA	0.014	0.011	0.015	0.020	0.007	0.033	0.076
CONVENTIONALS											
Total Dissolved Solids (mg/L) (EPA 160.1)	220	380	NA	NA	460	380	410	360	240	150	170
Chloride (mg/L) (EPA 325.2)	2.5	4.4	NA	NA	6.7	3.2	3.5	9.8	1.4	2.4	14
FIELD PARAMETERS											
pH (avg)	7.00	6.71	5.85	6.10	5.92	6.55	5.92	6.02	5.85	6.05	6.71
Temperature (° C) (avg)	15.6	14.7	15.9	15.0	15.0	15.2	14.0	14.4	15.1	14.7	13.8
Conductivity (mS/cm) (avg)	346	584	409	560	799	553	629	526	398	227	208
Dissolved oxygen (mg/L) (avg)	1.16	1.10	1.16	1.90	0.67	1.78	1.04	1.39	1.36	1.67	1.47
Turbidity (NTU)	85	4	160	85	40	29	58	43	29	124	251
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS						
Sample Identification:	LW11D	LW12D1	LW12D2	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CB49F	CB85I	CB85J	CB85A	CB85B	CD97A	CD97B
Date Collected:	8/29/00	8/31/00	8/31/00	8/31/00	8/31/00	9/13/00	9/13/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)							
Method OR-DEQ							
TPH-Diesel	U 0.88 (a)	0.64 (a)	0.25 U	NA	NA	3.4	3.8
TPH-D Motor Oil	NA	NA	NA	NA	NA	0.50 U	0.50 U
TPH-Gasoline	NA	NA	NA	NA	NA	7.7	7.7
PRIORITY POLLUTANT							
METALS (mg/L)							
Arsenic (7060)	0.007	0.033	0.022	NA	NA	0.022	0.022
Chromium (6010)	0.018	0.006	0.005 U	NA	NA	0.005 U	0.005 U
Copper (6010)	0.017	0.007	0.002 U	NA	NA	0.005	0.007
Lead (7421)	0.006	0.002	0.001 U	NA	NA	0.001	0.001 U
Nickel (6010)	0.02	0.01 U	0.01 U	NA	NA	0.01 U	0.01 U
Zinc (6010)	0.052	0.024	0.006 U	NA	NA	0.022 J	0.030 J
CONVENTIONALS							
Total Dissolved Solids (mg/L) (EPA 160.1)	380	320	280	NA	NA	390	360
Chloride (mg/L) (EPA 325.2)	10	6.8	8.2	NA	NA	9.1 J	7.4 J
FIELD PARAMETERS							
pH (avg)	6.35	6.85	6.64	6.14	6.48	6.19	6.19
Temperature (° C) (avg)	15.0	13.0	13.7	13.8	14.1	15.6	15.6
Conductivity (mS/cm) (avg)	523	485	443	305	338	463	463
Dissolved oxygen (mg/L) (avg)	1.49	1.74	0.52	2.10	2.14	11.94	11.94
Turbidity (NTU)	140	254	3	132	83	NM	NM
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

TABLE A-5
KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS FOR TABLES A-3 AND A-4

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.

[ ] = Detected constituent.

(a) The laboratory reported that hydrocarbon patterns that eluted in the range between mineral spirits and diesel #2 were detected; however the elution patterns do not match available standards.

(b) Raised detection limit due to required dilution. Phenol was detected during the initial analysis but value was above linear range of the detector. Subsequent dilution was too great to quantify the constituent. Concentration of phenol at LW-4S is likely between 95-200 µg/L.

(c) Additional dilution required due to concentration above the linear range of the detector. However, due to laboratory oversight, no additional sample dilution was performed. Actual concentration may be greater than or less than the reported value.

APPENDIX B

Data Validation Report

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Rebekah Brooks, Project Manager, Landau Associates

CC: Mr. Thomas Roick, Oregon Department of Environmental Quality (DEQ)
Mr. Kevin Murphy, Time Oil Co.
Ms. Patty Dost, Schwabe, Williamson & Wyatt
Mr. Mike Tishuk

FROM: Stacy Pischer, Landau Associates

DATE: January 3, 2001

RE: TIME OIL NORTHWEST TERMINAL
THIRD QUARTER 2000 GROUNDWATER MONITORING
LABORATORY DATA QUALITY EVALUATION

This memorandum provides the results of a data quality evaluation for 31 groundwater samples collected at the Time Oil Northwest Terminal between August 28 and September 13, 2000 for the Phase II remedial investigation (RI) third quarter, 2000 groundwater monitoring event. A data quality evaluation was performed for analyses of total petroleum hydrocarbons (TPH)(Oregon Department of Environmental Quality TPH-D, TPH-D extended, and TPH-G); volatile organic compounds (VOCs) (EPA method 8260); chlorophenols (EPA method 8040); semivolatile compounds (SVOCs) (EPA method 8270); selected priority pollutant metals (EPA method 6010/7000 series); chloride (EPA method 325.2); total dissolved solids (TDS) (EPA method 160.1); and ethanol (EPA method 8015). All of the above analyses were performed by Analytical Resources, Inc. (ARI), Seattle. This data quality evaluation covers ARI data packages CB49, CB68, CB85, and CD97. The data quality evaluation was performed in accordance with the quality assurance project plan (QAPP) contained in Appendix B of the *Phases I and II Remedial Investigation/Feasibility Study* work plan (Landau Associates 1996), and with applicable portions of the U.S. Environmental Protection Agency (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
- Blank results (laboratory, method, and field)
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates (MS/MSD) (including laboratory control samples)

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- Duplicate analyses (field and laboratory)
- Quantitation limits
- Conclusions 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.

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 exceptions.

- Due to surrogate recoveries below laboratory advisory control limits during the initial TPH-D analysis of samples associated with data package CB85, the samples were reanalyzed. The reanalysis occurred one to two days beyond the EPA recommended holding time of 7 days; however, because surrogate recoveries were within method and project-specified control limits during the initial analyses and because the initial analyses were performed within the recommended EPA holding time, it is recommended that results from the initial analyses be reported. No qualification of the data from the initial analyses was necessary due to holding time exceedances.

SURROGATE SPIKE RECOVERIES

All of the surrogate recoveries were within the project-specified control limits with the following exceptions.

- Recovery of two SVOC surrogates within the acid fraction exceeded current laboratory control limits for samples RW-2 and X, indicating a potential high bias. All detected SVOCs within the acid fraction were qualified as estimated (J), as indicated in Table 1.

- All surrogates were diluted out during reanalysis of diluted samples LW-4S, LW-11S and RW-1 for SVOCs. Because recoveries during the initial (nondiluted) analysis of these samples were within the laboratory and/or project-specified control limits, no qualifiers were assigned.

- One surrogate was diluted out during reanalysis of diluted sample LW-2S for SVOCs. Because recovery of the other five surrogates were within specified control limits and recoveries during the initial (nondiluted) analysis of these samples were within the specified control limits, no qualifiers were assigned.

- Recovery of the surrogate methylarachadite in the laboratory control sample associated with the OTPH-D(extended) analysis of samples RW-2 and X was slightly less than the current

laboratory lower control limit. Because recovery of spiked compounds (i.e., diesel and motor oil) in the laboratory control sample were within laboratory control limits, no qualifiers were assigned.

- As previously mentioned, recovery values for surrogate methylarachidate were below the laboratory advisory control limits (70-115%) during TPH-D analysis of samples associated with data package CB85. The samples were reanalyzed and surrogate recoveries during the reanalysis were mostly within the laboratory advisory control limits. However, because the reanalysis occurred one to two days beyond the EPA recommended holding time and because the results for the initial analysis were similar to the reanalysis, it is recommended that the results from the initial analysis be reported. Furthermore, the surrogate recovery values for the initial analysis were within project-specified control limits (32 –157%) and within the control limits specified by the method (50-150%); therefore, no qualifiers were added to the results from the initial analysis.

- Recovery for one of the surrogates associated with the SVOC analyses of samples LW-6D and R exceeded the current laboratory and project-specified upper control limits. 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.

- Surrogates were diluted out during reanalysis of diluted samples LW-4S, RW-1, RW-2, and X for chlorophenols. Because recoveries during the initial (nondiluted) analyses of these samples were within the laboratory and/or project-specified control limits, no qualifiers were assigned.

- Recovery of surrogate 1,2-dichlorobenzene-d4 during VOC analysis of sample LW-8S slightly exceeded the project-specified control limits but was within current laboratory control limits. No qualifiers were added to the data.

- Recovery of surrogate bromobenzene during OTPH-G analysis of samples B1, LW-86, and W slightly exceeded the current laboratory control limits. However, no qualifiers were added to the data because recovery of the second surrogate was within current laboratory control limits for each sample and because the presence of hydrocarbons in a sample can interfere with the recovery of the bromobenzene surrogate.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

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 batch if fewer than 20 samples were obtained) was performed for total metals and chloride analyses with the following exception. For samples collected on September 13, 2000 and reported in data package CD97, no MS/MSDs were performed for the OTPH-G and OTPH-Dx analyses, which does not meet the project specified criteria of at least one MS/MSD per laboratory batch of samples if fewer than 20 samples are obtained.

For all analyses, each MS/MSD was performed using a project sample. Recoveries and RPDs for the MS/MSDs were within the project-specified control limits with the following exceptions:

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- For the chlorophenol analyses associated with data package CD97, no values were reported for the MS/MSD pair due to saturation of the detector. No qualifiers were assigned.

- During the SVOC analyses associated with data package CD97, the pentachlorophenol and phenol spikes were not recovered in the MSD. The recovery of pentachlorophenol in the associated MS was within current laboratory and project-specified control limits; whereas, the recovery of phenol in the MS exceeded the current laboratory upper control limit. The variable recoveries for these spiked compounds is likely due to the high concentration of these compounds in the parent sample relative to the spiked amount. Pentachlorophenol results were not qualified because of the good recovery of this compound in the associated MS. All detected phenol results were qualified as estimated (J) because of the high recovery of phenol in the associated MS, as shown on Table 1.

- During the SVOC analyses associated with data package CD97, recovery of n-nitroso-di-n-propylamine in the MS exceeded the current laboratory and project-specified control limits, indicating a potential high bias. Recovery of this compound in the MSD also exceeded the current laboratory control limits but was within the project-specified control limits. N-nitroso-di-n-propylamine was not detected in the associated project samples; therefore, no qualification of the data was necessary.

- During the SVOC analyses associated with data package CB49, two MS/MSD pairs were performed using samples LW-1D and D. Recovery of 1,2,4-trichlorobenzene was slightly below current laboratory and project-specified control limits in the MSD associated with sample D. Recovery of 1,2,4-trichlorobenzene was also slightly below project-specified control limits in the MS associated with sample LW-1D but within current laboratory control limits. Because recovery of this compound in the other associated MS and MSD were within specified control limits, no qualifiers were assigned.

LABORATORY DUPLICATE

At least one laboratory duplicate sample was analyzed for total metals, total dissolved solids and chloride. All RPDs were within the laboratory and project-specified control limits. No qualification of the data was necessary.

LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample/blank spike was analyzed with each batch of samples. Laboratory control sample duplicates were performed with the OTPH-G analysis associated with data package CD97. Laboratory specified control limits were met for each laboratory control sample recovery with the following exceptions.

- During the SVOC analysis of the laboratory control sample associated data package CB85, recovery of spiking compound 1,4-dichlorobenzene was slightly below the current laboratory lower control limit, indicating a potential low bias. Because no MS/MSD was performed with this batch of samples and the accuracy of the data could not be evaluated further, all 1,4-dichlorobenzene results for samples associated with CB85 were qualified as estimated (UJ), as indicated in Table 1.

- During the SVOC analysis of the laboratory control sample associated data package CD97, recovery of spiking compound pentachlorophenol was slightly below the current laboratory lower control limit, indicating a potential low bias; however, because recovery of pentachlorophenol in the associated matrix spike was within specified control limits, no qualifiers were assigned.

All RPDs between the laboratory control sample duplicate results were within the laboratory-specified control limits. No qualification of the data was necessary.

METHOD BLANKS

Method blanks were analyzed with each batch of samples. No contamination was detected in the method blanks, except as described below.

- Di-n-butylphthalate was detected in the method blank associated with the SVOC analyses included in data package CB85. Di-n-butylphthalate was also detected in three of the associated project samples at concentrations less than five times the method blank concentration. The di-n-butylphthalate results for these samples were qualified as nondetect (U), as indicated in Table 1.

- Bis(2-ethylhexyl)phthalate was detected in the method blank associated with the SVOC analyses included in data package CD97. Bis(2-ethylhexyl)phthalate was also detected in one associated project sample at concentrations less than five times the method blank concentration. The bis(2-ethylhexyl)phthalate result for this sample was qualified as nondetect (U), as indicated in Table 1.

FIELD BLANKS

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 and OTPH-G analyses with each shipment of samples with one exception. No trip blank was submitted with the OTPH-G analysis of samples LW-1S, LW-1D, LW-2S, LW-3D, LW-7S, LW-11S, LW-11D, D, J1, J2, and K. Potential cross-contamination of these samples from external sources (i.e., sample containers, ambient air, etc.) could not be evaluated.

No VOCs or gasoline were detected in the trip blanks that were submitted for analysis. No qualification of the data was necessary.

FIELD DUPLICATE RESULTS

Two blind field duplicate samples (LW-8S/W and RW-2/X) were collected during this sampling event. The project-specified criteria of at least one blind field duplicate sample per 20 samples was met. Zinc and chloride results for samples RW-2 and X were qualified as estimated (J) based on low precision demonstrated by a high RPD between the sample and sample duplicate results (see Table 1). Acetone was not detected in sample LW-8S but was detected in the LW-8S duplicate sample (W). An RPD was calculated using the detection limit for LW-8S and the detected value for duplicate sample W. The RPD

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exceeded 20%; therefore, the detected acetone concentration in sample W and the nondetected result for LW-8S were qualified as estimated (J/UJ).

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples except for the following:

- The reporting limits for pentachlorophenol (analyzed using EPA method 8270) for all samples were higher than the project-specified quantitation limit (5.0 vs. 1.0 ppb); however, the reporting limits for pentachlorophenol (analyzed using modified EPA method 8040) met the project-specified quantitation limit of 0.25 ppb.

- The reporting limits for 2-chloronaphthalene and naphthalene were raised for samples RW-2 and X due to spectral interferences.

- The reporting limits for VOCs for samples RW-1, B1, LW-4S, and LW-4D were about 5 to 25 times higher than project-specified quantitation limits due to dilution requirements and/or hydrocarbon interferences.

- The reporting limits for 2,4,5-trichlorophenol for samples RW-1, RW-2, X, LW-2S, LW-4S, LW4D, and LW-11S were higher than project-specified quantitation limits due to peak interferences. The reporting limit for 2,3,6-trichlorophenol for samples RW-2 and X were also higher than project-specified quantitation limits due to peak interferences.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory, field, and matrix spike 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.

Other factors that may affect the use of the data and some of which require additional data qualifiers include the following:

- During the initial (nondiluted) analysis of sample LW-4S for SVOCs, phenol and pentachlorophenol were detected at concentrations that exceeded the linear range of the detector. The laboratory reported the phenol and pentachlorophenol concentrations at the maximum concentration within the linear range of the detector (95 and 6,600 µg/L, respectively) and the diluted the sample 100 times and reanalyzed. During the reanalysis, the detection limit for phenol was raised from 2 to 200 µg/L. Phenol was not detected at a concentration above 200 µg/L; therefore, the actual concentration of phenol in sample LW-4S is likely within the range of 95 and 200 µg/L. The concentration of pentachlorophenol still exceeded the linear range of the detector during the diluted reanalysis. The sample was not diluted further due to holding time exceedances. The maximum value for pentachlorophenol that was within the linear range of the detector during the reanalysis was 9,400 µg/L. This value should be reported but qualified as estimated (J), as indicated in Table 1.

- As reported by the laboratory, samples B1, G1A, J2, X, LW-2S, LW-4S, LW-4D, LW-6D, LW-7S, LW-8S, LW-11S, LW-11D, LW-12D1, RW-1, and RW-2, showed detectable hydrocarbon patterns that elute in the range between mineral spirits and diesel #2; however,

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the elution patterns do not closely match either product. A footnote to this affect has been added to the Landau Associates summary data tables.

- During collection of sample RW-2 and its duplicate (i.e., sample W), the sample collector noted that the groundwater was frothy with a noticeable amount of entrained air. It is believed that the entrained air was due to a leak in the piping connections from which the samples were collected. Introduction of air into the sample may cause loss of some compounds due to volatilization; therefore, all VOC results for these samples were qualified as estimated (J detects; UJ nondetects), as indicated in Table 1.

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. 1996. *Phases I and II Remedial Investigation/Feasibility Study Work Plan.*

BZTO104(e)015813

TABLE 1
SUMMARY OF DATA QUALIFIERS
3rd QUARTER 2000 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES CB49, CB68, CB85 and CD97

Analyte	Qualifier	Sample Number	Reason
Acetone	J, detect UJ, nondetect	W, LW-8S	Low precision in field duplicate
All VOCs	J, detects UJ, nondetects	RW-2, X	Potential loss of volatiles during sampling due to entrainment of air in groundwater sample.
Di-n-butylphthalate	U	R, G1A, LW-12D2	Method blank contamination
1,4-dichlorobenzene	UJ, nondetects	O, R, G1A, LW-6D, LW-9D, LW-10D, LW-12D1, LW-12D2	Low LCS recovery
Pentachlorophenol (Method 8270)	J, detects	LW-4S	Sample not quantified within linear range of the detector.
Bis(2-ethylhexyl)phthalate	U	X	Method blank contamination
Phenol	J, detects	RW-2, X	High surrogate and martrix spike recoveries
4-Methylphenol	J, detects	RW-2, X	High surrogate recoveries
2,4-Dichlorophenol	J, detects	RW-2, X	High surrogate recoveries
2,4,5-Trichlorophenol	J, detects	RW-2, X	High surrogate recoveries
Pentachlorophenol	J, detects	RW-2, X	High surrogate recoveries
Chloride	J, detects	RW-2, X	Low precision in field duplicate
Zinc	J, detects	RW-2, X	Low precision in field duplicate

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

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APPENDIX C

Laboratory Data

LAB DATA IS NOT INCLUDED IN THIS REPORT

Landau Associates
Environmental and Geotechnical Services

CONFIDENTIAL PRIVILEGED COMMUNICATION
AND ATTORNEY WORK PRODUCT – RESTRICTED
DISTRIBUTION

TRANSMITTAL

REC'D JAN 29 2001

86-102
(E) E2

To: Oregon Department of Environmental Quality

Date: January 26, 2001

Attn: Tom Roick

Project No.: 231001.135

RE: Schedule – Phases I/II RI/FS
Time Oil Northwest Terminal

Copies	Description
1	Revised Schedule for Phase I/II RI/FS activities

Message:

Enclosed is the above-referenced document for your review. Schedules for the east property and Phase III RI activities will be provided with upcoming documents.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

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

RB/

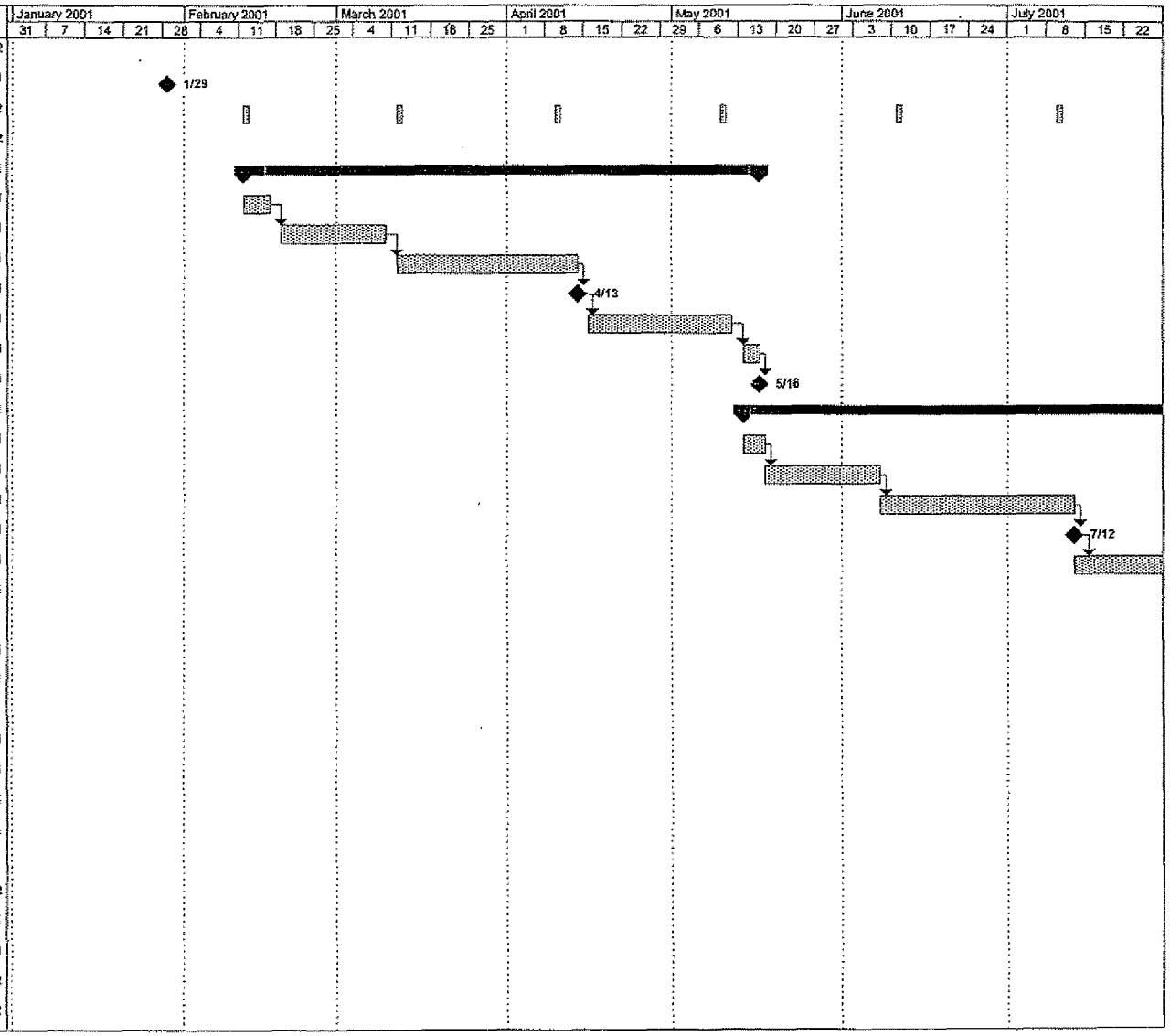
1/26/01 S:\SHAREDOC\231\001\DEQ_transm.doc

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

BZTO104(e)015818

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
PROJECT MANAGEMENT	**249 days**	**Mon 1/29/01**	**Thu 1/10/02**
Revised Schedule to DEQ	0 days	Mon 1/29/01	Mon 1/29/01
Monthly Reports to DEQ	239 days	Mon 2/12/01	Thu 1/10/02
QUARTERLY GROUNDWATER EVENTS	**262 days**	**Mon 2/12/01**	**Tue 2/12/02**
1st Quarter, 2001	**68 days**	**Mon 2/12/01**	**Wed 5/16/01**
Sampling Event	5 days	Mon 2/12/01	Fri 2/16/01
Laboratory Analyses	15 days	Mon 2/19/01	Fri 3/9/01
Groundwater Report Preparation	25 days	Mon 3/12/01	Fri 4/13/01
Groundwater Report to Client	0 days	Fri 4/13/01	Fri 4/13/01
Client Review	20 days	Mon 4/16/01	Fri 5/11/01
Incorporate Client Comments	3 days	Mon 5/14/01	Wed 5/16/01
Groundwater Report to DEQ	0 days	Wed 5/16/01	Wed 5/16/01
2nd Quarter, 2001	**67 days**	**Mon 5/14/01**	**Tue 8/14/01**
Sampling Event	4 days	Mon 5/14/01	Thu 5/17/01
Laboratory Analyses	15 days	Fri 5/18/01	Thu 6/7/01
Groundwater Report Preparation	25 days	Fri 6/8/01	Thu 7/12/01
Groundwater Report to Client	0 days	Thu 7/12/01	Thu 7/12/01
Client Review	20 days	Fri 7/13/01	Thu 8/9/01
Incorporate Client Comments	3 days	Fri 8/10/01	Tue 8/14/01
Groundwater Report to DEQ	0 days	Tue 8/14/01	Tue 8/14/01
3rd Quarter, 2001	**67 days**	**Mon 8/13/01**	**Tue 11/13/01**
Sampling Event	4 days	Mon 8/13/01	Thu 8/16/01
Laboratory Analyses	15 days	Fri 8/17/01	Thu 9/6/01
Groundwater Report Preparation	25 days	Fri 9/7/01	Thu 10/11/01
Groundwater Report to Client	0 days	Thu 10/11/01	Thu 10/11/01
Client Review	20 days	Fri 10/12/01	Thu 11/8/01
Incorporate Client Comments	3 days	Fri 11/9/01	Tue 11/13/01
Groundwater Report to DEQ	0 days	Tue 11/13/01	Tue 11/13/01
4th Quarter, 2001	**67 days**	**Mon 11/12/01**	**Tue 2/12/02**
Sampling Event	4 days	Mon 11/12/01	Thu 11/15/01
Laboratory Analyses	15 days	Fri 11/16/01	Thu 12/6/01
Groundwater Report Preparation	25 days	Fri 12/7/01	Thu 1/10/02
Groundwater Report to Client	0 days	Thu 1/10/02	Thu 1/10/02



(a) Schedule assumes sufficient groundwater elevation exists

Fri 1/26/01 s:\sharedoc\231\001\schedule\NWTfinal.mpp

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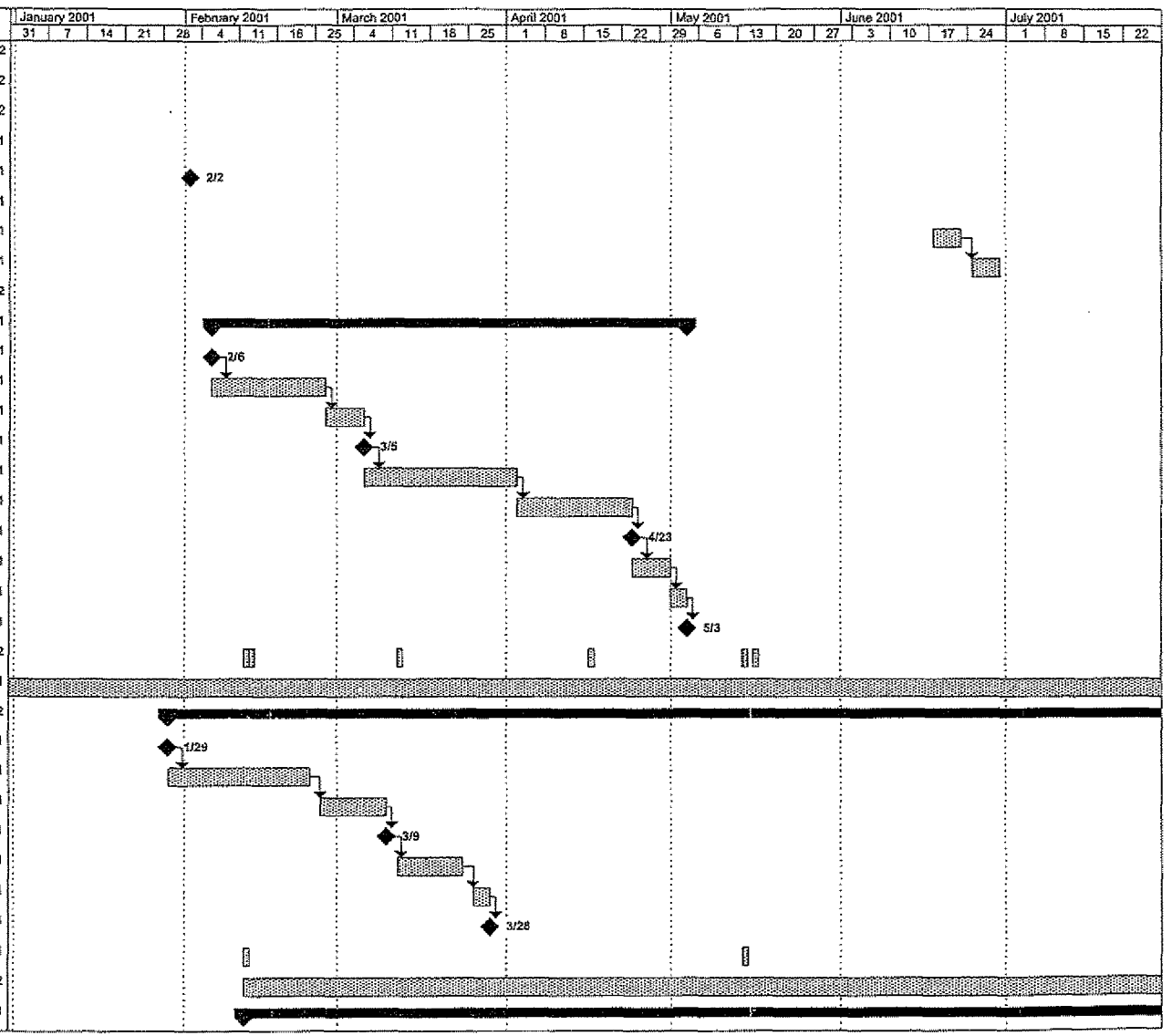
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Client Review	20 days	Fri 1/11/02	Thu 2/7/02
Incorporate Client Comments	3 days	Fri 2/8/02	Tue 2/12/02
Groundwater Report to DEQ	0 days	Tue 2/12/02	Tue 2/12/02
PHASE II RI REPORT	0 days	Fri 2/2/01	Fri 2/2/01
Response Letter/Final Report to DEQ	0 days	Fri 2/2/01	Fri 2/2/01
ADDITIONAL INVESTIGATIONS	10 days	Mon 6/18/01	Fri 6/29/01
Soil Sampling (with Phase III RI)	5 days	Mon 6/18/01	Fri 6/22/01
Storm Drain Water Sampling (with Phase III RI)	5 days	Mon 6/25/01	Fri 6/29/01
GROUNDWATER INTERIM ACTION	386 days	Fri 7/14/00	Fri 1/4/02
Completion Report	63 days	Tue 2/6/01	Thu 5/3/01
Draft Report to Client	0 days	Tue 2/6/01	Tue 2/6/01
Client Review/Comment	15 days	Tue 2/6/01	Mon 2/26/01
Incorporate Client Comments	5 days	Tue 2/27/01	Mon 3/5/01
Report to DEQ	0 days	Mon 3/5/01	Mon 3/5/01
DEQ Review/Comment	20 days	Tue 3/6/01	Mon 4/2/01
Prepare Response to DEQ Comments/Finalize Report	15 days	Tue 4/3/01	Mon 4/23/01
Response Letter to Client	0 days	Mon 4/23/01	Mon 4/23/01
Client Review of Response	5 days	Tue 4/24/01	Mon 4/30/01
Incorporate Client Comments	3 days	Tue 5/1/01	Thu 5/3/01
Response Letter and Final Report to DEQ	0 days	Thu 5/3/01	Thu 5/3/01
Interim Action Startup/Implementation	386 days	Fri 7/14/00	Fri 1/4/02
Implementation in Lower Zone (at RW-2)	328 days	Fri 7/14/00	Tue 10/16/01
Lower Zone Startup Monitoring	245 days	Mon 1/29/01	Fri 1/4/02
Startup Monitoring Tech Memo to DEQ	0 days	Mon 1/29/01	Mon 1/29/01
DEQ Review/Comment	20 days	Mon 1/29/01	Fri 2/23/01
Prepare Response to DEQ Comments	10 days	Mon 2/26/01	Fri 3/9/01
Reponse Letter to Client	0 days	Fri 3/9/01	Fri 3/9/01
Client Review	10 days	Mon 3/12/01	Fri 3/23/01
Incorporate Client Comments	3 days	Mon 3/26/01	Wed 3/28/01
Response Letter to DEQ	0 days	Wed 3/28/01	Wed 3/28/01
Routine Water Level Monitoring	131 days	Mon 2/12/01	Mon 8/13/01
Implementation in Upper Zone (at HRW-1) (a)	235 days	Mon 2/12/01	Fri 1/4/02
Upper Zone Startup Monitoring	131 days	Mon 2/12/01	Mon 8/13/01



(a) Schedule assumes sufficient groundwater elevation exists

BZTO104(e)015820

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Baseline and Initial Startup Monitoring	10 days	Mon 2/12/01	Fri 2/23/01
Startup Monitoring Tech Memo Preparation	15 days	Mon 2/26/01	Fri 3/16/01
Tech Memo to Client	0 days	Fri 3/16/01	Fri 3/16/01
Client Review	15 days	Mon 3/19/01	Fri 4/6/01
Incorporate Client Comments	5 days	Mon 4/9/01	Fri 4/13/01
Report to DEQ	0 days	Fri 4/13/01	Fri 4/13/01
DEQ Review/Comment	20 days	Mon 4/16/01	Fri 5/11/01
Prepare Response to DEQ Comments	10 days	Mon 5/14/01	Fri 5/25/01
Response Letter to Client	0 days	Fri 5/25/01	Fri 5/25/01
Client Review	10 days	Mon 5/28/01	Fri 6/8/01
Incorporate Client Comments	3 days	Mon 6/11/01	Wed 6/13/01
Response Letter to DEQ	0 days	Wed 6/13/01	Wed 6/13/01
Routine Water Level Monitoring	**111 days**	**Mon 3/12/01**	**Mon 8/13/01**
Quarterly Status Reports to DEQ	**196 days**	**Tue 2/13/01**	**Tue 11/13/01**
RISK SENSITIVITY ANALYSES	**128 days**	**Wed 1/31/01**	**Fri 7/27/01**
Scope Outline Internal Reviews	12 days	Wed 1/31/01	Thu 2/15/01
Scope Outline to DEQ	0 days	Thu 2/15/01	Thu 2/15/01
DEQ Review/Comment	15 days	Fri 2/16/01	Thu 3/8/01
Discussion/Meeting with DEQ	1 day	Fri 3/9/01	Fri 3/9/01
DEQ Approval of Scope	2 days	Mon 3/12/01	Tue 3/13/01
Conduct Sensitivity Analyses	20 days	Wed 3/14/01	Tue 4/10/01
Prepare Sensitivity Analyses Results Report	20 days	Wed 4/11/01	Tue 5/8/01
Conduct Internal Review	15 days	Wed 5/9/01	Tue 5/29/01
Report to DEQ	0 days	Tue 5/29/01	Tue 5/29/01
DEQ Review/Comment	20 days	Wed 5/30/01	Tue 6/26/01
Prepare Response to DEQ Comments and Finalize Report	10 days	Wed 6/27/01	Tue 7/10/01
Internal Review of DEQ Response	5 days	Wed 7/11/01	Tue 7/17/01
Response Letter and Final Report to DEQ	3 days	Wed 7/18/01	Fri 7/20/01
DEQ Approval of Risk Assessment Approach	5 days	Mon 7/23/01	Fri 7/27/01
PILOT TESTING (BIOLOGICAL TREATMENT FOR SOIL)	**242 days**	**Wed 1/31/01**	**Thu 1/3/02**
Pilot Testing Work Plan	**52 days**	**Wed 1/31/01**	**Thu 4/12/01**
Work Plan Internal Reviews	12 days	Wed 1/31/01	Thu 2/15/01
Work Plan to DEQ	0 days	Thu 2/15/01	Thu 2/15/01

(a) Schedule assumes sufficient groundwater elevation exists

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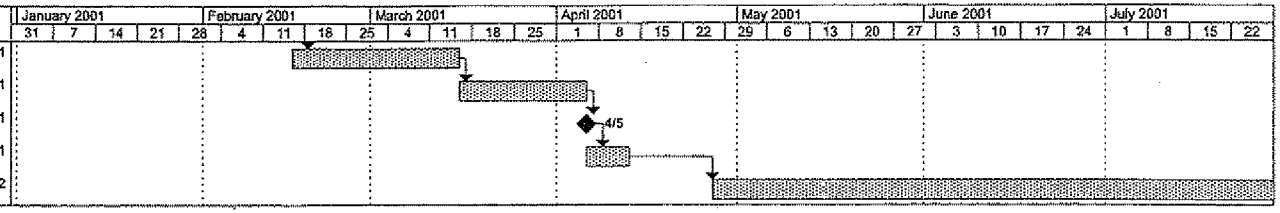
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
DEQ Review/Comment	20 days	Fri 2/16/01	Thu 3/15/01
Prepare Response to DEQ Comments and Finalize Wc	15 days	Fri 3/16/01	Thu 4/5/01
Response Letter and Final Work Plan to DEQ	0 days	Thu 4/5/01	Thu 4/5/01
DEQ Approval of Work Plan	5 days	Fri 4/6/01	Thu 4/12/01
Pilot Test Implementation (minimum duration)	180 days	Fri 4/27/01	Thu 1/3/02

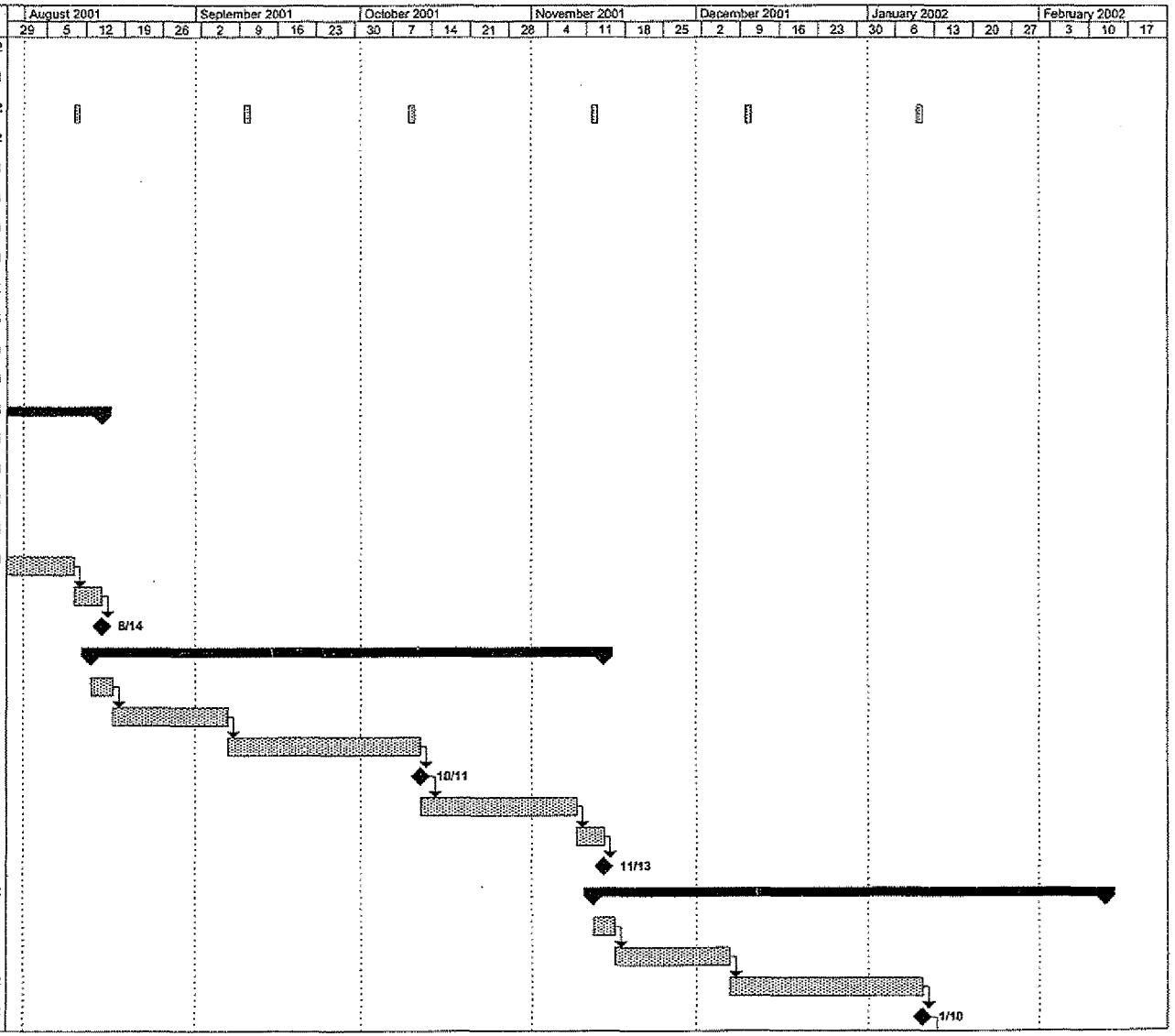


(a) Schedule assumes sufficient groundwater elevation exists

BZTO104(e)015822

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
PROJECT MANAGEMENT	**249 days**	**Mon 1/29/01**	**Thu 1/10/02**
Revised Schedule to DEQ	0 days	Mon 1/29/01	Mon 1/29/01
Monthly Reports to DEQ	**239 days**	**Mon 2/12/01**	**Thu 1/10/02**
QUARTERLY GROUNDWATER EVENTS	**262 days**	**Mon 2/12/01**	**Tue 2/12/02**
1st Quarter, 2001	**68 days**	**Mon 2/12/01**	**Wed 5/16/01**
Sampling Event	5 days	Mon 2/12/01	Fri 2/16/01
Laboratory Analyses	15 days	Mon 2/19/01	Fri 3/9/01
Groundwater Report Preparation	25 days	Mon 3/12/01	Fri 4/13/01
Groundwater Report to Client	0 days	Fri 4/13/01	Fri 4/13/01
Client Review	20 days	Mon 4/16/01	Fri 5/11/01
Incorporate Client Comments	3 days	Mon 5/14/01	Wed 5/16/01
Groundwater Report to DEQ	0 days	Wed 5/16/01	Wed 5/16/01
2nd Quarter, 2001	**67 days**	**Mon 5/14/01**	**Tue 8/14/01**
Sampling Event	4 days	Mon 5/14/01	Thu 5/17/01
Laboratory Analyses	15 days	Fri 5/18/01	Thu 6/7/01
Groundwater Report Preparation	25 days	Fri 6/8/01	Thu 7/12/01
Groundwater Report to Client	0 days	Thu 7/12/01	Thu 7/12/01
Client Review	20 days	Fri 7/13/01	Thu 8/9/01
Incorporate Client Comments	3 days	Fri 8/10/01	Tue 8/14/01
Groundwater Report to DEQ	0 days	Tue 8/14/01	Tue 8/14/01
3rd Quarter, 2001	**67 days**	**Mon 8/13/01**	**Tue 11/13/01**
Sampling Event	4 days	Mon 8/13/01	Thu 8/16/01
Laboratory Analyses	15 days	Fri 8/17/01	Thu 9/6/01
Groundwater Report Preparation	25 days	Fri 9/7/01	Thu 10/11/01
Groundwater Report to Client	0 days	Thu 10/11/01	Thu 10/11/01
Client Review	20 days	Fri 10/12/01	Thu 11/8/01
Incorporate Client Comments	3 days	Fri 11/9/01	Tue 11/13/01
Groundwater Report to DEQ	0 days	Tue 11/13/01	Tue 11/13/01
4th Quarter, 2001	**67 days**	**Mon 11/12/01**	**Tue 2/12/02**
Sampling Event	4 days	Mon 11/12/01	Thu 11/15/01
Laboratory Analyses	15 days	Fri 11/16/01	Thu 12/6/01
Groundwater Report Preparation	25 days	Fri 12/7/01	Thu 1/10/02
Groundwater Report to Client	0 days	Thu 1/10/02	Thu 1/10/02

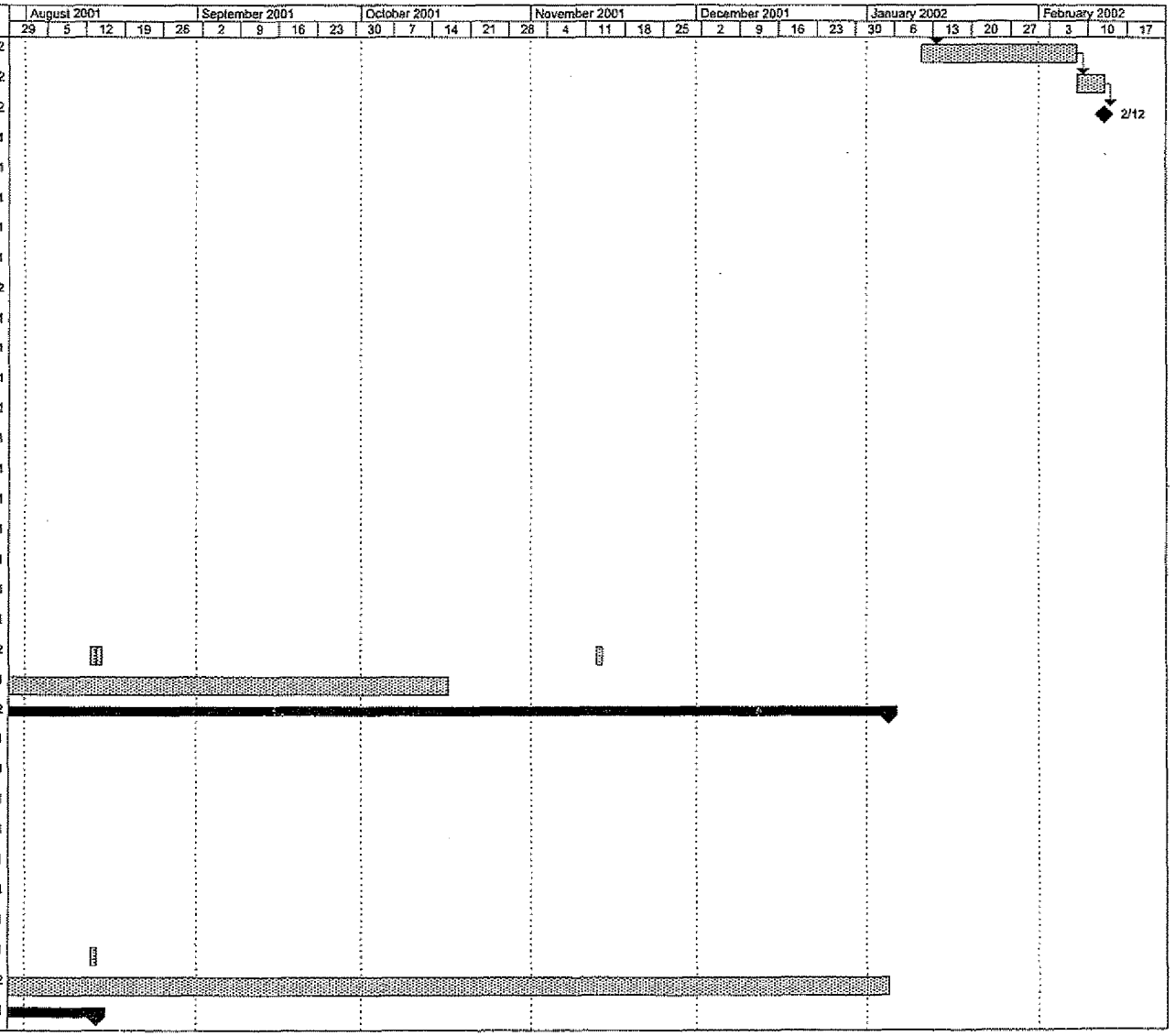


(a) Schedule assumes sufficient groundwater elevation exists

BZTO104(e)015823

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Client Review	20 days	Fri 1/11/02	Thu 2/7/02
Incorporate Client Comments	3 days	Fri 2/8/02	Tue 2/12/02
Groundwater Report to DEQ	0 days	Tue 2/12/02	Tue 2/12/02
PHASE II RI REPORT	**0 days**	**Fri 2/2/01**	**Fri 2/2/01**
Response Letter/Final Report to DEQ	0 days	Fri 2/2/01	Fri 2/2/01
ADDITIONAL INVESTIGATIONS	**10 days**	**Mon 6/18/01**	**Fri 6/29/01**
Soil Sampling (with Phase III RI)	5 days	Mon 6/18/01	Fri 6/22/01
Storm Drain Water Sampling (with Phase III RI)	5 days	Mon 6/25/01	Fri 6/29/01
GROUNDWATER INTERIM ACTION	**386 days**	**Fri 7/14/00**	**Fri 1/4/02**
Completion Report	**63 days**	**Tue 2/6/01**	**Thu 5/3/01**
Draft Report to Client	0 days	Tue 2/6/01	Tue 2/6/01
Client Review/Comment	15 days	Tue 2/6/01	Mon 2/26/01
Incorporate Client Comments	5 days	Tue 2/27/01	Mon 3/5/01
Report to DEQ	0 days	Mon 3/5/01	Mon 3/5/01
DEQ Review/Comment	20 days	Tue 3/6/01	Mon 4/2/01
Prepare Response to DEQ Comments/Finalize Report	15 days	Tue 4/3/01	Mon 4/23/01
Response Letter to Client	0 days	Mon 4/23/01	Mon 4/23/01
Client Review of Response	5 days	Tue 4/24/01	Mon 4/30/01
Incorporate Client Comments	3 days	Tue 5/1/01	Thu 5/3/01
Response Letter and Final Report to DEQ	0 days	Thu 5/3/01	Thu 5/3/01
Interim Action Startup/Implementation	**386 days**	**Fri 7/14/00**	**Fri 1/4/02**
Implementation in Lower Zone (at RW-2)	**328 days**	**Fri 7/14/00**	**Tue 10/16/01**
Lower Zone Startup Monitoring	**245 days**	**Mon 1/29/01**	**Fri 1/4/02**
Startup Monitoring Tech Memo to DEQ	0 days	Mon 1/29/01	Mon 1/29/01
DEQ Review/Comment	20 days	Mon 1/29/01	Fri 2/23/01
Prepare Response to DEQ Comments	10 days	Mon 2/26/01	Fri 3/9/01
Reponse Letter to Client	0 days	Fri 3/9/01	Fri 3/9/01
Client Review	10 days	Mon 3/12/01	Fri 3/23/01
Incorporate Client Comments	3 days	Mon 3/26/01	Wed 3/28/01
Response Letter to DEQ	0 days	Wed 3/28/01	Wed 3/28/01
Routine Water Level Monitoring	**131 days**	**Mon 2/12/01**	**Mon 8/13/01**
Implementation in Upper Zone (at HRW-1) (a)	**235 days**	**Mon 2/12/01**	**Fri 1/4/02**
Upper Zone Startup Monitoring	**131 days**	**Mon 2/12/01**	**Mon 8/13/01**



(a) Schedule assumes sufficient groundwater elevation exists

BZTO104(e)015824

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

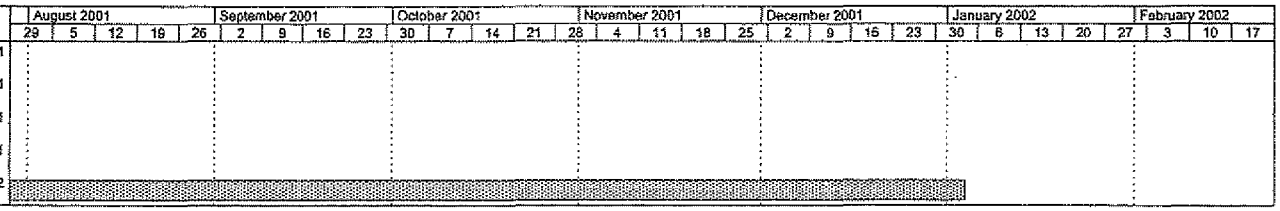
Task Name	Duration	Start	Finish
Baseline and Initial Startup Monitoring	10 days	Mon 2/12/01	Fri 2/23/01
Startup Monitoring Tech Memo Preparation	15 days	Mon 2/26/01	Fri 3/16/01
Tech Memo to Client	0 days	Fri 3/16/01	Fri 3/16/01
Client Review	15 days	Mon 3/19/01	Fri 4/6/01
Incorporate Client Comments	5 days	Mon 4/9/01	Fri 4/13/01
Report to DEQ	0 days	Fri 4/13/01	Fri 4/13/01
DEQ Review/Comment	20 days	Mon 4/16/01	Fri 5/11/01
Prepare Response to DEQ Comments	10 days	Mon 5/14/01	Fri 5/25/01
Response Letter to Client	0 days	Fri 5/25/01	Fri 5/25/01
Client Review	10 days	Mon 5/28/01	Fri 6/8/01
Incorporate Client Comments	3 days	Mon 6/11/01	Wed 6/13/01
Response Letter to DEQ	0 days	Wed 6/13/01	Wed 6/13/01
Routine Water Level Monitoring	**111 days**	**Mon 3/12/01**	**Mon 8/13/01**
Quarterly Status Reports to DEQ	**196 days**	**Tue 2/13/01**	**Tue 11/13/01**
RISK SENSITIVITY ANALYSES	**128 days**	**Wed 1/31/01**	**Fri 7/27/01**
Scope Outline Internal Reviews	12 days	Wed 1/31/01	Thu 2/15/01
Scope Outline to DEQ	0 days	Thu 2/15/01	Thu 2/15/01
DEQ Review/Comment	15 days	Fri 2/16/01	Thu 3/8/01
Discussion/Meeting with DEQ	1 day	Fri 3/9/01	Fri 3/9/01
DEQ Approval of Scope	2 days	Mon 3/12/01	Tue 3/13/01
Conduct Sensitivity Analyses	20 days	Wed 3/14/01	Tue 4/10/01
Prepare Sensitivity Analyses Results Report	20 days	Wed 4/11/01	Tue 5/8/01
Conduct Internal Review	15 days	Wed 5/9/01	Tue 5/29/01
Report to DEQ	0 days	Tue 5/29/01	Tue 5/29/01
DEQ Review/Comment	20 days	Wed 5/30/01	Tue 6/26/01
Prepare Response to DEQ Comments and Finalize Report	10 days	Wed 6/27/01	Tue 7/10/01
Internal Review of DEQ Response	5 days	Wed 7/11/01	Tue 7/17/01
Response Letter and Final Report to DEQ	3 days	Wed 7/18/01	Fri 7/20/01
DEQ Approval of Risk Assessment Approach	5 days	Mon 7/23/01	Fri 7/27/01
PILOT TESTING (BIOLOGICAL TREATMENT FOR SOIL)	**242 days**	**Wed 1/31/01**	**Thu 1/3/02**
Pilot Testing Work Plan	**52 days**	**Wed 1/31/01**	**Thu 4/12/01**
Work Plan Internal Reviews	12 days	Wed 1/31/01	Thu 2/15/01
Work Plan to DEQ	0 days	Thu 2/15/01	Thu 2/15/01

(a) Schedule assumes sufficient groundwater elevation exists

BZTO104(e)015825

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
DEQ Review/Comment	20 days	Fri 2/16/01	Thu 3/15/01
Prepare Response to DEQ Comments and Finalize Wc	15 days	Fri 3/16/01	Thu 4/5/01
Response Letter and Final Work Plan to DEQ	0 days	Thu 4/5/01	Thu 4/5/01
DEQ Approval of Work Plan	5 days	Fri 4/6/01	Thu 4/12/01
Pilot Test Implementation (minimum duration)	180 days	Fri 4/27/01	Thu 1/3/02



(a) Schedule assumes sufficient groundwater elevation exists

86-102(e)E

Landau Associates
Environmental and Geotechnical Services

RECD FEB 0 2 2001

January 30, 2001

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

RE: RECOMMENDATION FOR REDUCTION OF ANALYSES
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick,

On behalf of Time Oil Co., this letter provides our recommendation to reduce the types of analyses conducted for future sampling events at the Time Oil Northwest Terminal. We recommend that analyses for chlorinated phenols (EPA method 8040) and for total petroleum hydrocarbons (TPH) be discontinued for future quarterly groundwater sampling events and for other future site investigation, except as described below. This recommendation is based on groundwater sample results from the previous 15 quarterly sampling events, conducted April 1997 through November 2000 and soil results collected during the Phase I and Phase II remedial investigations (RI) in 1996-97 and during the east property predevelopment investigation (EPPI) in 2000.

For previous soil and groundwater investigations, chlorinated phenol analysis has been conducted in addition to standard semivolatile analyses (EPA method 8270) to provide information on pentachlorophenol (PCP) and its breakdown products at lower detection limits than could be achieved using the standard semivolatile method. Additionally, this analysis provides results for breakdown products that are not typically quantified using the semivolatile analysis (e.g., tetrachlorophenols, some trichlorophenols). Based on the volume of data we have collected to date from both media using both analyses, we believe that we have a sufficient amount of data to evaluate baseline conditions for PCP and its breakdown products in soil and groundwater for future remedial action events. Also, in general, concentrations of these analytes have been generally comparable between the EPA method 8040 and 8270 results. For future events, we recommend that analysis for these constituents (with the exception of the tetrachlorophenols and 2,3,6- and 2,3,4-trichlorophenol which will no longer be analyzed) be continued using semivolatile analyses (EPA method 8270) with selected ion monitoring (SIM) to achieve lower detection limits. If we determine that additional information is needed on the PCP breakdown products in the future, we will resume analysis for chlorinated phenols at that time.

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Additionally, numerous TPH analyses (e.g., TPH-HCID, TPH-D, TPH-Dx, TPH-G) have been conducted on soil and groundwater samples collected during previous sampling events at the terminal. While these analyses may be useful as screening tools in the initial evaluations of the presence/absence of petroleum-related contamination at a site, Oregon's Hazardous Substance Remedial Action Rules do not use TPH in risk evaluation. To address risk associated with petroleum-based contamination, we have analyzed for TPH indicator chemicals regulated in Oregon (e.g., benzene, toluene, ethylbenzene, xylenes, PAHs, lead) using volatile and semivolatile methods, as recommended in DEQ's guidance, *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, 1999). Therefore, for future events, we recommend discontinuing analyses for TPH, unless needed as a screening tool. We intend to use TPH in the initial phases of the Phase III RI for this purpose.

We propose that this recommendation be effective for the upcoming first quarter 2001 groundwater sampling event, currently scheduled for the week of February 12, 2001.

We hope that this letter provides you with the information that you need for DEQ and Time Oil to come to an agreement on this recommendation. We would like to get a response from you by February 9, 2001, if possible, so that we can make the appropriate arrangements for the sampling event. Please call me or Kevin Murphy with your comments.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/rgm

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

BZTO104(e)015827

Landau
Associates
Environmental and Geotechnical Services

REC'D JAN 16 2001

January 9, 2001

86-109
ED

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 2000 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

For Rebekah Brooks
Project Manager

1/9/01 S:\WPROC\231\001\038\DEQ-Dec00.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
December 2000

SUMMARY OF WORK PERFORMED

- Prepared and submitted the November 2000 monthly report to DEQ.
- Continued internal reviews of *Third Quarter 2000 Groundwater Report.*
- Received, processed, validated, and began preparation of the *Fourth Quarter 2000 Groundwater Report.*
- Installed a hydrocarbon passive recovery canister with a capacity of 0.5 L in well LW-11S. Recovered the product on nine occasions in December (approximately biweekly) for a total of about 8.5 L recovered since early November. On December 29, no measurable product was observed and only about 0.1 L of product was recovered from the passive system. Retained recovered product in appropriately labeled containers in an appropriate storage location at the Northwest Terminal.
- Continued internal review of response to DEQ's comments on the *Phase II RI Report.*
- Continued development of a strategy for a sensitivity analyses to calculate a range of potential risk-based cleanup levels for key constituents prior to conducting the risk assessment for the terminal to possibly expedite remediation of the soil stockpile.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 1.3 million gallons of groundwater have been recovered, and over 1 million gallons have been treated and discharged. Analytical results indicate pentachlorophenol is degraded to nondetectable concentrations in the effluent.
- Continued implementation of groundwater interim action startup monitoring in the lower zone, including collection of the third round of monthly water level measurements in the lower zone.
- Coordinated with subcontractor for preparation of as-built construction drawings to facilitate completion of groundwater interim action completion report.
- Conducted internal reviews of a technical memorandum summarizing startup monitoring activities for groundwater extraction in the lower zone at RW-2.
- Conducted internal reviews of the third quarter, 2000 interim action status report.
- Continued preparation of a pilot study work plan for treatment of contaminated soil.
- Continued internal reviews of a report to provide the results of the EPPI on the east property, including the results of human health and ecological risk evaluations, statistical evaluations for compliance, and plans for further action.
- Began preparation of the Phase III RI work plan, including update of the Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

BZTO104(e)015829

RESULTS COLLECTED

- Validated analytical results for the fourth quarter, 2000 event are attached as Tables A-3, A-4, and A-5 to this report.

- Groundwater level measurements collected during monthly interim action startup monitoring in the lower zone will be provided in the next quarterly status report.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Submit the *Third Quarter 2000 Groundwater Report* and the *Third Quarter 2000 Interim Action Status Report* to DEQ.

- Provide response letter to DEQ on the Phase II RI report.

- Continue preparation and conduct internal reviews of the *Fourth Quarter 2000 Groundwater Report.*

- Continue to recover product at well LW-11S weekly through mid-January and then, monthly through March 2001. (Product was not observed in LW-11S during the first week of January 2001.)

- Incorporate as-built system drawings into groundwater interim action completion report.

- Submit technical memorandum summarizing the results of the lower zone pumping test to DEQ.

- Continue implementation of the interim action startup plan including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping (if appropriate based on upper zone water level measurements). Continue full-scale treatment and discharge to POTW.

- Evaluate system operation data for groundwater interim action and prepare status report for the fourth quarter, 2000.

- Continue preparation and internal review of the pilot study work plan.

- Complete internal reviews of *EPPI Result Report* and submit to DEQ.

- Continue preparation of the Phase III RI work plan.

- Provide DEQ with updated schedules for the Phase I/II RI/FS, east property, and Phase III activities at the Northwest Terminal.

BZTO104(e)015830

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040/SW8270AF MOD.								
Pentachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	1100	48	0.25 U
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
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
2,4,5-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.33 U	3.8 U	0.25 U
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
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	47	4.1	0.25 U
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	1.5	5.9	0.25 U
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.4 J2	730	2.0 U
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2-Methylphenol	2.2	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Methylphenol	5.6	1.0 U	1.0 U	NA	1.0 U	1.0 U	120	1.0 U
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	9.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	NA	10 U	10 U	96	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	10	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Naphthalene	2.0	1.0 U	1.0 U	NA	1.0 U	9.2	13	5.2
4-Chloroaniline	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	9.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.7	1.6
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW8S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/9/00	11/7/00	11/7/00
CHLORINATED PHENOLS (µg/L)				
EPA Method SW8040/SW8270AF MOD.				
Pentachlorophenol	0.25 U	1.4	3400	3400
2,4,6-Trichlorophenol	0.25 U	0.25 U	1.1	1.1
2,3,6-Trichlorophenol	0.25 U	0.25 U	0.44 U	0.48 U
2,4,5-Trichlorophenol	0.25 U	0.25 U	30 U	32 U
2,3,4-Trichlorophenol	0.25 U	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	630	640
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	16	16
SEMIVOLATILES (µg/L)				
EPA Method SW8270				
Phenol	2.0 U	NA	8.2 J2	14 J2
Bis-(2-Chloroethyl) Ether	2.0 U	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
2-Methylphenol	2.0 U	NA	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	NA	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	2.0 U	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	NA	1.0 U	1.0 U
Isophorone	1.0 U	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	NA	3.0 U	3.0 U
Benzoic Acid	10 U	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	NA	1.0 U	1.0 U
Naphthalene	4.3	NA	7.1	5.8
4-Chloroaniline	3.0 U	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	NA	2.0 U	2.0 U
2-Methylnaphthalene	4.7	NA	2.2	1.7
Hexachlorocyclopentadiene	5.0 U	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	NA	5.0 U	5.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	NA	6.0 U	6.0 U	18 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	NA	10 U	10 U	30 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	NA	10 U	10 U	30 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	1500	120	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U

BZTO104(e)015833

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW8S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/9/00	11/7/00	11/7/00
2,4,5-Trichlorophenol	5.0 U	NA	40	31
2-Chloronaphthalene	1.0 U	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	NA	10 U	10 U
4-Nitrophenol	5.0 U	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	NA	1.0 U	1.0 U
Fluorene	1.0 U	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	NA	4000	3900
Phenanthrene	1.0 U	NA	1.0 U	1.0 U
Carbazole	1.0 U	NA	1.0 U	1.0 U
Anthracene	1.0 U	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	NA	1.5	2.0
Fluoranthene	1.0 U	NA	1.0 U	1.0 U
Pyrene	1.0 U	NA	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	NA	1.1	1.0 U
Chrysene	1.0 U	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	NA	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	NA	1.0 U	1.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	2.0	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
Acetone	5.0 U	5.0 U	5.0 U	NA	5.0 U	27	49	110 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2-Butanone	28	5.0 U	5.0 U	NA	5.0 U	15 U	110	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Benzene	160	1.0 U	1.0 U	NA	1.0 U	3.0 U	7.4	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Toluene	1200	1.0 U	1.0 U	NA	1.0 U	3.0 U	19	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Ethylbenzene	100	1.0 U	1.0 U	NA	1.0 U	11	61	23
Styrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U

BZTO104(e)015835

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW8S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/9/00	11/7/00	11/7/00
VOLATILES (µg/L)				
EPA Method SW8260				
Chloromethane	1.0 U	NA	1.0 U	1.0 U
Bromomethane	1.0 U	NA	1.0 U	1.0 U
Vinyl Chloride	1.0 U	NA	1.0 U	1.0 U
Chloroethane	1.0 U	NA	1.0 U	1.0 U
Methylene Chloride	2.0 U	NA	2.0 U	2.0 U
Acetone	5.0 U	NA	16	14
Carbon Disulfide	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	NA	1.0 U	1.0 U
Chloroform	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	NA	1.0 U	1.0 U
2-Butanone	12	NA	7.4 J2	41 J2
1,1,1-Trichloroethane	1.0 U	NA	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	NA	1.0 U	1.0 U
Vinyl Acetate	5.0 U	NA	5.0 U	5.0 U
Bromodichloromethane	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	NA	1.0 U	1.0 U
Trichloroethene	1.0 U	NA	1.0 U	1.0 U
Dibromochloromethane	1.0 U	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	NA	1.0 U	1.0 U
Benzene	5.0	NA	1.0	1.0 U
trans-1,3-Dichloropropene	1.0 U	NA	1.0 U	1.0 U
Bromoform	1.0 U	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	NA	5.0 U	5.0 U
2-Hexanone	5.0 U	NA	5.0 U	5.0 U
Tetrachloroethene	1.0 U	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	NA	1.0 U	1.0 U
Toluene	1.0 U	NA	9.1	8.2
Chlorobenzene	1.0 U	NA	1.0 U	1.0 U
Ethylbenzene	8.5	NA	96	86
Styrene	1.0 U	NA	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	NA	1.0 U	1.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
m,p-Xylene	320	1.0 U	1.0 U	NA	1.0 U	15	170	19
o-Xylene	160	1.0 U	1.0 U	NA	1.0 U	36	88	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	NA	50 U	150 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	NA	3.0 U	9.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	15	1.0 U	1.0 U	NA	1.0 U	47	46	2.8
1,2,4-Trimethylbenzene	61	1.0 U	1.0 U	NA	1.0 U	250	160	1.6
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Isopropylbenzene	9.0	1.0 U	2.5	NA	1.0 U	9.1	19	22
n-Propylbenzene	15	1.0 U	3.8	NA	1.0 U	20	27	33
Bromobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	9.3	7.7	2.6
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	8.5	4.8	1.2
n-Butylbenzene	1.8 U	1.0 U	1.0 U	NA	1.0 U	9.5	6.8 U	3.2
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Naphthalene	25	5.0 U	5.0 U	NA	5.0 U	27	19	13
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U

BZTO104(e)015837

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW8S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/9/00	11/7/00	11/7/00
1,1,2-Trichlorotrifluoroethane	2.0 U	NA	2.0 U	2.0 U
m,p-Xylene	2.2	NA	92	82
o-Xylene	1.0 U	NA	160	150
1,2-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	NA	1.0 U	1.0 U
Acrolein	50 U	NA	50 U	50 U
Methyl Iodide	1.0 U	NA	1.0 U	1.0 U
Bromoethane	2.0 U	NA	2.0 U	2.0 U
Acrylonitrile	5.0 U	NA	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	NA	1.0 U	1.0 U
Dibromomethane	1.0 U	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	NA	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	NA	29	25
1,2,4-Trimethylbenzene	2.6	NA	240	250
Hexachlorobutadiene	5.0 U	NA	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	NA	1.0 U	1.0 U
Bromochloromethane	1.0 U	NA	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	NA	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	NA	1.0 U	1.0 U
Isopropylbenzene	100	NA	26	21
n-Propylbenzene	56	NA	36	31
Bromobenzene	1.0 U	NA	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	NA	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	NA	1.0 U	1.0 U
tert-Butylbenzene	4.9	NA	1.0 U	1.0 U
sec-Butylbenzene	11	NA	11	10
4-Isopropyltoluene	1.0 U	NA	5.2	4.6
n-Butylbenzene	4.1	NA	6.0	6.0
1,2,4-Trichlorobenzene	5.0 U	NA	5.0 U	5.0 U
Naphthalene	6.6	NA	11	12
1,2,3-Trichlorobenzene	5.0 U	NA	5.0 U	5.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0.37	0.25 U	0.25 U	NA	0.25 U	4.0 (b)	19	0.32 (b)
TPH-Motor Oil Range	0.50 U	NA	0.50 U	NA	NA	NA	5.0 U	NA
TPH-Gasoline Range	8.8	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.007	0.014	0.012	0.001 U	0.011	0.017	0.006	0.015
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
Copper (6010)	0.081	0.002 U	0.002 U	0.004 J2	0.002 U	0.005 J2	0.008	0.002 U
Lead (7421)	0.001 U	0.001 U	0.001 U	0.001	0.001	0.003	0.001	0.002
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.03	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.009	0.006 U	0.013	0.009	0.024
CONVENTIONALS								
Total Dissolved Solids (mg/L) (EPA 160.1)	140	220	160	NA	170	220	990	210
Chloride (mg/L) (EPA 325.2)	2.5	5.4	2.3	NA	3.6	26	7.7	4.1
FIELD PARAMETERS								
pH (avg)	4.89	5.41	5.27	5.05	5.21	5.58	5.74	5.18
Temperature (° C) (avg)	13.4	14.3	14.4	15.3	15.2	15.3	14.3	14.9
Conductivity (mS/cm) (avg)	222	300	212	323	207	302	884	302
Dissolved oxygen (mg/L) (avg)	0.84	2.04	1.09	2.36	1.86	0.98	0.62	2.02
Turbidity (NTU)	7	0	0	2	0	74	38	16
ETHANOL (mg/L)	5.0 U	NA	NA	NA	NA	NA	NA	NA

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW8S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/9/00	11/7/00	11/7/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)				
Method OR-DEQ				
TPH-Diesel Range	2.3	NA	6.4 (b)	5.7 (b)
TPH-Motor Oil Range	0.50 U	NA	0.50 U (b)	0.50 U (b)
TPH-Gasoline Range	3.9	NA	9.7 (a)	9.9 (a)
PRIORITY POLLUTANT				
METALS (mg/L)				
Arsenic (7060)	0.022	NA	0.006	0.006
Chromium (6010)	0.005 U	NA	0.015	0.010
Copper (6010)	0.002 U	NA	0.020 J2	0.016 J2
Lead (7421)	0.005	NA	0.006	0.004
Nickel (6010)	0.01 U	NA	0.01	0.01
Zinc (6010)	0.041	NA	0.054	0.048
CONVENTIONALS				
Total Dissolved Solids (mg/L) (EPA 160.1)	190	NA	220	230
Chloride (mg/L) (EPA 325.2)	4.2	NA	7.3	6.2
FIELD PARAMETERS				
pH (avg)	5.74	5.62	5.28	5.27
Temperature (° C) (avg)	14.7	10.7	14.2	14.1
Conductivity (mS/cm) (avg)	352	272	305	303
Dissolved oxygen (mg/L) (avg)	0.53	1.47	0.69	0.72
Turbidity (NTU)	30	1	408	421
ETHANOL (mg/L)	5.0 U	NA	5.0 U	5.0 U

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
CHLORINATED PHENOLS (µg/L)										
EPA Method SW8040										
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,5-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,4-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
SEMIVOLATILES (µg/L)										
EPA Method SW8270										
Phenol	2.0 U	2.0 U	2.0 U	6.4	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	2.0 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	1.0 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	1.0 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	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	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	1.0 U
2-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	2.0 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	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	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	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	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	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	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	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	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	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	5.4	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	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	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	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	4.1	1.0 U	1.0 U	11	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	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	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8040									
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	45	38
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
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
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	1.2 U	1.1
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
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	3.6	3.5
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	1.3	1.2
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	85	97
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	14	18
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	NA	NA	NA	21	22
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	13	14
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	31	32
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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
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	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	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	2.1	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	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	6.0 U
Acenaphthene	1.0 U	1.0 U	1.8	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	5.0 U
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	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	2.0	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	1.0 U
Fluorene	1.0 U	1.0 U	3.5	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	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	1.0 U
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
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	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	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	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	2.2	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	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	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	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	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	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	2.2	1.0 U	1.0 U	1.0 U	1.0 U	2.8 U	1.0 U	1.0 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	1.0 U
Di-n-Octyl 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
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	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	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	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	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	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	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	NA	NA	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	77	95
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	2.7	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	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	NA	NA	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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	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	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	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	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	2.0 U
Acetone	5.0 U	5.0 U	11	12	5.0 U	5.0 U	15	17 U	5.0 U	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	1.0 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	1.0 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	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	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	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	1.0 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	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	21	5.0 U	5.0 U	14	5.0 U	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	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	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	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	1.0 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	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	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	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	1.0 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	1.0 U
Benzene	1.0 U	1.0 U	7.7	77	1.0 U	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	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	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	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	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	1.0 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	1.0 U
Toluene	1.0 U	1.0 U	3.0	3.6	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	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	1.3	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	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	1.0 U

BZTO104(e)015845

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
Acetone	5.0 U	12	5.0 U	5.0 U	NA	NA	NA	20	17
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	8.4	5.0 U	NA	NA	NA	30	24
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.8	2.7
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.5
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	27	29
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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	2.0 U
m,p-Xylene	1.0 U	1.0 U	2.6	2.4	1.0	1.0 U	1.0 U	3.6	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	1.0 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	1.0 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	1.0 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	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-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	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-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	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	5.0 U	5.0 U	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	3.0 U	3.0 U	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	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	1.4	1.0 U	1.0 U	1.0 U	1.0 U	12	1.0 U	1.0 U
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	2.4 M	1.0 U	1.0 U	240	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	5.0 U	5.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	33	24	140	1.0 U	1.0 U	56	24	1.0 U
n-Propylbenzene	1.0 U	1.0 U	18	14	130	1.0 U	1.0 U	60	2.8	1.0 U
Bromobenzene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.0 U	1.0 U	2.9	2.8	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	6.7	4.4	19	1.0 U	1.0 U	9.1	6.4	1.0 U
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
n-Butylbenzene	1.0 U	1.0 U	2.5	1.3 U	12	1.0 U	1.0 U	7.0	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	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	12	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	5.0 U	5.0 U	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	78	81
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	15	15
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U	NA	NA	NA	100 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	6.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	3.1	4.8	1.0 U	NA	NA	NA	58	66
1,2,4-Trimethylbenzene	1.0 U	5.6	22	1.0 U	NA	NA	NA	200	220
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	1.3	1.0 U	NA	NA	NA	57	68
n-Propylbenzene	1.0 U	1.6	2.2	1.0 U	NA	NA	NA	75	90
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.1	2.8
sec-Butylbenzene	1.0 U	1.7	1.6	1.0 U	NA	NA	NA	11	14
4-Isopropyltoluene	1.0 U	1.0 U	1.6	1.0 U	NA	NA	NA	5.7	7.6
n-Butylbenzene	1.0 U	1.5	1.4 U	1.0 U	NA	NA	NA	11	14 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	22	25
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U

BZTO104(e)015848

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)										
Method OR-DEQ										
TPH-Diesel	0.25 U	0.40	NA	NA	2.2	0.25 U	0.25 U	5.4	1.2	0.25 U
TPH-D Motor Oil	0.50 U	0.50 U	NA	NA	NA	NA	NA	0.50 U	NA	NA
TPH-Gasoline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT										
METALS (mg/L)										
Arsenic (7060)	0.006	0.008	NA	NA	0.033	0.005	0.016	0.028	0.015	0.030
Chromium (6010)	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.010
Copper (6010)	0.002 U	0.002 U	NA	NA	0.004	0.002 J2	0.004 J2	0.004	0.006	0.015
Lead (7421)	0.001 U	0.001 U	NA	NA	0.003	0.001	0.001	0.001 U	0.002	0.003
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	0.01 U
Zinc (6010)	0.006 U	0.006 U	NA	NA	0.009	0.007	0.017	0.013	0.008	0.028
CONVENTIONALS										
Total Dissolved Solids (mg/L) (EPA 160.1)	240	340	NA	NA	380	360	350	370	220	170
Chloride (mg/L) (EPA 325.2)	3.2	5.1	NA	NA	8.2	3.2	6.9	16	2.2	2.1
FIELD PARAMETERS										
pH (avg)	5.53	5.46	5.70	5.91	5.84	5.47	5.58	5.96	5.73	5.91
Temperature (° C) (avg)	13.3	12.8	13.4	13.5	13.7	14.0	12.7	13.3	13.8	13.4
Conductivity (mS/cm) (avg)	319	578	437	571	679	481	624	656	360	242
Dissolved oxygen (mg/L) (avg)	2.17	1.02	0.39	0.69	0.64	2.23	1.28	0.31	1.20	1.06
Turbidity (NTU)	0	0	509	1	7	7	26	143	0	64
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel	0.25 U	0.70 (b)	0.78	0.25 U	NA	NA	NA	5.2	5.0
TPH-D Motor Oil	0.50 U	NA	0.50 U	0.50 U	NA	NA	NA	0.50 U	0.50 U
TPH-Gasoline	NA	NA	NA	NA	NA	NA	NA	4.6	5.0
PRIORITY POLLUTANT									
METALS (mg/L)									
Arsenic (7060)	0.022	0.007	0.019	0.020	NA	NA	NA	0.021	0.021
Chromium (6010)	0.013	0.016	0.010	0.005 U	NA	NA	NA	0.005 U	0.005 U
Copper (6010)	0.021	0.018 J2	0.016	0.004	NA	NA	NA	0.002 U	0.004
Lead (7421)	0.006	0.008	0.006	0.001 U	NA	NA	NA	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01	0.01 U	0.01 U	NA	NA	NA	0.01 U	0.01 U
Zinc (6010)	0.030	0.058	0.037	0.006 U	NA	NA	NA	0.116	0.122
CONVENTIONALS									
Total Dissolved Solids (mg/L) (EPA 160.1)	160	380	330	280	NA	NA	NA	320	310
Chloride (mg/L) (EPA 325.2)	2.0	14	3.3	3.3	NA	NA	NA	4.7	5.0
FIELD PARAMETERS									
pH (avg)	6.10	5.75	5.68	5.48	6.12	5.95	6.12	5.55	5.54
Temperature (° C) (avg)	13.0	12.8	12.2	13.3	12.8	13.5	12.8	12.7	12.7
Conductivity (mS/cm) (avg)	203	544	444	442	265	79	265	513	513
Dissolved oxygen (mg/L) (avg)	1.09	1.23	0.93	0.29	1.25	1.21	1.25	0.53	0.55
Turbidity (NTU)	264	5	218	0	238	72	238	12	12
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product
Laboratory Identification:	LW11S
Date Collected:	CK77K
	11/8/00
CHLORINATED PHENOLS (µg/kg)	
EPA Method SW8040/SW8270AF MOD.	
Pentachlorophenol	3200000
VOLATILES (µg/kg)	
EPA Method SW8260	
Chloromethane	98000 U
Bromomethane	98000 U
Vinyl Chloride	98000 U
Chloroethane	98000 U
Methylene Chloride	200000 U
Acetone	490000 U
Carbon Disulfide	98000 U
1,1-Dichloroethene	98000 U
1,1-Dichloroethane	98000 U
trans-1,2-Dichloroethene	98000 U
cis-1,2-Dichloroethene	98000 U
Chloroform	98000 U
1,2-Dichloroethane	98000 U
2-Butanone	490000 U
1,1,1-Trichloroethane	98000 U
Carbon Tetrachloride	98000 U
Vinyl Acetate	490000 U
Bromodichloromethane	98000 U
1,2-Dichloropropane	98000 U
cis-1,3-Dichloropropene	98000 U
Trichloroethene	98000 U
Dibromochloromethane	98000 U
1,1,2-Trichloroethane	98000 U
Benzene	98000 U
trans-1,3-Dichloropropene	98000 U
Bromoform	98000 U
4-Methyl-2-Pentanone (MIBK)	49000 U
2-Hexanone	49000 U
Tetrachloroethene	98000 U
1,1,2,2-Tetrachloroethane	98000 U
Toluene	120000
Chlorobenzene	98000 U

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TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product LW11S
Laboratory Identification:	CK77K
Date Collected:	11/8/00
Ethylbenzene	1400000
Styrene	98000 U
Trichlorofluoromethane	98000 U
1,1,2-Trichlorotrifluoroethane	200000 U
m,p-Xylene	3200000
o-Xylene	2300000
1,2-Dichlorobenzene	98000 U
1,3-Dichlorobenzene	98000 U
1,4-Dichlorobenzene	98000 U
Acrolein	4900000 U
Methyl Iodide	98000 U
Bromoethane	200000 U
Acrylonitrile	490000 U
1,1-Dichloropropene	98000 U
Dibromomethane	98000 U
1,1,1,2-Tetrachloroethane	98000 U
1,2-Dibromo-3-chloropropane	490000 U
1,2,3-Trichloropropane	290000 U
trans-1,4-Dichloro-2-butene	490000 U
1,3,5-Trimethylbenzene	4300000
1,2,4-Trimethylbenzene	13000000
Hexachlorobutadiene	490000 U
Ethylene Dibromide	98000 U
Bromochloromethane	98000 U
2,2-Dichloropropane	98000 U
1,3-Dichloropropane	98000 U
Isopropylbenzene	1000000
n-Propylbenzene	2200000
Bromobenzene	98000 U
2-Chlorotoluene	98000 U
4-Chlorotoluene	98000 U
tert-Butylbenzene	98000 U
sec-Butylbenzene	1000000
4-Isopropyltoluene	1200000
n-Butylbenzene	1700000
1,2,4-Trichlorobenzene	490000 U
Naphthalene	640000
1,2,3-Trichlorobenzene	490000 U

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TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product LW11S
Laboratory Identification:	CK77K
Date Collected:	11/8/00
TOTAL PETROLEUM HYDROCARBONS (mg/kg)	
Method NWTPH HCID	
Gas Range	1300000
Diesel Range	81000
Oil Range	50000 U

BZTO104(e)015853

KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS FOR TABLES A-3, A-4, AND A-5

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.

J1 = Laboratory flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J2 = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

[ ] = 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 hydrocarbon patterns that eluted in the range between mineral spirits and diesel #2 were detected; however the elution patterns do not match available standards.

BZTO104(e)015854

6-4-01

JAN 11 2001

Landau Associates
Environmental and Geotechnical Services

TRANSMITTAL

86-105 (E)EQ

To: Distribution List | Date: January 9, 2001

Attn: | Project No.: 231001.135

RE: Project Schedules - Time Oil Northwest Terminal

Copies	Description
1	Preliminary Schedule - Phases I/II RI/FS
1	Preliminary Schedule – East Property
1	Preliminary Schedule – Phase III RI

Message:

Distribution List:

Kevin Murphy, Time Oil Co.
Don Butler, Time Oil Co.
Mike Tischuk, Beazer East, Inc. (Phases I/II RI/FS only)
Shannon Craig, Hanson (Phases I/II RI/FS only)
Patty Dost, Schwabe Williamson & Wyatt

Enclosed are revised project schedules for the Time Oil Northwest Terminal. Kevin has requested that your review and comment on these schedules is URGENT. We would like to provide them to DEQ by JANUARY 17. Please provide any comments you may have to me by NOON on JANUARY 16.

Thank you.

LANDAU ASSOCIATES, INC.

By:

For Rebekah Brooks
Senior Hydrogeologist

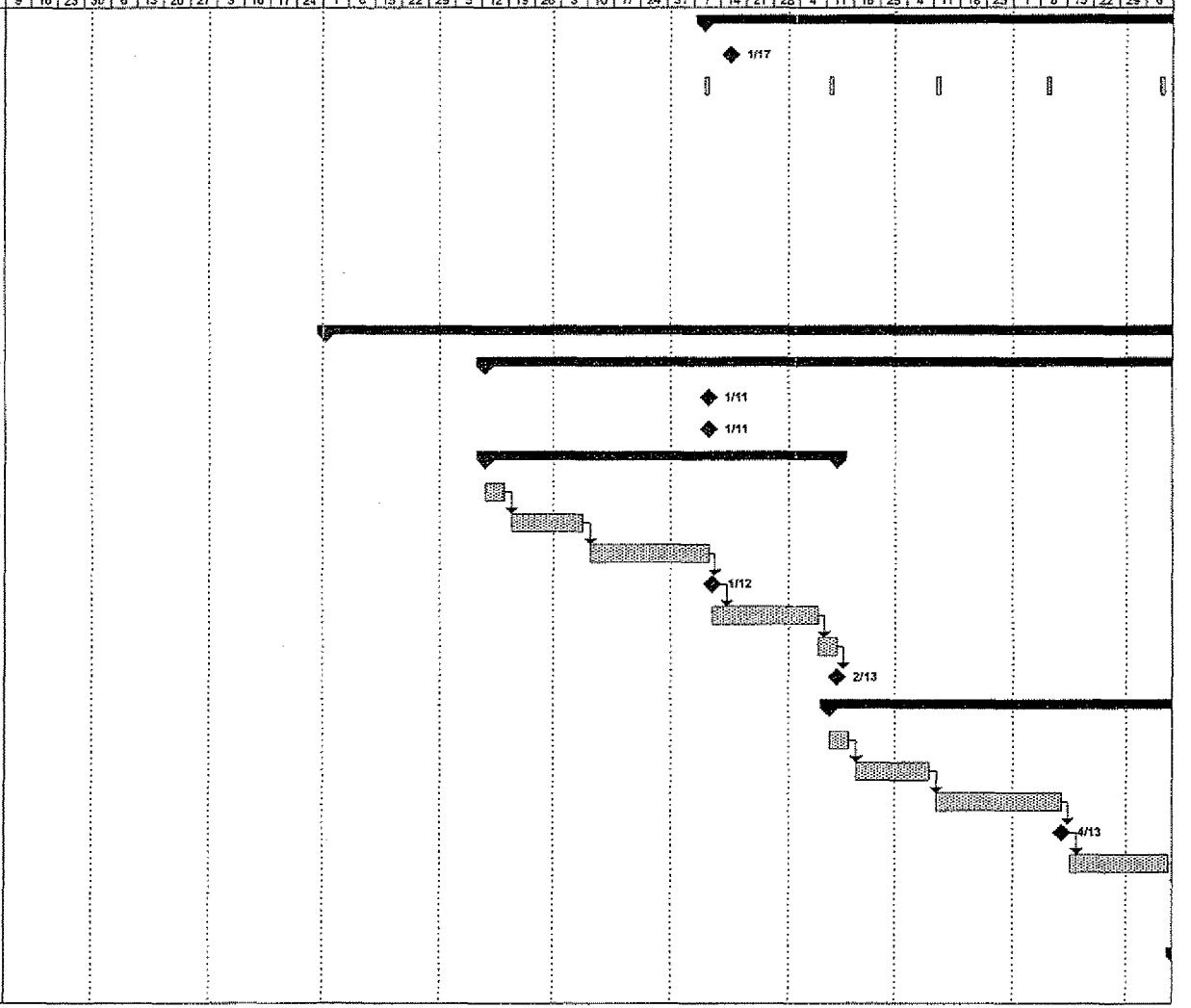
RB/

1/9/01 S:\SHAREDOC\231\001\timeoil_trans.doc

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

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
PROJECT MANAGEMENT	239 days	Wed 1/10/01	Mon 12/10/01
Revised Schedule to DEQ	0 days	Wed 1/17/01	Wed 1/17/01
Monthly Reports to DEQ	239 days	Wed 1/10/01	Mon 12/10/01
Monthly Reports to DEQ 7	1 day	Tue 7/10/01	Tue 7/10/01
Monthly Reports to DEQ 8	1 day	Fri 8/10/01	Fri 8/10/01
Monthly Reports to DEQ 9	1 day	Mon 9/10/01	Mon 9/10/01
Monthly Reports to DEQ 10	1 day	Wed 10/10/01	Wed 10/10/01
Monthly Reports to DEQ 11	1 day	Mon 11/12/01	Mon 11/12/01
Monthly Reports to DEQ 12	1 day	Mon 12/10/01	Mon 12/10/01
Monthly Reports to DEQ 7	1 day	Tue 7/10/01	Tue 7/10/01
PHASE I/II RI/FS	357 days	Mon 10/2/00	Tue 2/12/02
Quarterly Groundwater Events	327 days	Mon 11/13/00	Tue 2/12/02
3rd Quarter, 2000	0 days	Thu 1/11/01	Thu 1/11/01
Groundwater Report to DEQ	0 days	Thu 1/11/01	Thu 1/11/01
4th Quarter, 2000	67 days	Mon 11/13/00	Tue 2/13/01
Sampling Event	5 days	Mon 11/13/00	Fri 11/17/00
Laboratory Analyses	15 days	Mon 11/20/00	Fri 12/8/00
Groundwater Report Preparation	23 days	Mon 12/11/00	Wed 1/10/01
Groundwater Report to Client	0 days	Fri 1/12/01	Fri 1/12/01
Client Review	20 days	Fri 1/12/01	Thu 2/8/01
Incorporate Client Comments	3 days	Fri 2/9/01	Tue 2/13/01
Groundwater Report to DEQ	0 days	Tue 2/13/01	Tue 2/13/01
1st Quarter, 2001	68 days	Mon 2/12/01	Wed 5/16/01
Sampling Event	5 days	Mon 2/12/01	Fri 2/16/01
Laboratory Analyses	15 days	Mon 2/19/01	Fri 3/9/01
Groundwater Report Preparation	25 days	Mon 3/12/01	Fri 4/13/01
Groundwater Report to Client	0 days	Fri 4/13/01	Fri 4/13/01
Client Review	20 days	Mon 4/16/01	Fri 5/11/01
Incorporate Client Comments	3 days	Mon 5/14/01	Wed 5/16/01
Groundwater Report to DEQ	0 days	Wed 5/16/01	Wed 5/16/01
2nd Quarter, 2001	67 days	Mon 5/14/01	Tue 8/14/01
Sampling Event	4 days	Mon 5/14/01	Thu 5/17/01



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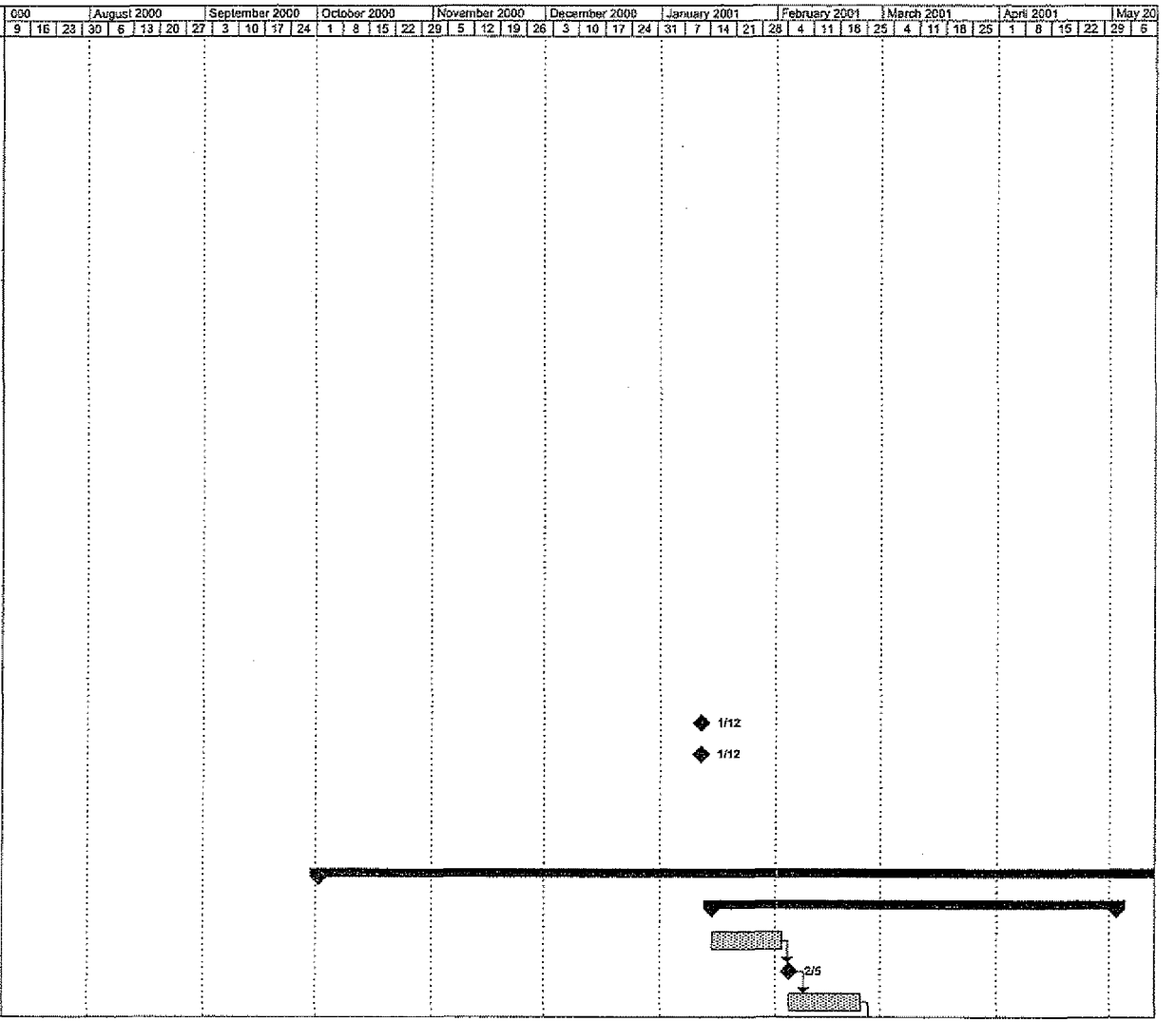
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Laboratory Analyses	15 days	Fri 5/18/01	Thu 6/7/01
Groundwater Report Preparation	25 days	Fri 6/8/01	Thu 7/12/01
Groundwater Report to Client	0 days	Thu 7/12/01	Thu 7/12/01
Client Review	20 days	Fri 7/13/01	Thu 8/9/01
Incorporate Client Comments	3 days	Fri 8/10/01	Tue 8/14/01
Groundwater Report to DEQ	0 days	Tue 8/14/01	Tue 8/14/01
3rd Quarter, 2001	67 days	Mon 8/13/01	Tue 11/13/01
Sampling Event	4 days	Mon 8/13/01	Thu 8/16/01
Laboratory Analyses	15 days	Fri 8/17/01	Thu 9/6/01
Groundwater Report Preparation	25 days	Fri 9/7/01	Thu 10/11/01
Groundwater Report to Client	0 days	Thu 10/11/01	Thu 10/11/01
Client Review	20 days	Fri 10/12/01	Thu 11/8/01
Incorporate Client Comments	3 days	Fri 11/9/01	Tue 11/13/01
Groundwater Report to DEQ	0 days	Tue 11/13/01	Tue 11/13/01
4th Quarter, 2001	67 days	Mon 11/12/01	Tue 2/12/02
Sampling Event	4 days	Mon 11/12/01	Thu 11/15/01
Laboratory Analyses	15 days	Fri 11/16/01	Thu 12/6/01
Groundwater Report Preparation	25 days	Fri 12/7/01	Thu 1/10/02
Groundwater Report to Client	0 days	Thu 1/10/02	Thu 1/10/02
Client Review	20 days	Fri 1/11/02	Thu 2/7/02
Incorporate Client Comments	3 days	Fri 2/8/02	Tue 2/12/02
Groundwater Report to DEQ	0 days	Tue 2/12/02	Tue 2/12/02
PHASE II RI REPORT	0 days	Fri 1/12/01	Fri 1/12/01
Response Letter to DEQ	0 days	Fri 1/12/01	Fri 1/12/01
ADDITIONAL INVESTIGATIONS	10 days	Mon 6/18/01	Fri 6/29/01
Soil Sampling (with Phase III RI)	5 days	Mon 6/18/01	Fri 6/22/01
Storm Drain Backfill/Water Sampling (with Phase III RI)	5 days	Mon 6/25/01	Fri 6/29/01
GROUNDWATER INTERIM ACTION	330 days	Mon 10/2/00	Fri 1/4/02
Completion Report	78 days	Mon 1/15/01	Thu 5/3/01
Completion Report Preparation	15 days	Mon 1/15/01	Fri 2/2/01
Draft Report to Client	0 days	Mon 2/5/01	Mon 2/5/01
Client Review/Comment	15 days	Mon 2/5/01	Fri 2/23/01



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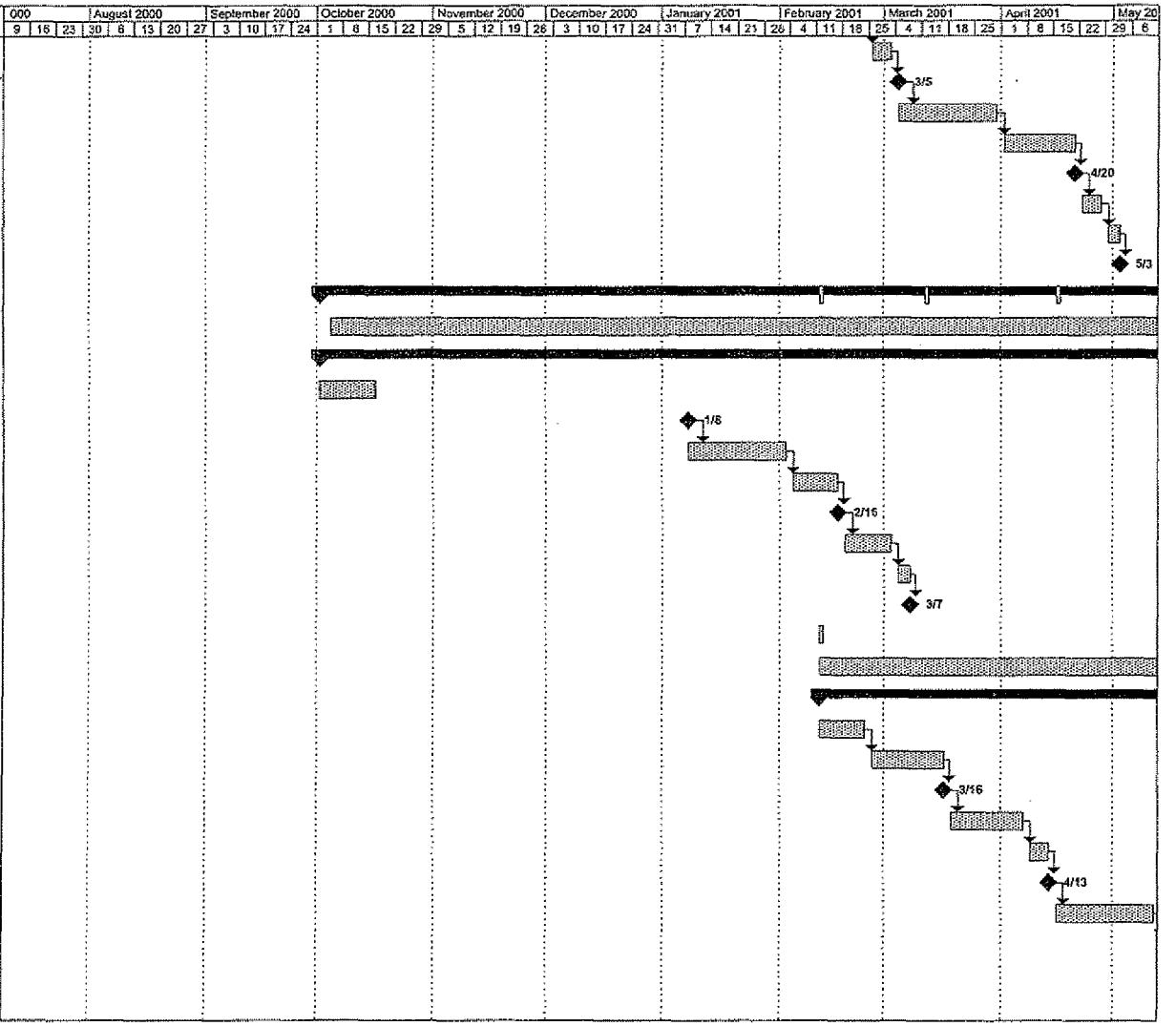
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Incorporate Client Comments	5 days	Mon 2/26/01	Fri 3/2/01
Report to DEQ	0 days	Mon 3/5/01	Mon 3/5/01
DEQ Review/Comment	20 days	Mon 3/5/01	Fri 3/30/01
Prepare Response to DEQ Comments and Finalize Report	15 days	Mon 4/2/01	Fri 4/20/01
Response Letter to Client	0 days	Fri 4/20/01	Fri 4/20/01
Client Review of Response	5 days	Mon 4/23/01	Fri 4/27/01
Incorporate Client Comments	3 days	Mon 4/30/01	Wed 5/2/01
Response Letter and Final Report to DEQ	0 days	Thu 5/3/01	Thu 5/3/01
Interim Action Startup/Implementation	**330 days**	**Mon 10/2/00**	**Fri 1/4/02**
Interim Action Implementation in Lower Zone	324 days	Thu 10/5/00	Tue 1/1/02
Lower Zone Startup Monitoring	**226 days**	**Mon 10/2/00**	**Mon 8/13/01**
Baseline and Initial Startup Monitoring	11 days	Mon 10/2/00	Mon 10/16/00
Startup Monitoring Tech Memo to DEQ	0 days	Mon 1/8/01	Mon 1/8/01
DEQ Review/Comment	20 days	Mon 1/8/01	Fri 2/2/01
Prepare Response to DEQ Comments	10 days	Mon 2/5/01	Fri 2/16/01
Reponse Letter to Client	0 days	Fri 2/16/01	Fri 2/16/01
Client Review	10 days	Mon 2/19/01	Fri 3/2/01
Incorporate Client Comments	3 days	Mon 3/5/01	Wed 3/7/01
Response Letter to DEQ	0 days	Wed 3/7/01	Wed 3/7/01
Routine Water Level Monitoring	**131 days**	**Mon 2/12/01**	**Mon 8/13/01**
Interim Action Implementation in Upper Zone	235 days	Mon 2/12/01	Fri 1/4/02
Upper Zone Startup Monitoring	**131 days**	**Mon 2/12/01**	**Mon 8/13/01**
Baseline and Initial Startup Monitoring	10 days	Mon 2/12/01	Fri 2/23/01
Startup Monitoring Tech Memo Preparation	15 days	Mon 2/26/01	Fri 3/16/01
Tech Memo to Client	0 days	Fri 3/16/01	Fri 3/16/01
Client Review	15 days	Mon 3/19/01	Fri 4/6/01
Incorporate Client Comments	5 days	Mon 4/9/01	Fri 4/13/01
Report to DEQ	0 days	Fri 4/13/01	Fri 4/13/01
DEQ Review/Comment	20 days	Mon 4/16/01	Fri 5/11/01
Prepare Response to DEQ Comments	10 days	Mon 5/14/01	Fri 5/25/01
Response Letter to Client	0 days	Fri 5/25/01	Fri 5/25/01
Client Review	10 days	Mon 5/28/01	Fri 6/8/01



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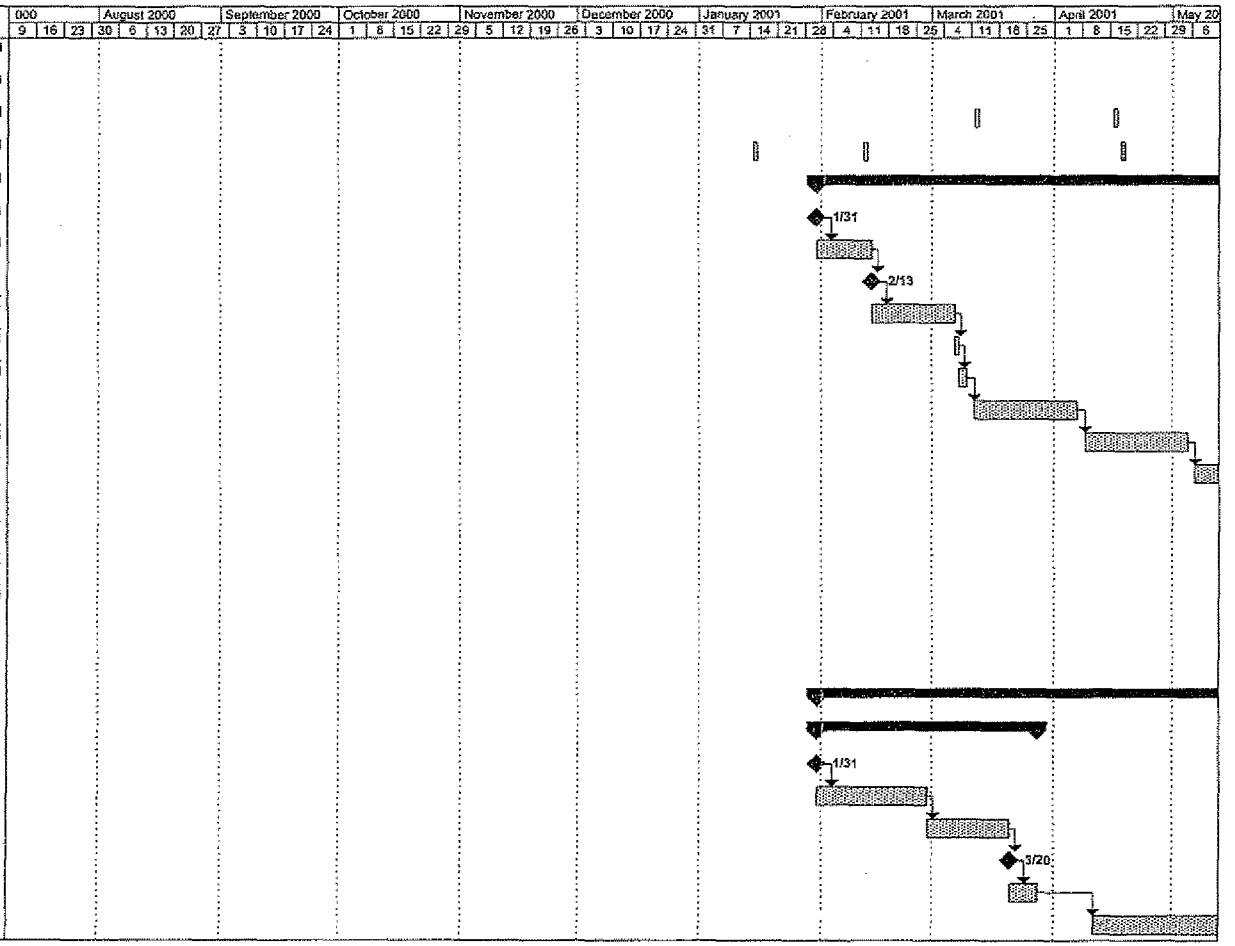
Landau Associates, Inc.

BZTO104(e)015858

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

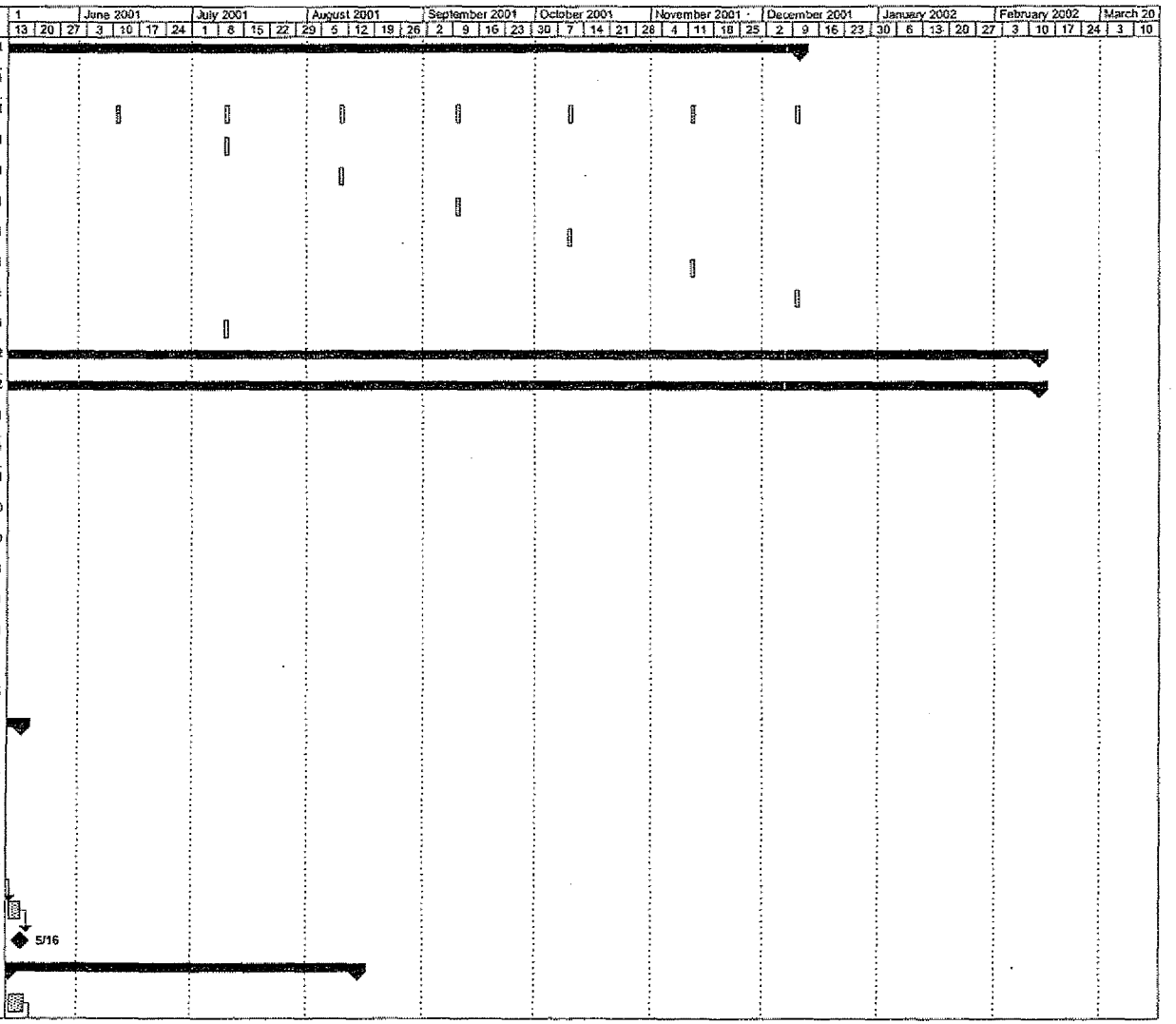
Task Name	Duration	Start	Finish
Incorporate Client Comments	3 days	Mon 6/11/01	Wed 6/13/01
Response Letter to DEQ	0 days	Wed 6/13/01	Wed 6/13/01
Routine Water Level Monitoring	111 days	Mon 3/12/01	Mon 8/13/01
Quarterly Status Reports to DEQ	152 days	Mon 1/15/01	Tue 8/14/01
RISK SENSITIVITY ANALYSES	126 days	Wed 1/31/01	Wed 7/25/01
Complete Scope Outline (by Beazer, Inc.)	0 days	Wed 1/31/01	Wed 1/31/01
Scope Outline Internal Reviews	10 days	Wed 1/31/01	Tue 2/13/01
Scope Outline to DEQ	0 days	Tue 2/13/01	Tue 2/13/01
DEQ Review/Comment	15 days	Wed 2/14/01	Tue 3/6/01
Discussion/Meeting with DEQ	1 day	Wed 3/7/01	Wed 3/7/01
DEQ Approval of Scope	2 days	Thu 3/8/01	Fri 3/9/01
Conduct Sensitivity Analyses (by Beazer, Inc.)	20 days	Mon 3/12/01	Fri 4/6/01
Prepare Sensitivity Analyses Results Report (by Beazer, Inc.)	20 days	Mon 4/9/01	Fri 5/4/01
Conduct Internal Review	15 days	Mon 5/7/01	Fri 5/25/01
Report to DEQ	0 days	Fri 5/25/01	Fri 5/25/01
DEQ Review/Comment	20 days	Mon 5/28/01	Fri 6/22/01
Prepare Response to DEQ Comments and Finalize Report (by Beazer, Inc.)	10 days	Mon 6/25/01	Fri 7/6/01
Internal Review of DEQ Response	5 days	Mon 7/9/01	Fri 7/13/01
Response Letter and Final Report to DEQ (by Beazer, Inc.)	3 days	Mon 7/16/01	Wed 7/18/01
DEQ Approval of Risk Assessment Approach	5 days	Thu 7/19/01	Wed 7/25/01
PILOT TESTING (BIOLOGICAL TREATMENT FOR SOIL)	180 days	Wed 1/31/01	Tue 10/9/01
Pilot Testing Work Plan	40 days	Wed 1/31/01	Tue 3/27/01
Work Plan to DEQ (by Time Oil)	0 days	Wed 1/31/01	Wed 1/31/01
DEQ Review/Comment	20 days	Wed 1/31/01	Tue 2/27/01
Prepare Response to DEQ Comments and Finalize Work Plan	15 days	Wed 2/28/01	Tue 3/20/01
Response Letter and Final Work Plan to DEQ	0 days	Tue 3/20/01	Tue 3/20/01
DEQ Approval of Work Plan	5 days	Wed 3/21/01	Tue 3/27/01
Pilot Test Implementation (by Time Oil)	130 days	Wed 4/11/01	Tue 10/9/01



BZTO104(e)015859

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

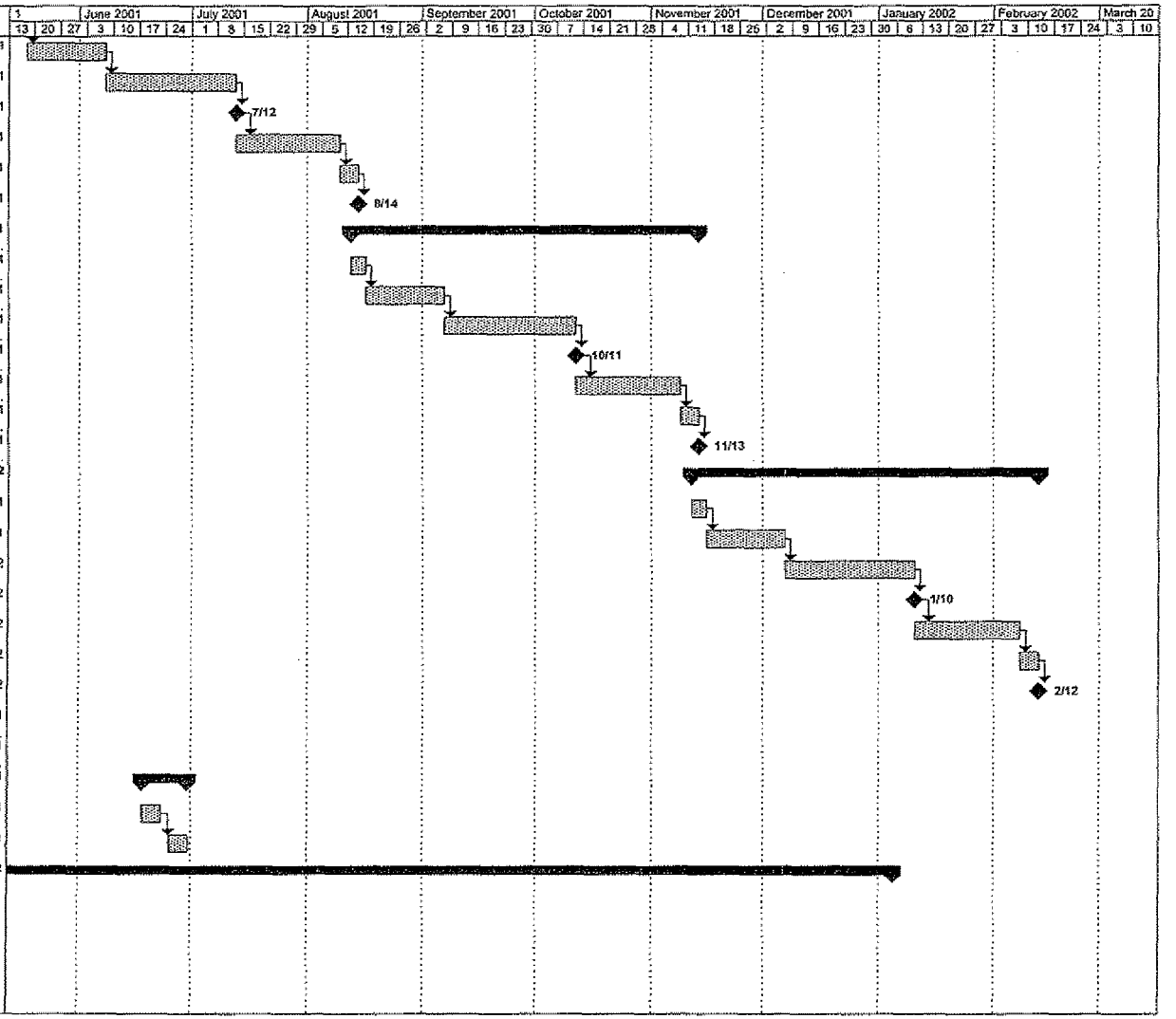
Task Name	Duration	Start	Finish
PROJECT MANAGEMENT	239 days	Wed 1/10/01	Mon 12/10/01
Revised Schedule to DEQ	0 days	Wed 1/17/01	Wed 1/17/01
Monthly Reports to DEQ	239 days	Wed 1/10/01	Mon 12/10/01
Monthly Reports to DEQ 7	1 day	Tue 7/10/01	Tue 7/10/01
Monthly Reports to DEQ 8	1 day	Fri 8/10/01	Fri 8/10/01
Monthly Reports to DEQ 9	1 day	Mon 9/10/01	Mon 9/10/01
Monthly Reports to DEQ 10	1 day	Wed 10/10/01	Wed 10/10/01
Monthly Reports to DEQ 11	1 day	Mon 11/12/01	Mon 11/12/01
Monthly Reports to DEQ 12	1 day	Mon 12/10/01	Mon 12/10/01
Monthly Reports to DEQ 7	1 day	Tue 7/10/01	Tue 7/10/01
PHASE I/II RI/FS	357 days	Mon 10/2/00	Tue 2/12/02
Quarterly Groundwater Events	327 days	Mon 11/13/00	Tue 2/12/02
3rd Quarter, 2000	0 days	Thu 1/11/01	Thu 1/11/01
Groundwater Report to DEQ	0 days	Thu 1/11/01	Thu 1/11/01
4th Quarter, 2000	67 days	Mon 11/13/00	Tue 2/13/01
Sampling Event	5 days	Mon 11/13/00	Fri 11/17/00
Laboratory Analyses	15 days	Mon 11/20/00	Fri 12/8/00
Groundwater Report Preparation	23 days	Mon 12/11/00	Wed 1/10/01
Groundwater Report to Client	0 days	Fri 1/12/01	Fri 1/12/01
Client Review	20 days	Fri 1/12/01	Thu 2/8/01
Incorporate Client Comments	3 days	Fri 2/9/01	Tue 2/13/01
Groundwater Report to DEQ	0 days	Tue 2/13/01	Tue 2/13/01
1st Quarter, 2001	69 days	Mon 2/12/01	Wed 5/16/01
Sampling Event	5 days	Mon 2/12/01	Fri 2/16/01
Laboratory Analyses	15 days	Mon 2/19/01	Fri 3/9/01
Groundwater Report Preparation	25 days	Mon 3/12/01	Fri 4/13/01
Groundwater Report to Client	0 days	Fri 4/13/01	Fri 4/13/01
Client Review	20 days	Mon 4/16/01	Fri 5/11/01
Incorporate Client Comments	3 days	Mon 5/14/01	Wed 5/16/01
Groundwater Report to DEQ	0 days	Wed 5/16/01	Wed 5/16/01
2nd Quarter, 2001	67 days	Mon 5/14/01	Tue 8/14/01
Sampling Event	4 days	Mon 5/14/01	Thu 5/17/01



BZTO104(e)015860

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

Task Name	Duration	Start	Finish
Laboratory Analyses	15 days	Fri 5/18/01	Thu 6/7/01
Groundwater Report Preparation	25 days	Fri 6/8/01	Thu 7/12/01
Groundwater Report to Client	0 days	Thu 7/12/01	Thu 7/12/01
Client Review	20 days	Fri 7/13/01	Thu 8/9/01
Incorporate Client Comments	3 days	Fri 8/10/01	Tue 8/14/01
Groundwater Report to DEQ	0 days	Tue 8/14/01	Tue 8/14/01
3rd Quarter, 2001	67 days	Mon 8/13/01	Tue 11/13/01
Sampling Event	4 days	Mon 8/13/01	Thu 8/16/01
Laboratory Analyses	15 days	Fri 8/17/01	Thu 9/6/01
Groundwater Report Preparation	25 days	Fri 9/7/01	Thu 10/11/01
Groundwater Report to Client	0 days	Thu 10/11/01	Thu 10/11/01
Client Review	20 days	Fri 10/12/01	Thu 11/8/01
Incorporate Client Comments	3 days	Fri 11/9/01	Tue 11/13/01
Groundwater Report to DEQ	0 days	Tue 11/13/01	Tue 11/13/01
4th Quarter, 2001	67 days	Mon 11/12/01	Tue 2/12/02
Sampling Event	4 days	Mon 11/12/01	Thu 11/15/01
Laboratory Analyses	15 days	Fri 11/16/01	Thu 12/6/01
Groundwater Report Preparation	25 days	Fri 12/7/01	Thu 1/10/02
Groundwater Report to Client	0 days	Thu 1/10/02	Thu 1/10/02
Client Review	20 days	Fri 1/11/02	Thu 2/7/02
Incorporate Client Comments	3 days	Fri 2/8/02	Tue 2/12/02
Groundwater Report to DEQ	0 days	Tue 2/12/02	Tue 2/12/02
PHASE II RI REPORT	0 days	Fri 1/12/01	Fri 1/12/01
Response Letter to DEQ	0 days	Fri 1/12/01	Fri 1/12/01
ADDITIONAL INVESTIGATIONS	10 days	Mon 6/18/01	Fri 6/29/01
Soil Sampling (with Phase III RI)	5 days	Mon 6/18/01	Fri 6/22/01
Storm Drain Backfill/Water Sampling (with Phase III RI)	5 days	Mon 6/25/01	Fri 6/29/01
GROUNDWATER INTERIM ACTION	330 days	Mon 10/2/00	Fri 1/4/02
Completion Report	78 days	Mon 1/15/01	Thu 5/3/01
Completion Report Preparation	15 days	Mon 1/15/01	Fri 2/2/01
Draft Report to Client	0 days	Mon 2/5/01	Mon 2/5/01
Client Review/Comment	15 days	Mon 2/5/01	Fri 2/23/01



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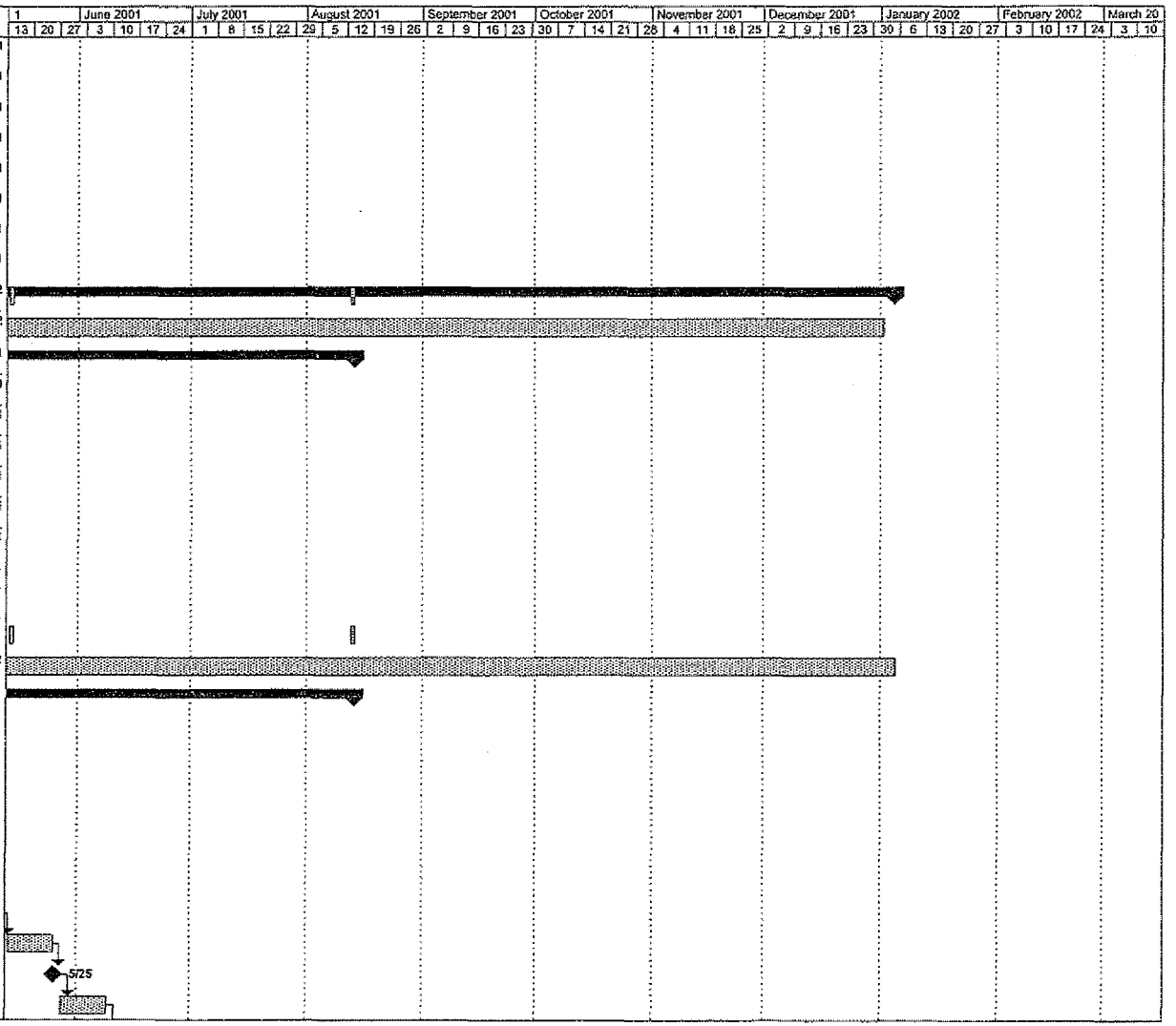
Landau Associates, Inc.

BZTO104(e)015861

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

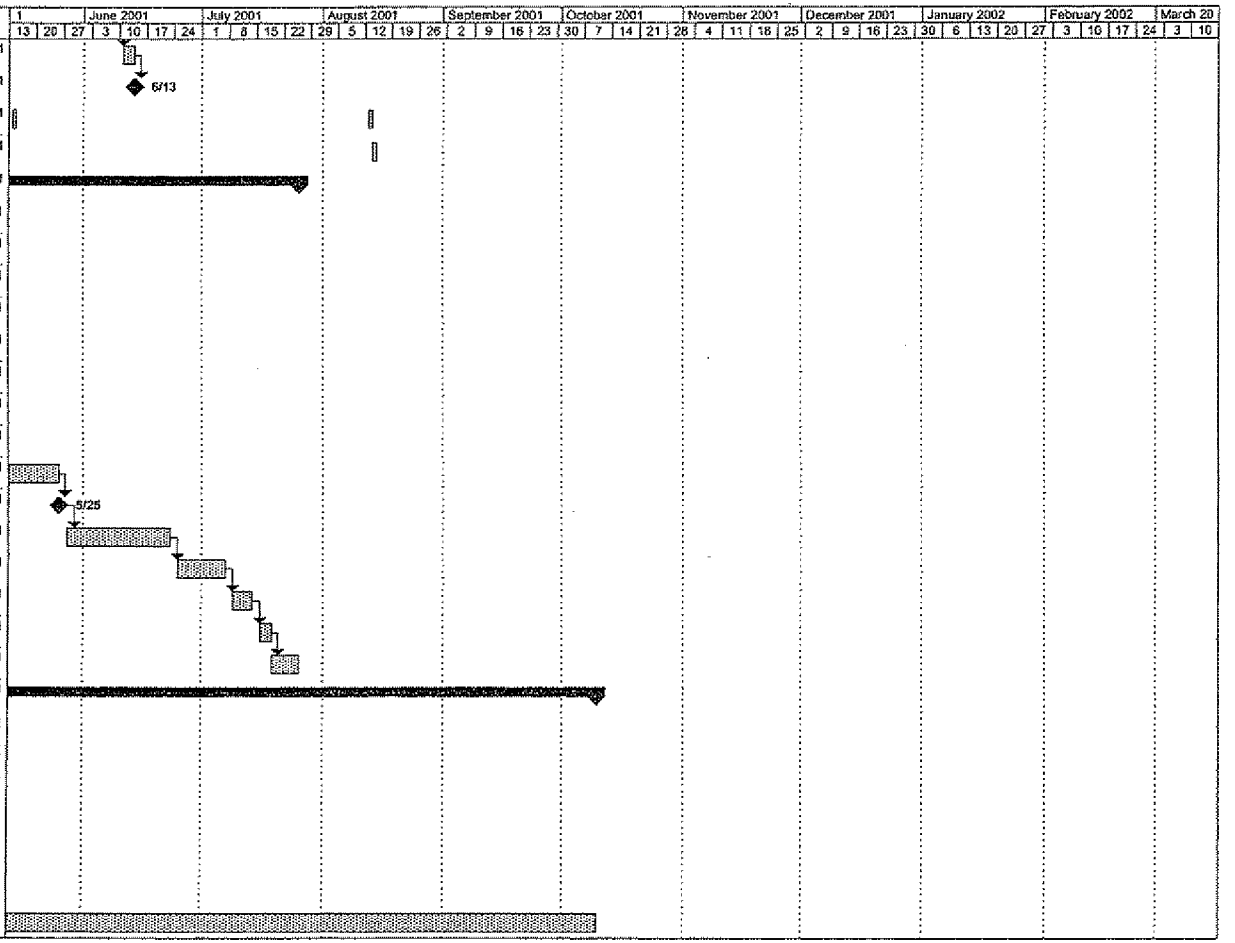
Task Name	Duration	Start	Finish
Incorporate Client Comments	5 days	Mon 2/26/01	Fri 3/2/01
Report to DEQ	0 days	Mon 3/5/01	Mon 3/5/01
DEQ Review/Comment	20 days	Mon 3/5/01	Fri 3/30/01
Prepare Response to DEQ Comments and Finalize Report	15 days	Mon 4/2/01	Fri 4/20/01
Response Letter to Client	0 days	Fri 4/20/01	Fri 4/20/01
Client Review of Response	5 days	Mon 4/23/01	Fri 4/27/01
Incorporate Client Comments	3 days	Mon 4/30/01	Wed 5/2/01
Response Letter and Final Report to DEQ	0 days	Thu 5/3/01	Thu 5/3/01
Interim Action Startup/Implementation	339 days	Mon 10/2/00	Fri 1/4/02
Interim Action Implementation in Lower Zone	324 days	Thu 10/5/00	Tue 1/1/02
Lower Zone Startup Monitoring	226 days	Mon 10/2/00	Mon 8/13/01
Baseline and Initial Startup Monitoring	11 days	Mon 10/2/00	Mon 10/16/00
Startup Monitoring Tech Memo to DEQ	0 days	Mon 1/8/01	Mon 1/8/01
DEQ Review/Comment	20 days	Mon 1/8/01	Fri 2/2/01
Prepare Response to DEQ Comments	10 days	Mon 2/5/01	Fri 2/16/01
Reponse Letter to Client	0 days	Fri 2/16/01	Fri 2/16/01
Client Review	10 days	Mon 2/19/01	Fri 3/2/01
Incorporate Client Comments	3 days	Mon 3/5/01	Wed 3/7/01
Response Letter to DEQ	0 days	Wed 3/7/01	Wed 3/7/01
Routine Water Level Monitoring	131 days	Mon 2/12/01	Mon 8/13/01
Interim Action Implementation in Upper Zone	235 days	Mon 2/12/01	Fri 1/4/02
Upper Zone Startup Monitoring	131 days	Mon 2/12/01	Mon 8/13/01
Baseline and Initial Startup Monitoring	10 days	Mon 2/12/01	Fri 2/23/01
Startup Monitoring Tech Memo Preparation	15 days	Mon 2/26/01	Fri 3/16/01
Tech Memo to Client	0 days	Fri 3/16/01	Fri 3/16/01
Client Review	15 days	Mon 3/19/01	Fri 4/6/01
Incorporate Client Comments	5 days	Mon 4/9/01	Fri 4/13/01
Report to DEQ	0 days	Fri 4/13/01	Fri 4/13/01
DEQ Review/Comment	20 days	Mon 4/16/01	Fri 5/11/01
Prepare Response to DEQ Comments	10 days	Mon 5/14/01	Fri 5/25/01
Response Letter to Client	0 days	Fri 5/25/01	Fri 5/25/01
Client Review	10 days	Mon 5/28/01	Fri 6/8/01



BZTO104(e)015862

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASES I/II RI/FS

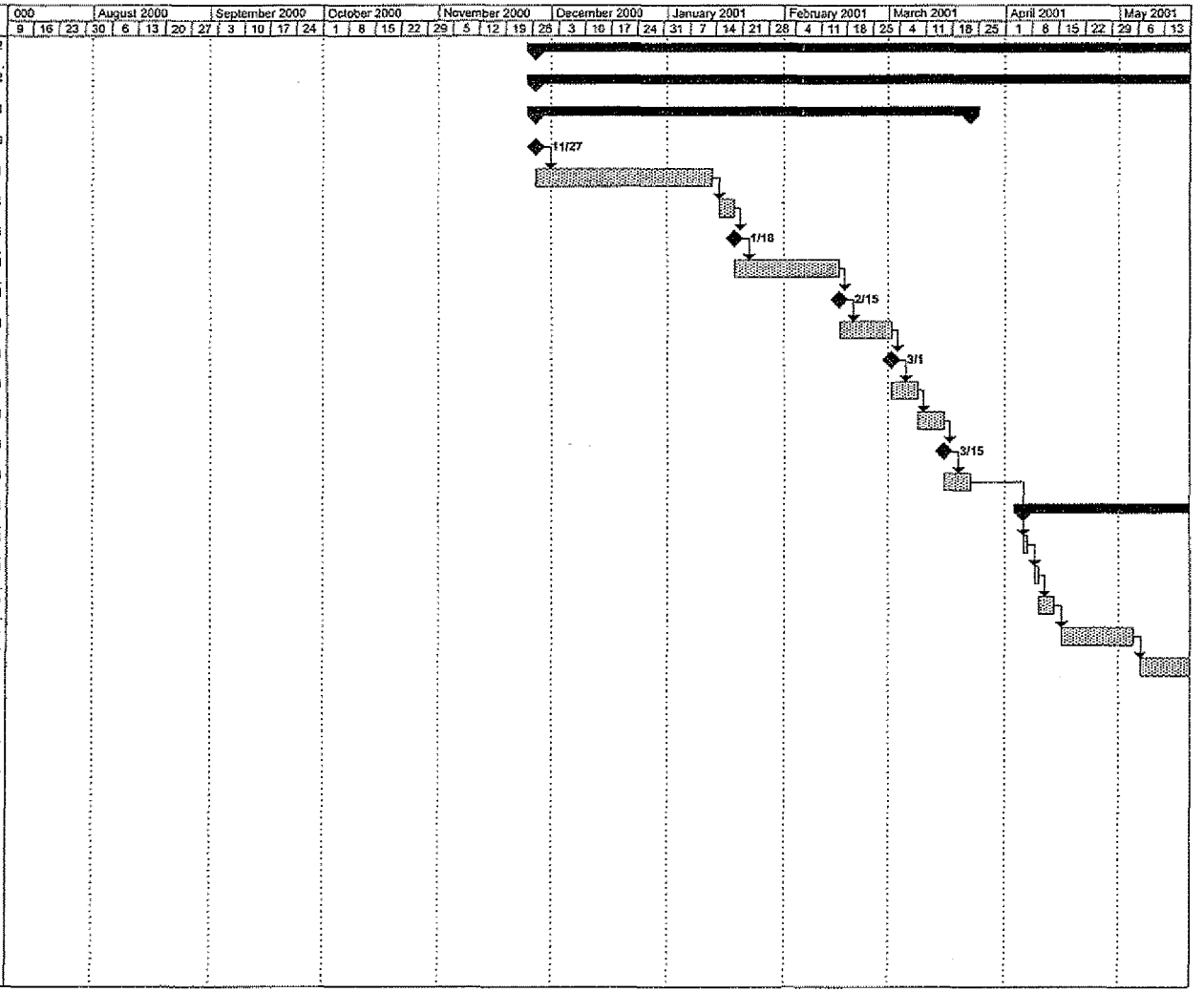
Task Name	Duration	Start	Finish
Incorporate Client Comments	3 days	Mon 6/11/01	Wed 6/13/01
Response Letter to DEQ	0 days	Wed 6/13/01	Wed 6/13/01
Routine Water Level Monitoring	111 days	Mon 3/12/01	Mon 8/13/01
Quarterly Status Reports to DEQ	152 days	Mon 1/15/01	Tue 8/14/01
RISK SENSITIVITY ANALYSES	126 days	Wed 1/31/01	Wed 7/25/01
Complete Scope Outline (by Beazer, Inc.)	0 days	Wed 1/31/01	Wed 1/31/01
Scope Outline Internal Reviews	10 days	Wed 1/31/01	Tue 2/13/01
Scope Outline to DEQ	0 days	Tue 2/13/01	Tue 2/13/01
DEQ Review/Comment	15 days	Wed 2/14/01	Tue 3/6/01
Discussion/Meeting with DEQ	1 day	Wed 3/7/01	Wed 3/7/01
DEQ Approval of Scope	2 days	Thu 3/8/01	Fri 3/9/01
Conduct Sensitivity Analyses (by Beazer, Inc.)	20 days	Mon 3/12/01	Fri 4/6/01
Prepare Sensitivity Analyses Results Report (by Beazer, Inc.)	20 days	Mon 4/9/01	Fri 5/4/01
Conduct Internal Review	15 days	Mon 5/7/01	Fri 5/25/01
Report to DEQ	0 days	Fri 5/25/01	Fri 5/25/01
DEQ Review/Comment	20 days	Mon 5/28/01	Fri 6/22/01
Prepare Response to DEQ Comments and Finalize Report (by Beazer, Inc.)	10 days	Mon 6/25/01	Fri 7/6/01
Internal Review of DEQ Response	5 days	Mon 7/9/01	Fri 7/13/01
Response Letter and Final Report to DEQ (by Beazer, Inc.)	3 days	Mon 7/16/01	Wed 7/18/01
DEQ Approval of Risk Assessment Approach	5 days	Thu 7/19/01	Wed 7/25/01
PILOT TESTING (BIOLOGICAL TREATMENT FOR SOIL)	180 days	Wed 1/31/01	Tue 10/9/01
Pilot Testing Work Plan	40 days	Wed 1/31/01	Tue 3/27/01
Work Plan to DEQ (by Time Oil)	0 days	Wed 1/31/01	Wed 1/31/01
DEQ Review/Comment	20 days	Wed 1/31/01	Tue 2/27/01
Prepare Response to DEQ Comments and Finalize Work Plan	15 days	Wed 2/28/01	Tue 3/20/01
Response Letter and Final Work Plan to DEQ	0 days	Tue 3/20/01	Tue 3/20/01
DEQ Approval of Work Plan	5 days	Wed 3/21/01	Tue 3/27/01
Pilot Test Implementation (by Time Oil)	130 days	Wed 4/11/01	Tue 10/9/01



BZTO104(e)015863

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

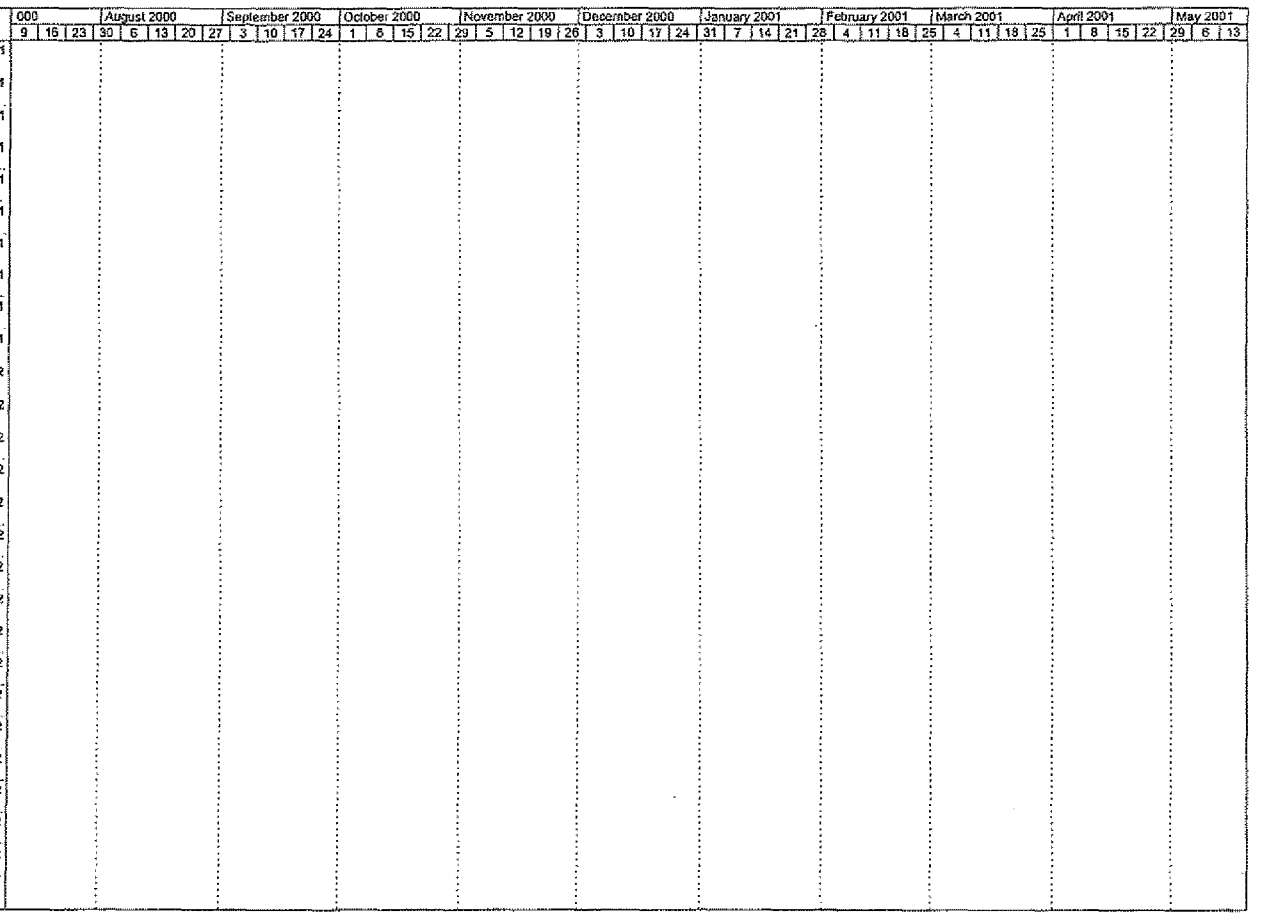
Task Name	Duration	Start	Finish
EAST PROPERTY	429 days	Mon 11/27/00	Thu 8/1/02
EPPI	429 days	Mon 11/27/00	Thu 8/1/02
Results Report	81 days	Mon 11/27/00	Thu 3/22/01
Report to Client	0 days	Mon 11/27/00	Mon 11/27/00
Client Review/Comment	32 days	Mon 11/27/00	Fri 1/12/01
Incorporate Client Comments	4 days	Mon 1/15/01	Thu 1/18/01
Report to DEQ	0 days	Thu 1/18/01	Thu 1/18/01
DEQ Review/Comment	20 days	Fri 1/19/01	Thu 2/15/01
Meeting with DEQ	0 days	Thu 2/15/01	Thu 2/15/01
Prepare Response to DEQ Comments	10 days	Fri 2/16/01	Thu 3/1/01
Response Letter to Client	0 days	Thu 3/1/01	Thu 3/1/01
Client Review of Response	5 days	Fri 3/2/01	Thu 3/8/01
Incorporation of Client Comments and Finalize Report	5 days	Fri 3/9/01	Thu 3/15/01
Response Letter and Final Report to DEQ	0 days	Thu 3/15/01	Thu 3/15/01
DEQ Approval of Planned Future Action	5 days	Fri 3/16/01	Thu 3/22/01
Pre-Remediation Investigation/Analyses	109 days	Fri 4/6/01	Mon 9/10/01
Soil Sampling for SPLP/TCLP Analyses - Field	1 day	Fri 4/6/01	Fri 4/6/01
Hot Spot Definition - Field	1 day	Mon 4/9/01	Mon 4/9/01
Remediation Area Refinement - Field	4 days	Tue 4/10/01	Fri 4/13/01
Laboratory Analyses	15 days	Mon 4/16/01	Fri 5/4/01
Data Evaluation/Technical Memorandum Prep	20 days	Mon 5/7/01	Mon 6/4/01
Technical Memorandum to Client	0 days	Mon 6/4/01	Mon 6/4/01
Client Review/Comment	10 days	Tue 6/5/01	Mon 6/18/01
Incorporate Client Comments	10 days	Tue 6/19/01	Mon 7/2/01
Technical Memorandum to DEQ	0 days	Mon 7/2/01	Mon 7/2/01
DEQ Review/Comment	20 days	Tue 7/3/01	Tue 7/31/01
Prepare Response to DEQ Comments	10 days	Wed 8/1/01	Tue 8/14/01
Response Letter to Client	0 days	Tue 8/14/01	Tue 8/14/01
Client Review of Response	10 days	Wed 8/15/01	Tue 8/28/01
Incorporation of Client Comments	3 days	Wed 8/29/01	Fri 8/31/01
Response Letter to DEQ	0 days	Fri 8/31/01	Fri 8/31/01



BZTO104(e)015864

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

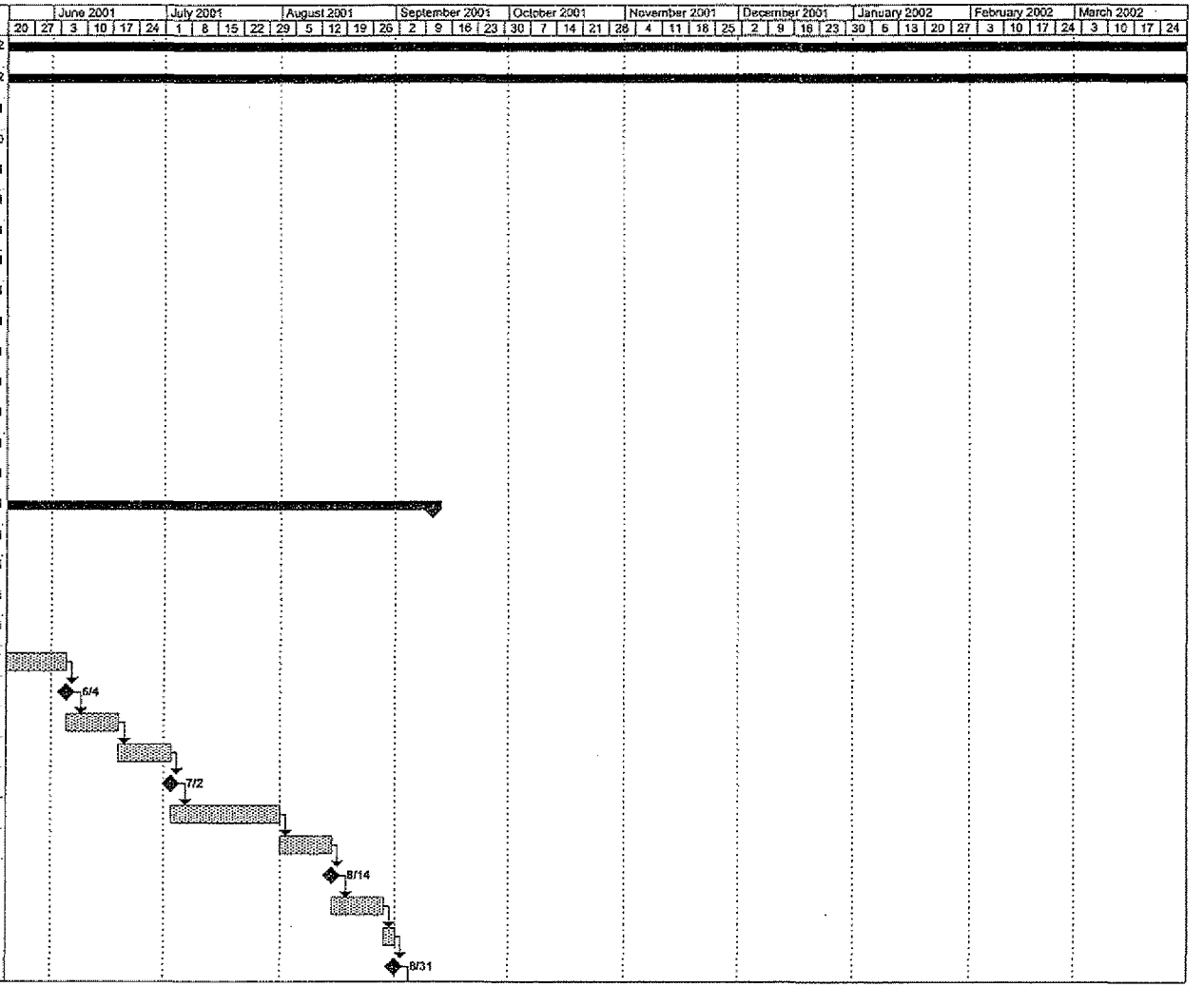
Task Name	Duration	Start	Finish
DEQ Approval of Planned Future Action	5 days	Tue 9/4/01	Mon 9/10/01
Contractor Scope of Work	**47 days**	**Tue 9/11/01**	**Wed 11/14/01**
Scope of Work Preparation	20 days	Tue 9/11/01	Mon 10/8/01
Scope of Work to Client	0 days	Mon 10/8/01	Mon 10/8/01
Client Review/Comment	10 days	Tue 10/9/01	Mon 10/22/01
Incorporate Client Comments	2 days	Tue 10/23/01	Wed 10/24/01
Scope of Work to DEQ	0 days	Wed 10/24/01	Wed 10/24/01
DEQ Review/Comment	15 days	Thu 10/25/01	Wed 11/14/01
DEQ Approval of Scope of Work/Remediation Approach	0 days	Wed 11/14/01	Wed 11/14/01
Contractor Bid Submittal/ Contractor Selection	**25 days**	**Thu 11/15/01**	**Fri 12/21/01**
Remediation	**10 days**	**Wed 1/16/02**	**Tue 1/29/02**
Confirmation Sampling	18 days	Wed 1/30/02	Fri 2/22/02
Soil Sampling	3 days	Wed 1/30/02	Fri 2/1/02
Laboratory Analyses	15 days	Mon 2/4/02	Fri 2/22/02
EPPI Completion Report	**113 days**	**Mon 2/25/02**	**Wed 7/31/02**
Data Evaluation/Preparation of Report	40 days	Mon 2/25/02	Fri 4/19/02
Report to Client	0 days	Fri 4/19/02	Fri 4/19/02
Client Review/Comment	20 days	Mon 4/22/02	Fri 5/17/02
Incorporation of Client Comments	5 days	Mon 5/20/02	Fri 5/24/02
Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Prepare Response to DEQ Comments	15 days	Mon 6/24/02	Fri 7/12/02
Response Letter to Client	0 days	Fri 7/12/02	Fri 7/12/02
Client Review of Response	10 days	Mon 7/15/02	Fri 7/26/02
Incorporation of Client Comments and Finalize Report	3 days	Mon 7/29/02	Wed 7/31/02
Response Letter and Final Report to DEQ	0 days	Wed 7/31/02	Wed 7/31/02
DEQ Submittal of NFA	**1 day**	**Thu 8/1/02**	**Thu 8/1/02**



BZTO104(e)015865

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

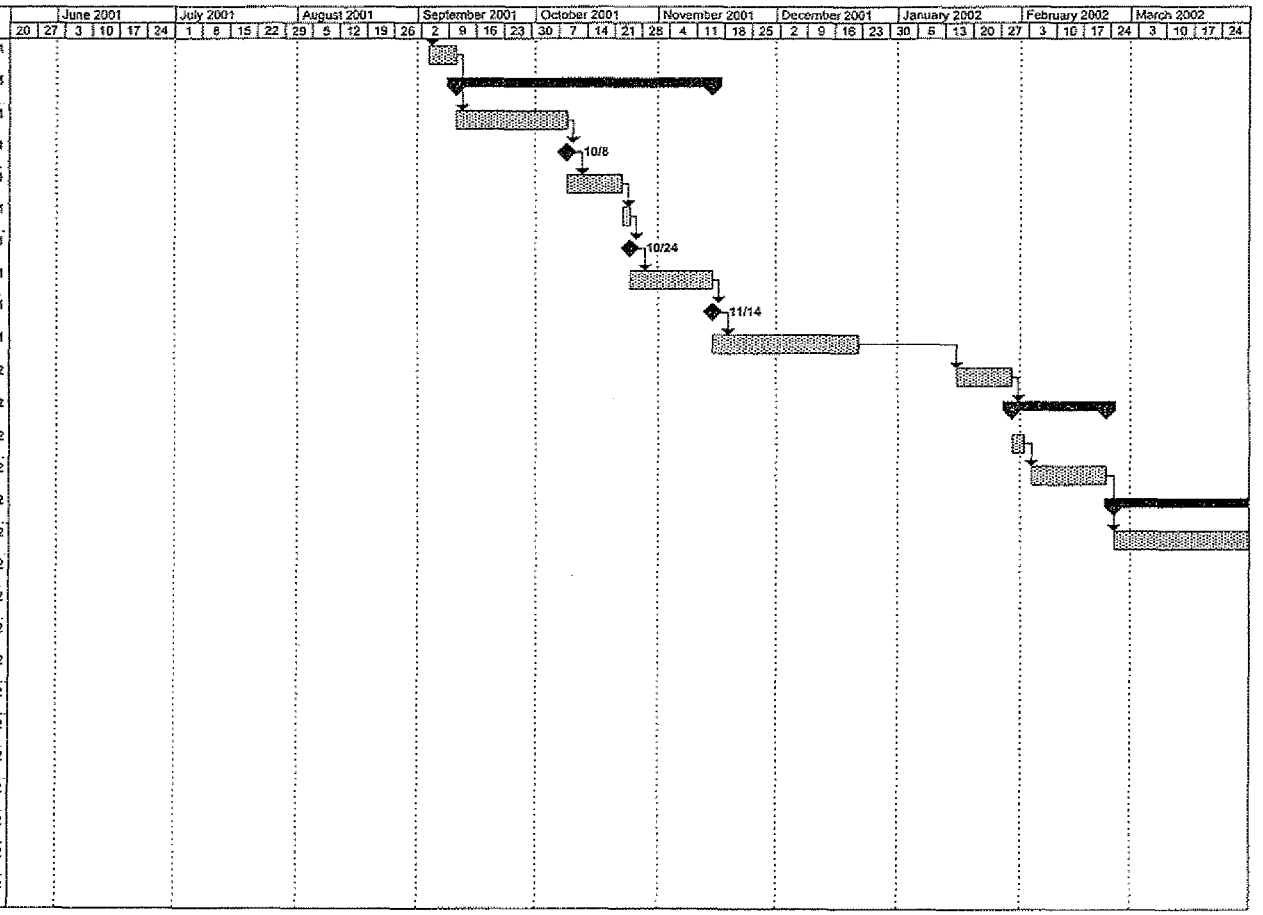
Task Name	Duration	Start	Finish
EAST PROPERTY	429 days	Mon 11/27/00	Thu 8/1/02
EPPI	429 days	Mon 11/27/00	Thu 8/1/02
Results Report	81 days	Mon 11/27/00	Thu 3/22/01
Report to Client	0 days	Mon 11/27/00	Mon 11/27/00
Client Review/Comment	32 days	Mon 11/27/00	Fri 1/12/01
Incorporate Client Comments	4 days	Mon 1/15/01	Thu 1/18/01
Report to DEQ	0 days	Thu 1/18/01	Thu 1/18/01
DEQ Review/Comment	20 days	Fri 1/19/01	Thu 2/15/01
Meeting with DEQ	0 days	Thu 2/15/01	Thu 2/15/01
Prepare Response to DEQ Comments	10 days	Fri 2/16/01	Thu 3/1/01
Response Letter to Client	0 days	Thu 3/1/01	Thu 3/1/01
Client Review of Response	5 days	Fri 3/2/01	Thu 3/8/01
Incorporation of Client Comments and Finalize Report	5 days	Fri 3/9/01	Thu 3/15/01
Response Letter and Final Report to DEQ	0 days	Thu 3/15/01	Thu 3/15/01
DEQ Approval of Planned Future Action	5 days	Fri 3/16/01	Thu 3/22/01
Pre-Remediation Investigation/Analyses	109 days	Fri 4/6/01	Mon 9/10/01
Soil Sampling for SPLP/TCLP Analyses - Field	1 day	Fri 4/6/01	Fri 4/6/01
Hot Spot Definition - Field	1 day	Mon 4/9/01	Mon 4/9/01
Remediation Area Refinement - Field	4 days	Tue 4/10/01	Fri 4/13/01
Laboratory Analyses	15 days	Mon 4/16/01	Fri 5/4/01
Data Evaluation/Technical Memorandum Prep	20 days	Mon 5/7/01	Mon 6/4/01
Technical Memorandum to Client	0 days	Mon 6/4/01	Mon 6/4/01
Client Review/Comment	10 days	Tue 6/5/01	Mon 6/18/01
Incorporate Client Comments	10 days	Tue 6/19/01	Mon 7/2/01
Technical Memorandum to DEQ	0 days	Mon 7/2/01	Mon 7/2/01
DEQ Review/Comment	20 days	Tue 7/3/01	Tue 7/31/01
Prepare Response to DEQ Comments	10 days	Wed 8/1/01	Tue 8/14/01
Response Letter to Client	0 days	Tue 8/14/01	Tue 8/14/01
Client Review of Response	10 days	Wed 8/15/01	Tue 8/28/01
Incorporation of Client Comments	3 days	Wed 8/29/01	Fri 8/31/01
Response Letter to DEQ	0 days	Fri 8/31/01	Fri 8/31/01



BZTO104(e)015866

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

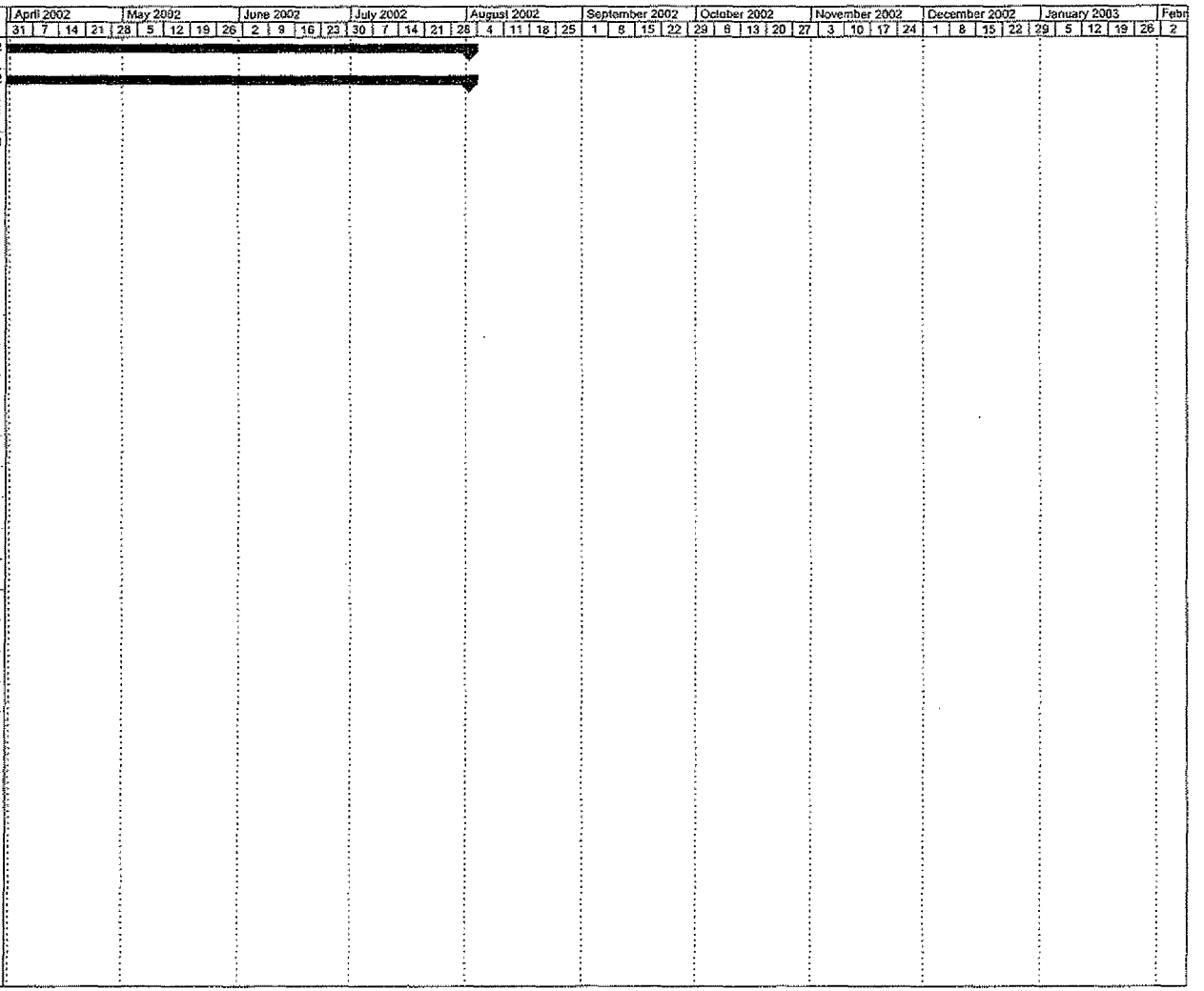
Task Name	Duration	Start	Finish
DEQ Approval of Planned Future Action	5 days	Tue 9/4/01	Mon 9/10/01
Contractor Scope of Work	47 days	Tue 9/11/01	Wed 11/14/01
Scope of Work Preparation	20 days	Tue 9/11/01	Mon 10/8/01
Scope of Work to Client	0 days	Mon 10/8/01	Mon 10/8/01
Client Review/Comment	10 days	Tue 10/9/01	Mon 10/22/01
Incorporate Client Comments	2 days	Tue 10/23/01	Wed 10/24/01
Scope of Work to DEQ	0 days	Wed 10/24/01	Wed 10/24/01
DEQ Review/Comment	15 days	Thu 10/25/01	Wed 11/14/01
DEQ Approval of Scope of Work/Remediation Approach	0 days	Wed 11/14/01	Wed 11/14/01
Contractor Bid Submittal/ Contractor Selection	25 days	Thu 11/15/01	Fri 12/21/01
Remediation	10 days	Wed 1/16/02	Tue 1/29/02
Confirmation Sampling	18 days	Wed 1/30/02	Fri 2/22/02
Soil Sampling	3 days	Wed 1/30/02	Fri 2/1/02
Laboratory Analyses	15 days	Mon 2/4/02	Fri 2/22/02
EPPI Completion Report	113 days	Mon 2/25/02	Wed 7/31/02
Data Evaluation/Preparation of Report	40 days	Mon 2/25/02	Fri 4/19/02
Report to Client	0 days	Fri 4/19/02	Fri 4/19/02
Client Review/Comment	20 days	Mon 4/22/02	Fri 5/17/02
Incorporation of Client Comments	5 days	Mon 5/20/02	Fri 5/24/02
Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Prepare Response to DEQ Comments	15 days	Mon 6/24/02	Fri 7/12/02
Response Letter to Client	0 days	Fri 7/12/02	Fri 7/12/02
Client Review of Response	10 days	Mon 7/15/02	Fri 7/26/02
Incorporation of Client Comments and Finalize Report	3 days	Mon 7/29/02	Wed 7/31/02
Response Letter and Final Report to DEQ	0 days	Wed 7/31/02	Wed 7/31/02
DEQ Submittal of NFA	1 day	Thu 8/1/02	Thu 8/1/02



BZTO104(e)015867

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

Task Name	Duration	Start	Finish
EAST PROPERTY	429 days	Mon 11/27/00	Thu 8/1/02
EPPI	429 days	Mon 11/27/00	Thu 8/1/02
Results Report	81 days	Mon 11/27/00	Thu 3/22/01
Report to Client	0 days	Mon 11/27/00	Mon 11/27/00
Client Review/Comment	32 days	Mon 11/27/00	Fri 1/12/01
Incorporate Client Comments	4 days	Mon 1/15/01	Thu 1/18/01
Report to DEQ	0 days	Thu 1/18/01	Thu 1/18/01
DEQ Review/Comment	20 days	Fri 1/19/01	Thu 2/15/01
Meeting with DEQ	0 days	Thu 2/15/01	Thu 2/15/01
Prepare Response to DEQ Comments	10 days	Fri 2/16/01	Thu 3/1/01
Response Letter to Client	0 days	Thu 3/1/01	Thu 3/1/01
Client Review of Response	5 days	Fri 3/2/01	Thu 3/8/01
Incorporation of Client Comments and Finalize Report	5 days	Fri 3/9/01	Thu 3/15/01
Response Letter and Final Report to DEQ	0 days	Thu 3/15/01	Thu 3/15/01
DEQ Approval of Planned Future Action	5 days	Fri 3/16/01	Thu 3/22/01
Pre-Remediation Investigation/Analyses	109 days	Fri 4/6/01	Mon 9/10/01
Soil Sampling for SPLP/TCLP Analyses - Field	1 day	Fri 4/6/01	Fri 4/6/01
Hot Spot Definition - Field	1 day	Mon 4/9/01	Mon 4/9/01
Remediation Area Refinement - Field	4 days	Tue 4/10/01	Fri 4/13/01
Laboratory Analyses	15 days	Mon 4/16/01	Fri 5/4/01
Data Evaluation/Technical Memorandum Prep	20 days	Mon 5/7/01	Mon 6/4/01
Technical Memorandum to Client	0 days	Mon 6/4/01	Mon 6/4/01
Client Review/Comment	10 days	Tue 6/5/01	Mon 6/18/01
Incorporate Client Comments	10 days	Tue 6/19/01	Mon 7/2/01
Technical Memorandum to DEQ	0 days	Mon 7/2/01	Mon 7/2/01
DEQ Review/Comment	20 days	Tue 7/3/01	Tue 7/31/01
Prepare Response to DEQ Comments	10 days	Wed 8/1/01	Tue 8/14/01
Response Letter to Client	0 days	Tue 8/14/01	Tue 8/14/01
Client Review of Response	10 days	Wed 8/15/01	Tue 8/28/01
Incorporation of Client Comments	3 days	Wed 8/29/01	Fri 8/31/01
Response Letter to DEQ	0 days	Fri 8/31/01	Fri 8/31/01



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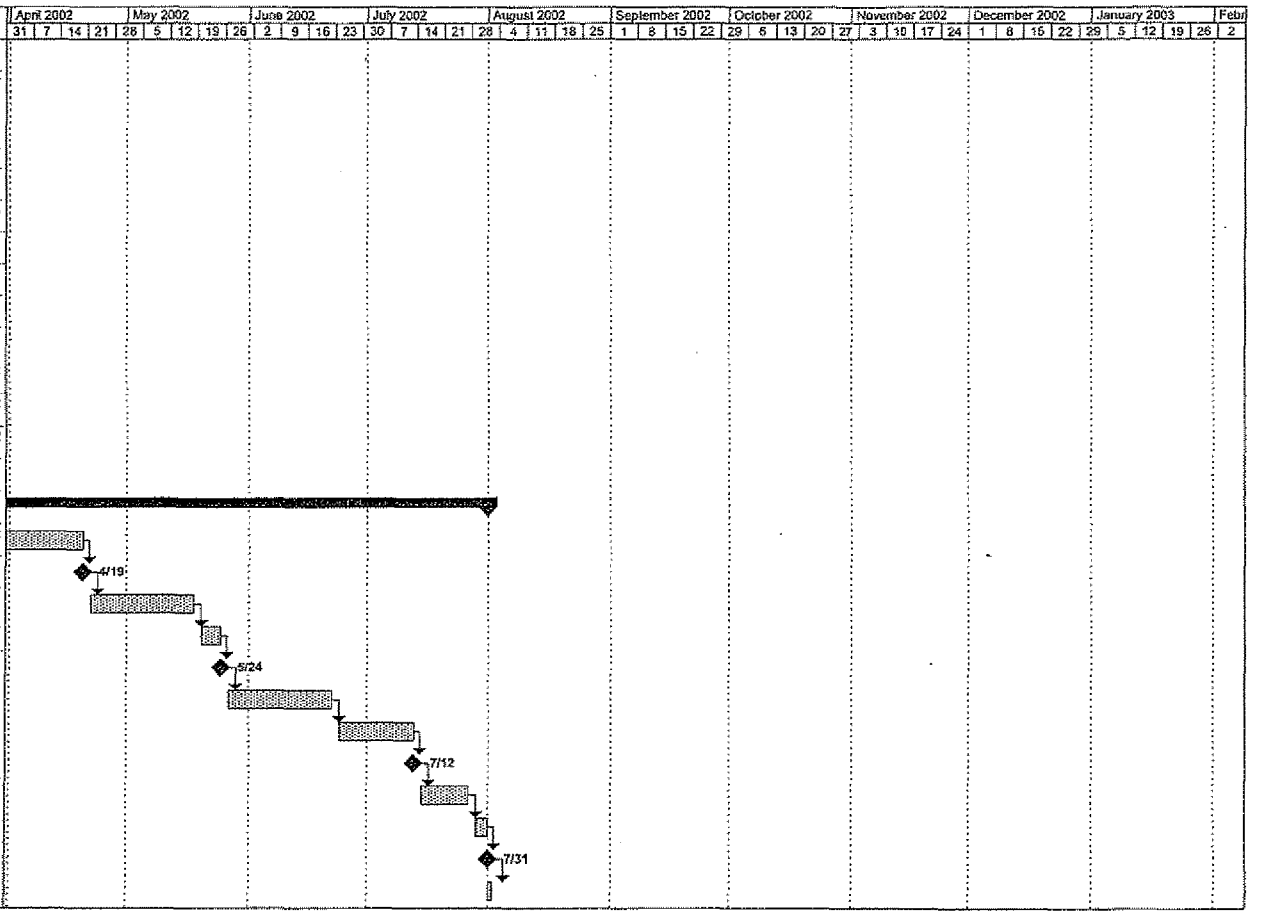
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - EAST PROPERTY

Task Name	Duration	Start	Finish
DEQ Approval of Planned Future Action	5 days	Tue 9/4/01	Mon 9/10/01
Contractor Scope of Work	47 days	Tue 9/11/01	Wed 11/14/01
Scope of Work Preparation	20 days	Tue 9/11/01	Mon 10/8/01
Scope of Work to Client	0 days	Mon 10/8/01	Mon 10/8/01
Client Review/Comment	10 days	Tue 10/9/01	Mon 10/22/01
Incorporate Client Comments	2 days	Tue 10/23/01	Wed 10/24/01
Scope of Work to DEQ	0 days	Wed 10/24/01	Wed 10/24/01
DEQ Review/Comment	15 days	Thu 10/25/01	Wed 11/14/01
DEQ Approval of Scope of Work/Remediation Approach	0 days	Wed 11/14/01	Wed 11/14/01
Contractor Bid Submittal/ Contractor Selection	25 days	Thu 11/15/01	Fri 12/21/01
Remediation	10 days	Wed 1/16/02	Tue 1/29/02
Confirmation Sampling	18 days	Wed 1/30/02	Fri 2/22/02
Soil Sampling	3 days	Wed 1/30/02	Fri 2/1/02
Laboratory Analyses	15 days	Mon 2/4/02	Fri 2/22/02
EPPI Completion Report	113 days	Mon 2/25/02	Wed 7/31/02
Data Evaluation/Preparation of Report	40 days	Mon 2/25/02	Fri 4/19/02
Report to Client	0 days	Fri 4/19/02	Fri 4/19/02
Client Review/Comment	20 days	Mon 4/22/02	Fri 5/17/02
Incorporation of Client Comments	5 days	Mon 5/20/02	Fri 5/24/02
Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Prepare Response to DEQ Comments	15 days	Mon 6/24/02	Fri 7/12/02
Response Letter to Client	0 days	Fri 7/12/02	Fri 7/12/02
Client Review of Response	10 days	Mon 7/15/02	Fri 7/26/02
Incorporation of Client Comments and Finalize Report	3 days	Mon 7/29/02	Wed 7/31/02
Response Letter and Final Report to DEQ	0 days	Wed 7/31/02	Wed 7/31/02
DEQ Submittal of NFA	1 day	Thu 8/1/02	Thu 8/1/02



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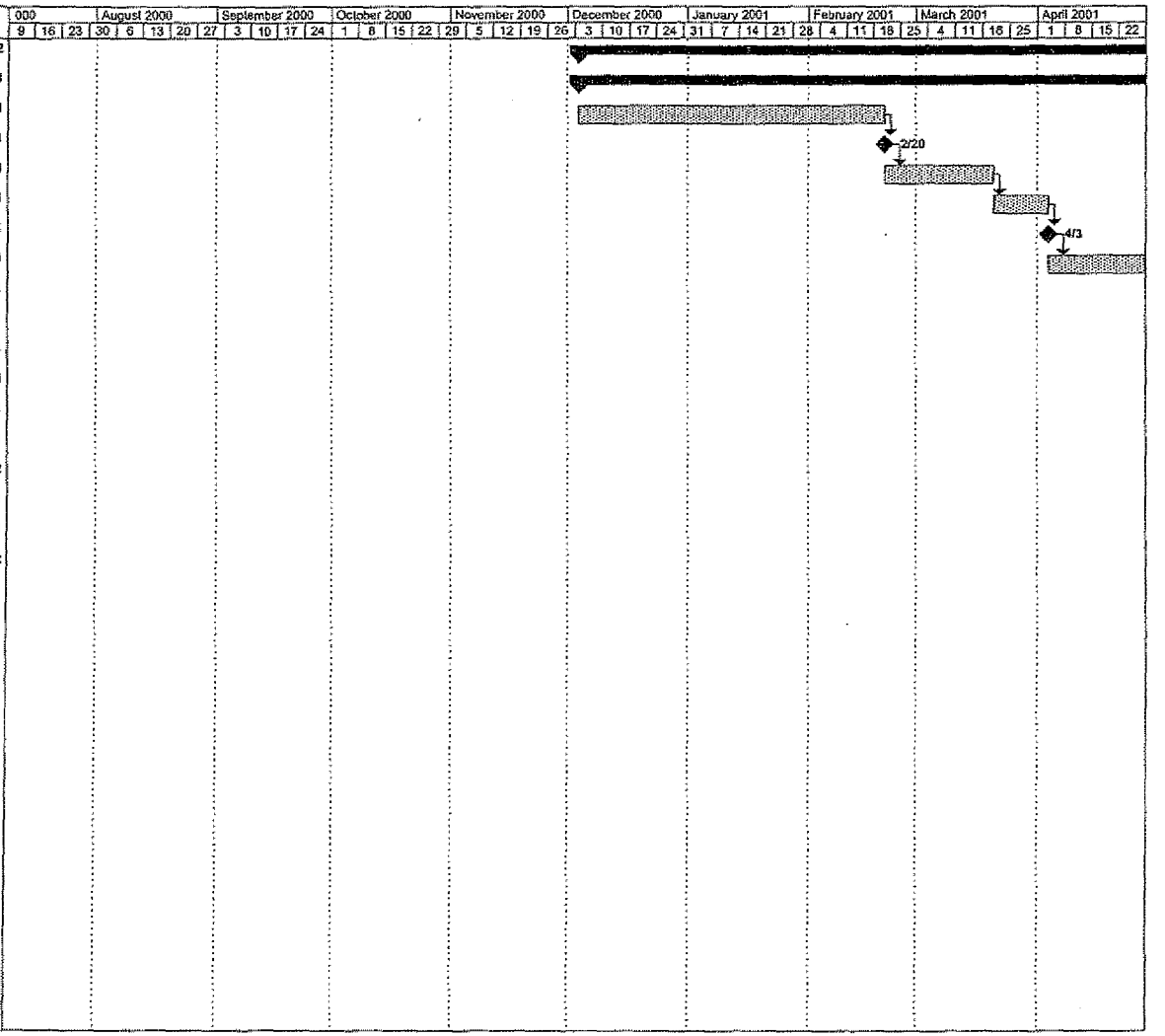
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
PHASE III RI	444 days	Mon 12/4/00	Mon 9/2/02
Phase III RI Work Plan	149 days	Mon 12/4/00	Thu 7/5/01
Work Plan Preparation	54 days	Mon 12/4/00	Tue 2/20/01
Work Plan to Client	0 days	Tue 2/20/01	Tue 2/20/01
Client Review/Comment	20 days	Wed 2/21/01	Tue 3/20/01
Incorporate Client Comments	10 days	Wed 3/21/01	Tue 4/3/01
Work Plan to DEQ	0 days	Tue 4/3/01	Tue 4/3/01
DEQ Review/Comment	20 days	Wed 4/4/01	Tue 5/1/01
Prepare Response to DEQ Comments	15 days	Wed 5/2/01	Tue 5/22/01
Response Letter to Client	0 days	Tue 5/22/01	Tue 5/22/01
Client Review/Comment	15 days	Wed 5/23/01	Wed 6/13/01
Incorporate Client Comments and Finalize Work Plan	10 days	Thu 6/14/01	Wed 6/27/01
Response Letter and Final Work Plan to DEQ	0 days	Wed 6/27/01	Wed 6/27/01
DEQ Approval of Work Plan	5 days	Thu 6/28/01	Thu 7/5/01
Phase III Preliminary Evaluation	139 days	Fri 7/20/01	Fri 2/8/02
Field Investigation (Geoprobe)	10 days	Fri 7/20/01	Thu 8/2/01
Laboratory Analyses	15 days	Fri 8/3/01	Thu 8/23/01
Technical Memorandum	114 days	Fri 8/24/01	Fri 2/8/02
Memorandum Preparation	25 days	Fri 8/24/01	Fri 9/28/01
Technical Memo to Client	0 days	Fri 9/28/01	Fri 9/28/01
Client Review/Comment	20 days	Mon 10/1/01	Fri 10/26/01
Incorporate Client Comments	10 days	Mon 10/29/01	Fri 11/9/01
Technical Memo to DEQ	0 days	Fri 11/9/01	Fri 11/9/01
DEQ Review/Comment	20 days	Mon 11/12/01	Tue 12/11/01
Meeting with DEQ	1 day	Wed 12/12/01	Wed 12/12/01
Prepare Response to DEQ Comments	15 days	Thu 12/13/01	Mon 1/7/02
Response Letter to Client	0 days	Mon 1/7/02	Mon 1/7/02
Client Review/Comment	15 days	Tue 1/8/02	Tue 1/29/02
Incorporate Client Comments	3 days	Wed 1/30/02	Fri 2/1/02
Response Letter to DEQ	0 days	Fri 2/1/02	Fri 2/1/02
DEQ Approval of Scope for RI	5 days	Mon 2/4/02	Fri 2/8/02
Phase III RI	131 days	Mon 3/4/02	Mon 9/2/02
Field Investigation (CPT/MW)	15 days	Mon 3/4/02	Fri 3/22/02



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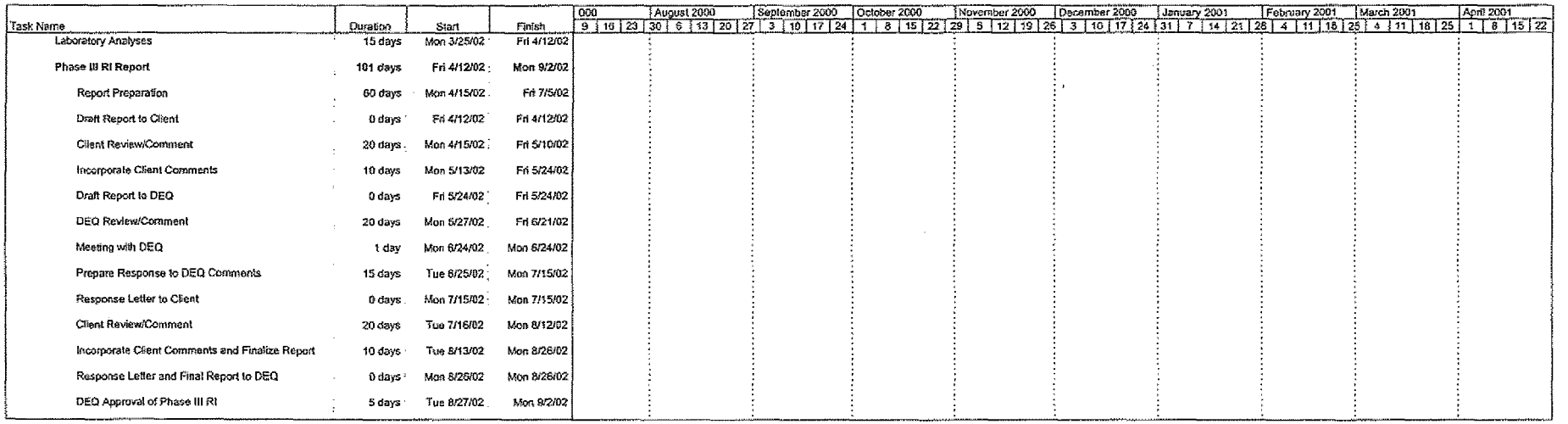
BZTO104(e)015870

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
Laboratory Analyses	15 days	Mon 3/25/02	Fri 4/12/02
Phase III RI Report	**101 days**	**Fri 4/12/02**	**Mon 9/2/02**
Report Preparation	60 days	Mon 4/15/02	Fri 7/5/02
Draft Report to Client	0 days	Fri 4/12/02	Fri 4/12/02
Client Review/Comment	20 days	Mon 4/15/02	Fri 5/10/02
Incorporate Client Comments	10 days	Mon 5/13/02	Fri 5/24/02
Draft Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Meeting with DEQ	1 day	Mon 6/24/02	Mon 6/24/02
Prepare Response to DEQ Comments	15 days	Tue 6/25/02	Mon 7/15/02
Response Letter to Client	0 days	Mon 7/15/02	Mon 7/15/02
Client Review/Comment	20 days	Tue 7/16/02	Mon 8/12/02
Incorporate Client Comments and Finalize Report	10 days	Tue 8/13/02	Mon 8/26/02
Response Letter and Final Report to DEQ	0 days	Mon 8/26/02	Mon 8/26/02
DEQ Approval of Phase III RI	5 days	Tue 8/27/02	Mon 9/2/02



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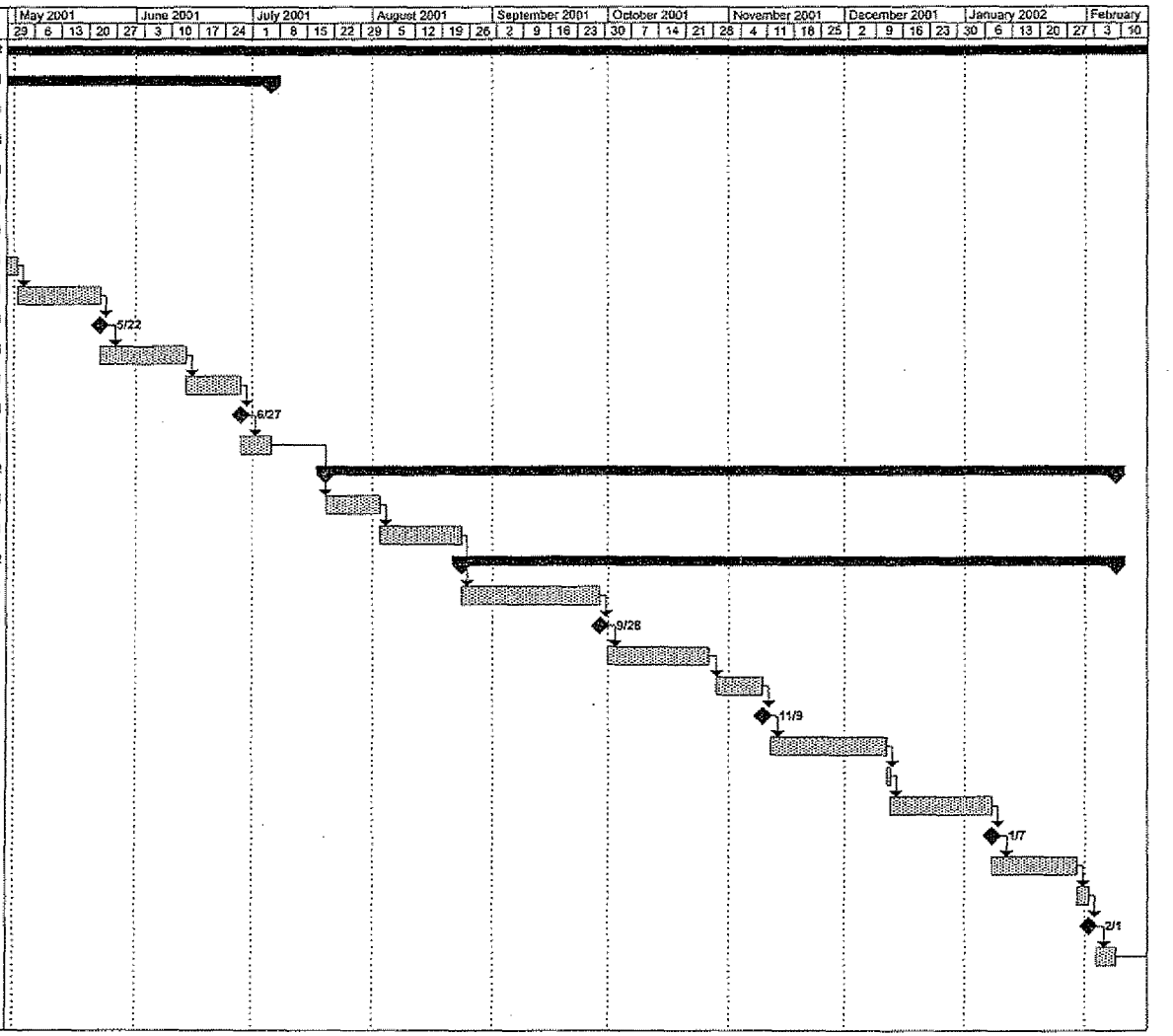
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
PHASE III RI	444 days	Mon 12/4/00	Mon 9/2/02
Phase III RI Work Plan	149 days	Mon 12/4/00	Thu 7/5/01
Work Plan Preparation	54 days	Mon 12/4/00	Tue 2/20/01
Work Plan to Client	0 days	Tue 2/20/01	Tue 2/20/01
Client Review/Comment	20 days	Wed 2/21/01	Tue 3/20/01
Incorporate Client Comments	10 days	Wed 3/21/01	Tue 4/3/01
Work Plan to DEQ	0 days	Tue 4/3/01	Tue 4/3/01
DEQ Review/Comment	20 days	Wed 4/4/01	Tue 5/1/01
Prepare Response to DEQ Comments	15 days	Wed 5/2/01	Tue 5/22/01
Response Letter to Client	0 days	Tue 5/22/01	Tue 5/22/01
Client Review/Comment	15 days	Wed 5/23/01	Wed 6/13/01
Incorporate Client Comments and Finalize Work Plan	10 days	Thu 6/14/01	Wed 6/27/01
Response Letter and Final Work Plan to DEQ	0 days	Wed 6/27/01	Wed 6/27/01
DEQ Approval of Work Plan	5 days	Thu 6/28/01	Thu 7/5/01
Phase III Preliminary Evaluation	139 days	Fri 7/20/01	Fri 2/8/02
Field Investigation (Geoprobe)	10 days	Fri 7/20/01	Thu 8/2/01
Laboratory Analyses	15 days	Fri 8/3/01	Thu 8/23/01
Technical Memorandum	114 days	Fri 8/24/01	Fri 2/8/02
Memorandum Preparation	25 days	Fri 8/24/01	Fri 9/28/01
Technical Memo to Client	0 days	Fri 9/28/01	Fri 9/28/01
Client Review/Comment	20 days	Mon 10/1/01	Fri 10/26/01
Incorporate Client Comments	10 days	Mon 10/29/01	Fri 11/9/01
Technical Memo to DEQ	0 days	Fri 11/9/01	Fri 11/9/01
DEQ Review/Comment	20 days	Mon 11/12/01	Tue 12/11/01
Meeting with DEQ	1 day	Wed 12/12/01	Wed 12/12/01
Prepare Response to DEQ Comments	15 days	Thu 12/13/01	Mon 1/7/02
Response Letter to Client	0 days	Mon 1/7/02	Mon 1/7/02
Client Review/Comment	15 days	Tue 1/8/02	Tue 1/29/02
Incorporate Client Comments	3 days	Wed 1/30/02	Fri 2/1/02
Response Letter to DEQ	0 days	Fri 2/1/02	Fri 2/1/02
DEQ Approval of Scope for RI	5 days	Mon 2/4/02	Fri 2/8/02
Phase III RI	131 days	Mon 3/4/02	Mon 9/2/02
Field Investigation (CPT/MW)	15 days	Mon 3/4/02	Fri 3/22/02



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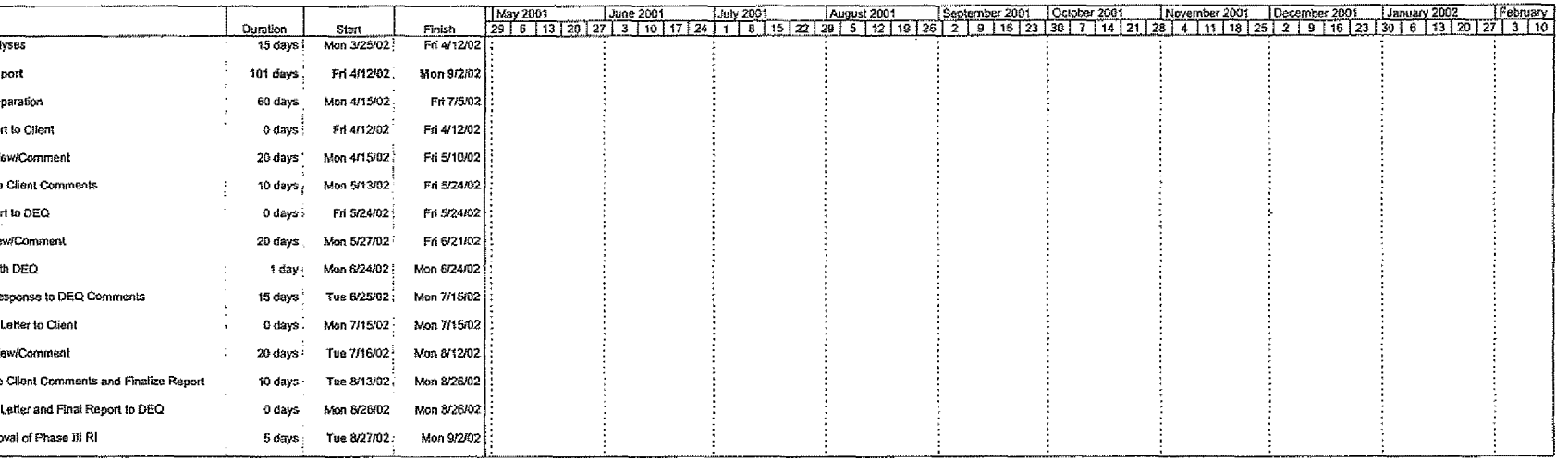
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

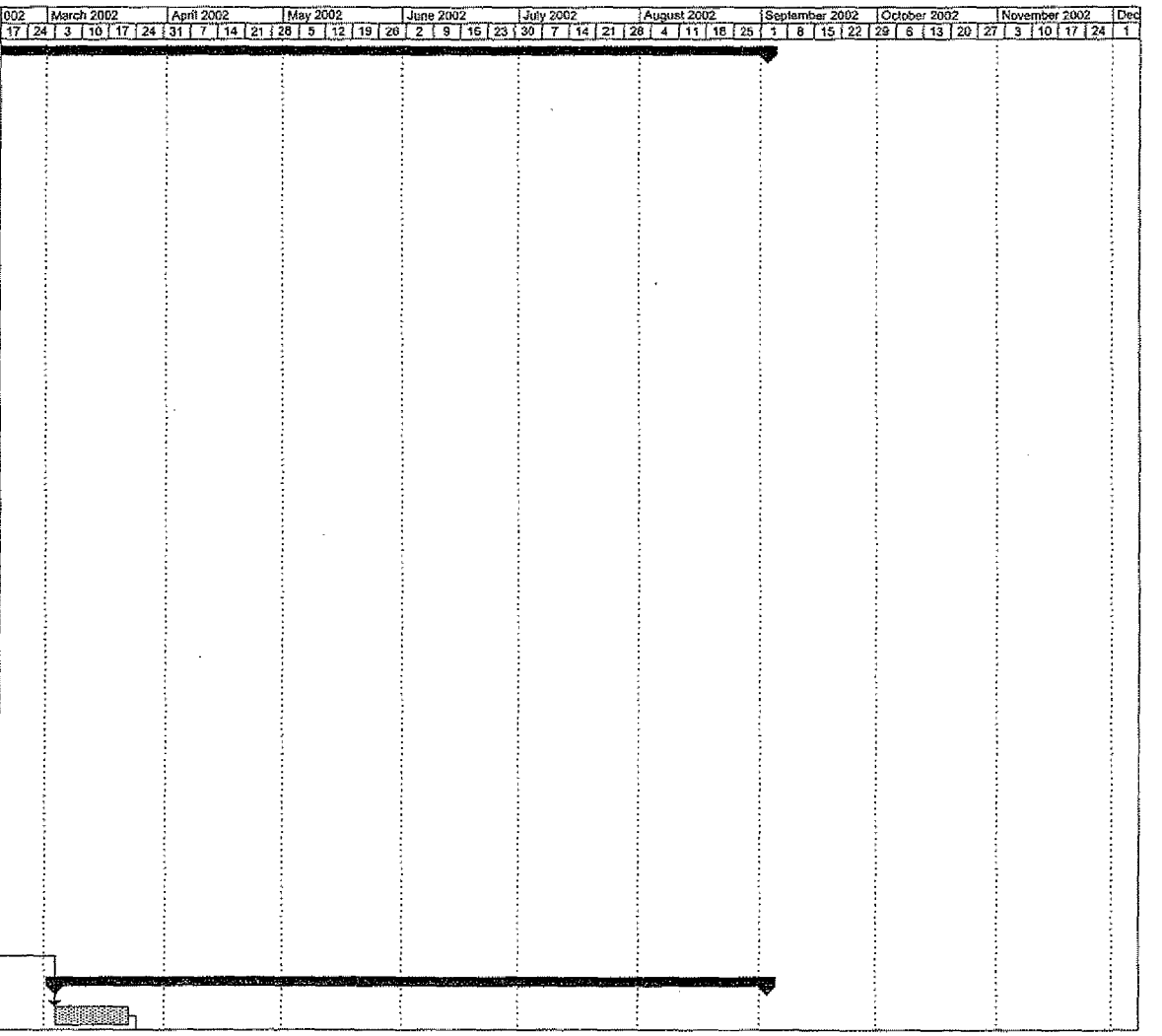
Task Name	Duration	Start	Finish
Laboratory Analyses	15 days	Mon 3/25/02	Fri 4/12/02
Phase III RI Report	**101 days**	**Fri 4/12/02**	**Mon 9/2/02**
Report Preparation	60 days	Mon 4/15/02	Fri 7/5/02
Draft Report to Client	0 days	Fri 4/12/02	Fri 4/12/02
Client Review/Comment	20 days	Mon 4/15/02	Fri 5/10/02
Incorporate Client Comments	10 days	Mon 5/13/02	Fri 5/24/02
Draft Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Meeting with DEQ	1 day	Mon 6/24/02	Mon 6/24/02
Prepare Response to DEQ Comments	15 days	Tue 6/25/02	Mon 7/15/02
Response Letter to Client	0 days	Mon 7/15/02	Mon 7/15/02
Client Review/Comment	20 days	Tue 7/16/02	Mon 8/12/02
Incorporate Client Comments and Finalize Report	10 days	Tue 8/13/02	Mon 8/26/02
Response Letter and Final Report to DEQ	0 days	Mon 8/26/02	Mon 8/26/02
DEQ Approval of Phase III RI	5 days	Tue 8/27/02	Mon 9/2/02



BZTO104(e)015873

PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
PHASE III RI	444 days	Mon 12/4/00	Mon 9/2/02
Phase III RI Work Plan	149 days	Mon 12/4/00	Thu 7/5/01
Work Plan Preparation	54 days	Mon 12/4/00	Tue 2/20/01
Work Plan to Client	0 days	Tue 2/20/01	Tue 2/20/01
Client Review/Comment	20 days	Wed 2/21/01	Tue 3/20/01
Incorporate Client Comments	10 days	Wed 3/21/01	Tue 4/3/01
Work Plan to DEQ	0 days	Tue 4/3/01	Tue 4/3/01
DEQ Review/Comment	20 days	Wed 4/4/01	Tue 5/1/01
Prepare Response to DEQ Comments	15 days	Wed 5/2/01	Tue 5/22/01
Response Letter to Client	0 days	Tue 5/22/01	Tue 5/22/01
Client Review/Comment	15 days	Wed 5/23/01	Wed 6/13/01
Incorporate Client Comments and Finalize Work Plan	10 days	Thu 6/14/01	Wed 6/27/01
Response Letter and Final Work Plan to DEQ	0 days	Wed 6/27/01	Wed 6/27/01
DEQ Approval of Work Plan	5 days	Thu 6/28/01	Thu 7/5/01
Phase III Preliminary Evaluation	139 days	Fri 7/20/01	Fri 2/8/02
Field Investigation (Geoprobe)	10 days	Fri 7/20/01	Thu 8/2/01
Laboratory Analyses	15 days	Fri 8/3/01	Thu 8/23/01
Technical Memorandum	114 days	Fri 8/24/01	Fri 2/8/02
Memorandum Preparation	25 days	Fri 8/24/01	Fri 9/28/01
Technical Memo to Client	0 days	Fri 9/28/01	Fri 9/28/01
Client Review/Comment	20 days	Mon 10/1/01	Fri 10/26/01
Incorporate Client Comments	10 days	Mon 10/29/01	Fri 11/9/01
Technical Memo to DEQ	0 days	Fri 11/9/01	Fri 11/9/01
DEQ Review/Comment	20 days	Mon 11/12/01	Tue 12/11/01
Meeting with DEQ	1 day	Wed 12/12/01	Wed 12/12/01
Prepare Response to DEQ Comments	15 days	Thu 12/13/01	Mon 1/7/02
Response Letter to Client	0 days	Mon 1/7/02	Mon 1/7/02
Client Review/Comment	15 days	Tue 1/8/02	Tue 1/29/02
Incorporate Client Comments	3 days	Wed 1/30/02	Fri 2/1/02
Response Letter to DEQ	0 days	Fri 2/1/02	Fri 2/1/02
DEQ Approval of Scope for RI	5 days	Mon 2/4/02	Fri 2/8/02
Phase III RI	131 days	Mon 3/4/02	Mon 9/2/02
Field Investigation (CPT/MW)	15 days	Mon 3/4/02	Fri 3/22/02



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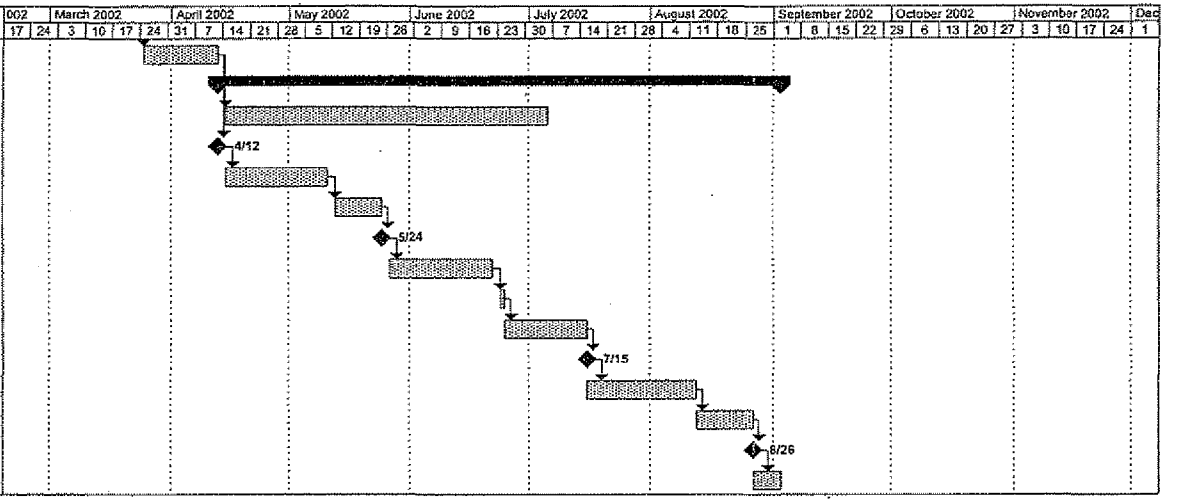
PRELIMINARY SCHEDULE
TIME OIL NORTHWEST TERMINAL - PHASE III RI

Task Name	Duration	Start	Finish
Laboratory Analyses	15 days	Mon 3/25/02	Fri 4/12/02
Phase III RI Report	101 days	Fri 4/12/02	Mon 9/2/02
Report Preparation	60 days	Mon 4/15/02	Fri 7/5/02
Draft Report to Client	0 days	Fri 4/12/02	Fri 4/12/02
Client Review/Comment	20 days	Mon 4/15/02	Fri 5/10/02
Incorporate Client Comments	10 days	Mon 5/13/02	Fri 5/24/02
Draft Report to DEQ	0 days	Fri 5/24/02	Fri 5/24/02
DEQ Review/Comment	20 days	Mon 5/27/02	Fri 6/21/02
Meeting with DEQ	1 day	Mon 6/24/02	Mon 6/24/02
Prepare Response to DEQ Comments	15 days	Tue 6/25/02	Mon 7/15/02
Response Letter to Client	0 days	Mon 7/15/02	Mon 7/15/02
Client Review/Comment	20 days	Tue 7/16/02	Mon 8/12/02
Incorporate Client Comments and Finalize Report	10 days	Tue 8/13/02	Mon 8/26/02
Response Letter and Final Report to DEQ	0 days	Mon 8/26/02	Mon 8/26/02
DEQ Approval of Phase III RI	5 days	Tue 8/27/02	Mon 9/2/02



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BZTO104(e)015875

Landau Associates
Environmental and Geotechnical Services

RECD OCT 0 5 2001

TRANSMITTAL

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

Date: October 1, 2001

Attn: Mr. Tom Roick

Project No.: 231001.117

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Memorandum Re: Groundwater Action Interim Status Report - Second Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon (10/1/01)

Message:

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

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
10/1/01 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.

BZTO104(e)015876

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Rebekah Brooks

DATE October 1, 2001

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – SECOND 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 second 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 second 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 second quarter of 2001; groundwater was extracted from lower zone recovery well RW-2 at a rate of approximately 10 gpm. During this time period, RW-2 operated for 2,077 hours (approximately 87 days) and extracted approximately 1,080,000 gallons of groundwater, with one short (less than 8 hours) shutdown on June 6, 2001. Approximately 1,030,000 gallons of groundwater were treated at the terminal wastewater treatment facility and discharged to the sanitary sewer under a permit with Metro (Permit No. 400-121) in the second quarter of 2001. The remaining volume of extracted groundwater was contained in storage tank number 16804 at the terminal pending treatment at the end of the second 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

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is operating) during the third quarter of 2001 to identify when the water level is sufficiently high to allow for groundwater extraction from HRW-1. However, unless the area receives a substantial amount of precipitation, water levels may not rise to a level sufficient to operate HRW-1 within the setup specified in the startup plan until late 2001.

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 will be provided in an upcoming technical memorandum.

DATA COLLECTION AND RESULTS

Quarterly groundwater level measurements were collected on June 4, 2001 to confirm that hydraulic capture of the lower zone PCP plume was maintained by the 10 gpm extraction rate from RW-2. Discrete water level measurements for the second 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. 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.

One water sample was collected at the point of discharge from the water treatment system into the sanitary sewer on May 22, 2001. This sample showed that the treated groundwater contained PCP at a

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concentration of 5.29 µg/L, which is less than the discharge limitation of 40 µg/L, as defined in the Metro permit for discharge to the sanitary sewer.

Groundwater samples were collected from five interim action wells (LW-13S, LW-14D, LW-17D, LW-18D, and RW-2) on June 5-6, 2001, during the second quarter 2001 sampling event. PCP was detected at a concentration of 4.4 µg/L in upper zone well LW-13S. The sample from lower zone recovery well RW-2 contained PCP at a concentration of 0.68 µg/L, which is significantly less than the concentration at RW-2 (12.3 µg/L) a month previously (Table 2). 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 second 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 *Draft Second Quarter 2001 Groundwater Report* (Landau Associates 2001).

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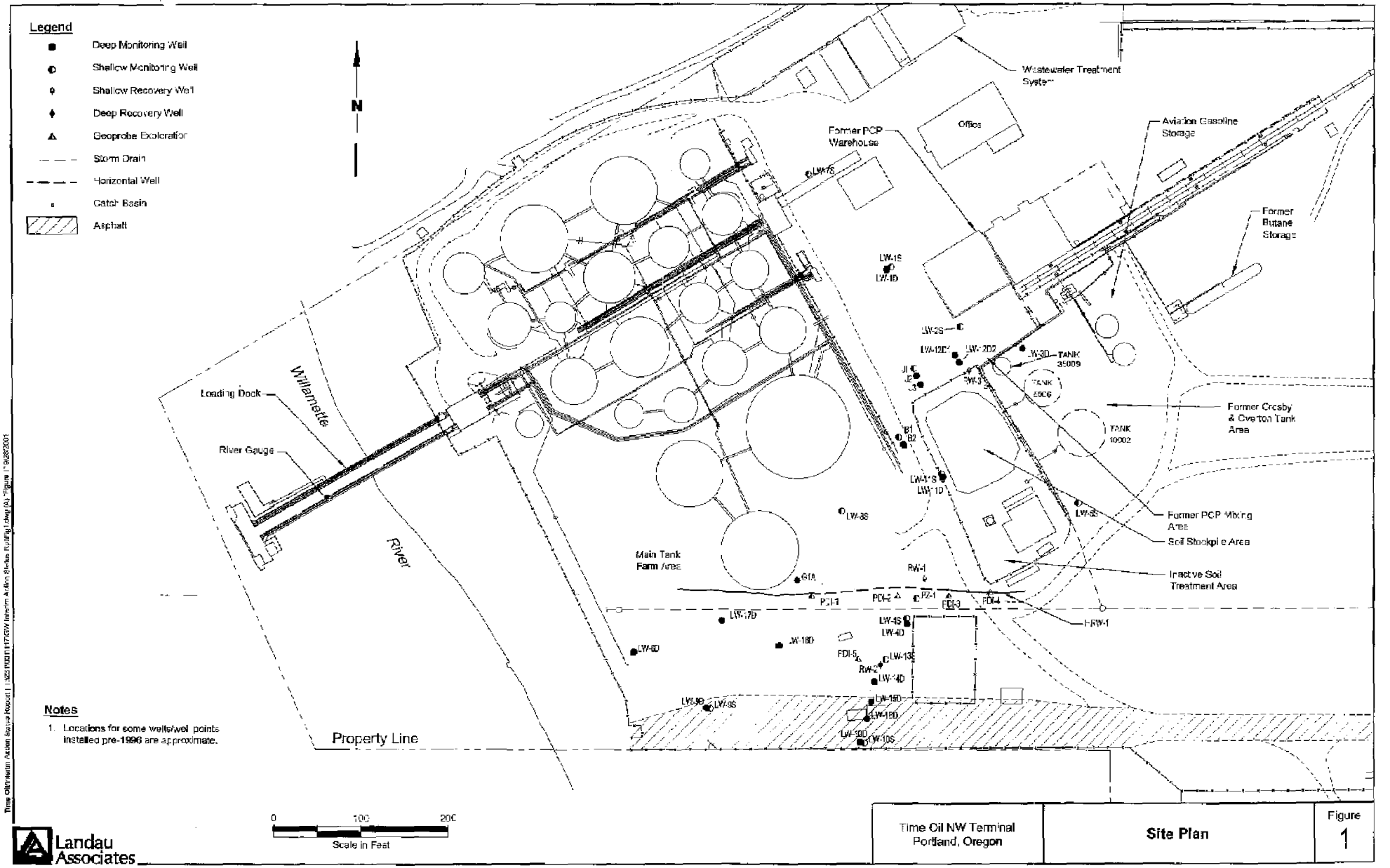

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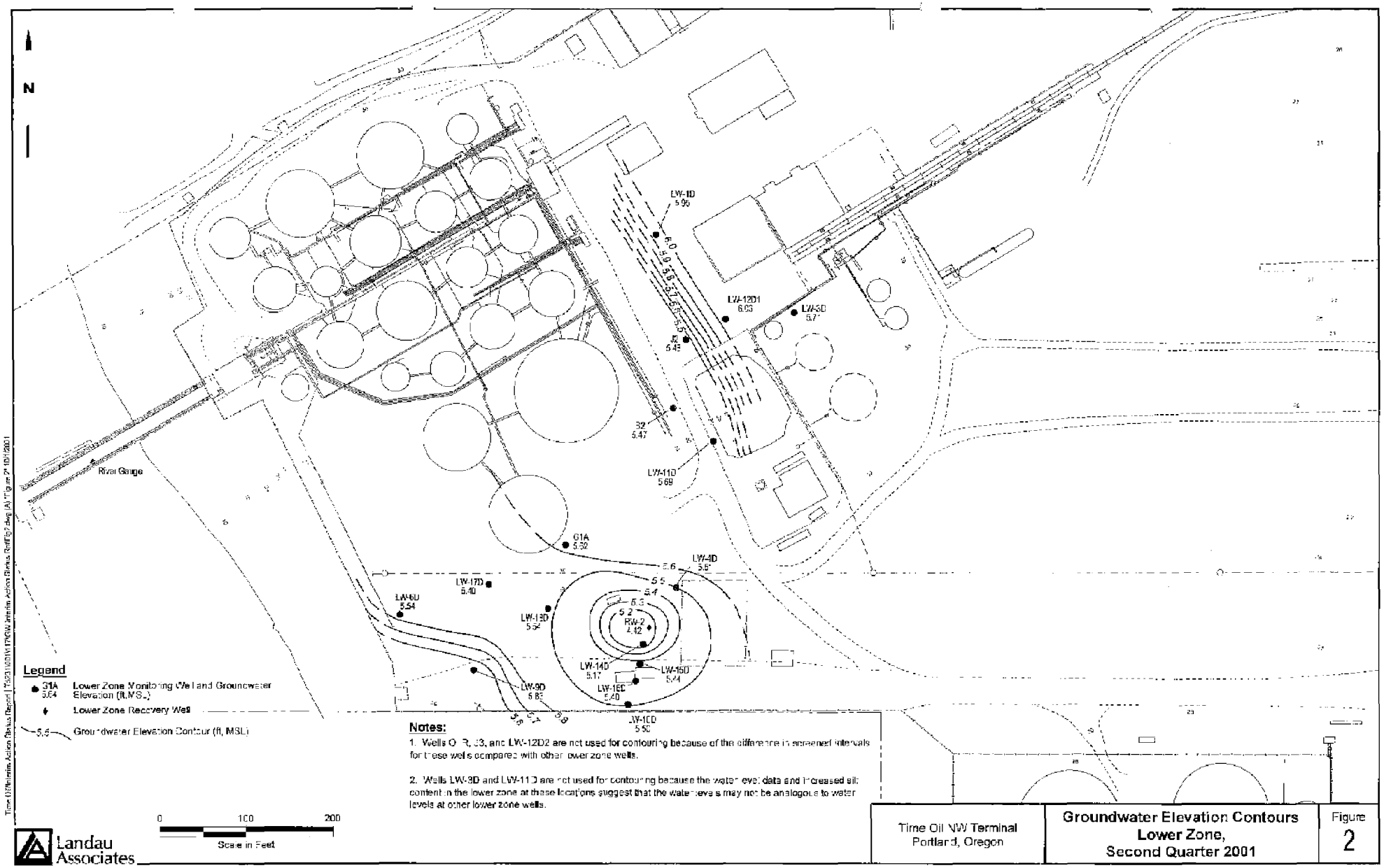

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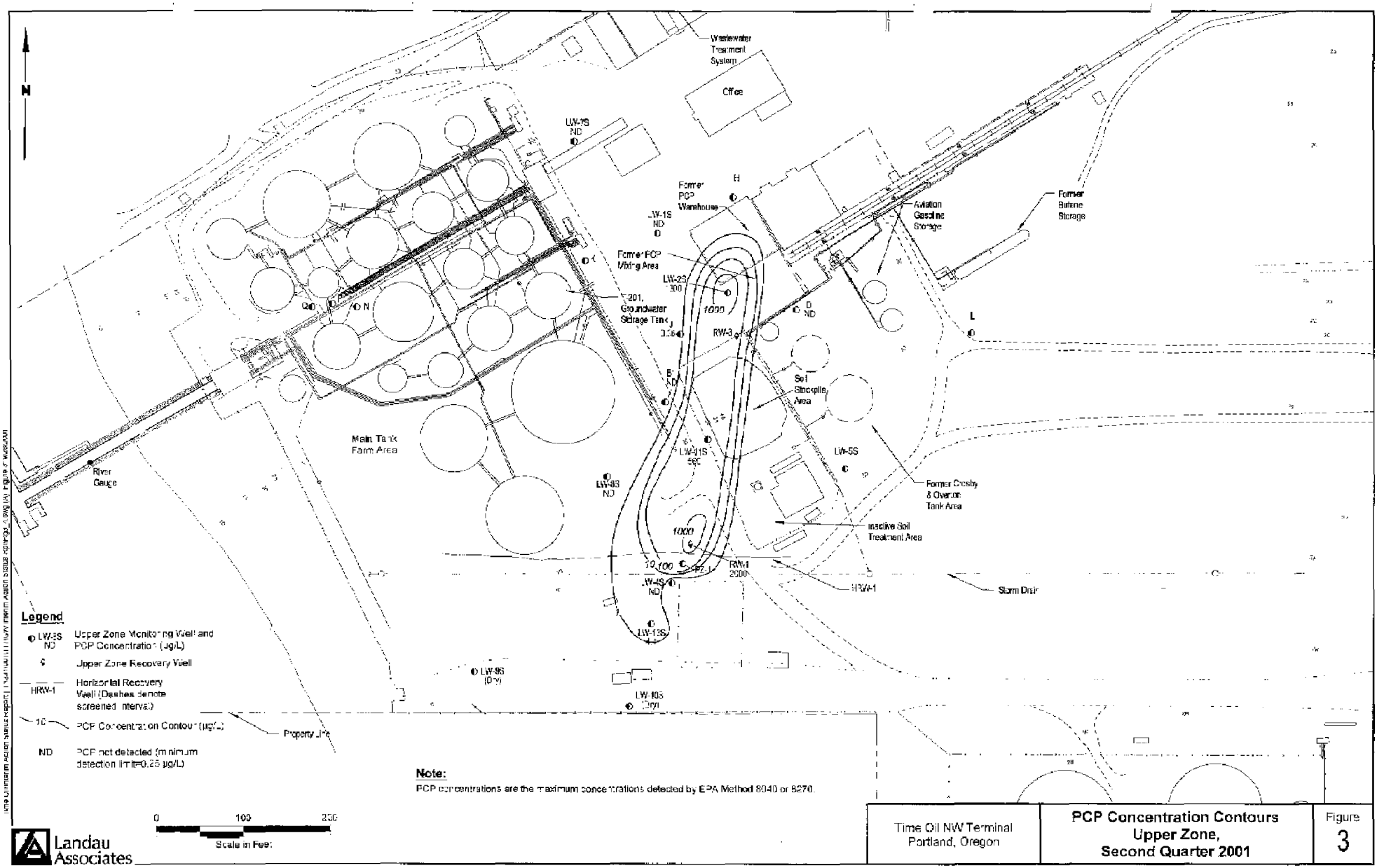

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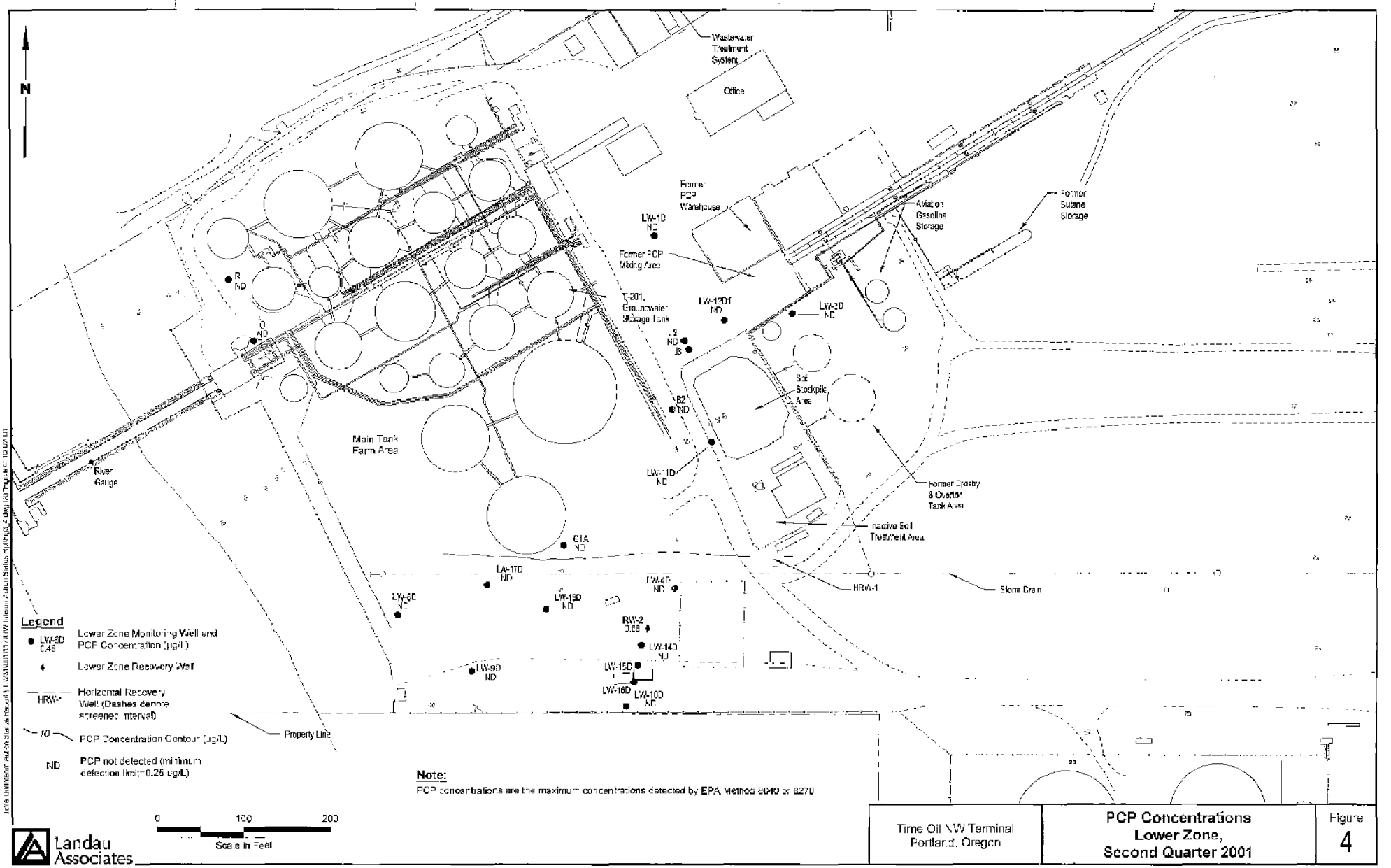

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TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
LOWER WATER-BEARING ZONE
TIME OIL NORTHWEST TERMINAL

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		0.68	0.04	563,853			
Quarterly Totals	*1,084,029*			*0.11*	*1,034,894*			

(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.

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TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - SECOND 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	06/04/01	13:04	30.31	24.84	5.47	----	
G1A	06/04/01	11:40	29.72	24.10	5.62	----	
J2	06/04/01	13:02	29.65	24.17	5.48	----	
LW1D	06/04/01	12:23	28.31	22.36	5.95	----	
LW3D	06/04/01	12:35	30.80	25.09	5.71	----	
LW4D	06/04/01	12:07	30.17	24.66	5.51	----	
LW6D	06/04/01	11:42	30.84	25.30	5.54	----	
LW9D	06/04/01	11:49	30.98	25.15	5.83	----	
LW10D	06/04/01	11:52	31.12	25.62	5.50	----	
LW11D	06/04/01	13:11	29.04	23.35	5.69	----	
LW12D1	06/04/01	12:32	30.02	23.99	6.03	----	
LW14D	06/04/01	12:00	30.54	25.37	5.17	----	
LW15D	06/04/01	11:59	30.85	25.41	5.44	----	
LW16D	06/04/01	11:57	28.40	23.00	5.40	----	
LW17D	06/04/01	11:44	27.82	22.42	5.40	----	
LW18D	06/04/01	11:47	27.82	22.28	5.54	----	
RW2	06/04/01	12:05	30.68	26.26	4.42	----	
Other:							
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	----	

---- 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 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)].

Landau Associates
Environmental and Geotechnical Services

REC'D OCT 15 2001

TRANSMITTAL

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

Date: October 11, 2001

Attn: Mr. Kevin Murphy

Project No.: 231001.139

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Technical Memorandum re: Vacuum-Enhanced Groundwater Pumping Test, Time Oil Northwest Terminal (10/11/01)

Message:

Please find enclosed 1 copy of the above-referenced document. Please call me if you have any questions.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
10/11/01 S:\WPROC\231\TRANSMIT.FAX\murphy et al_trn.doc

Enclosure

cc: Tom Roick, DEQ
Don Butler, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.

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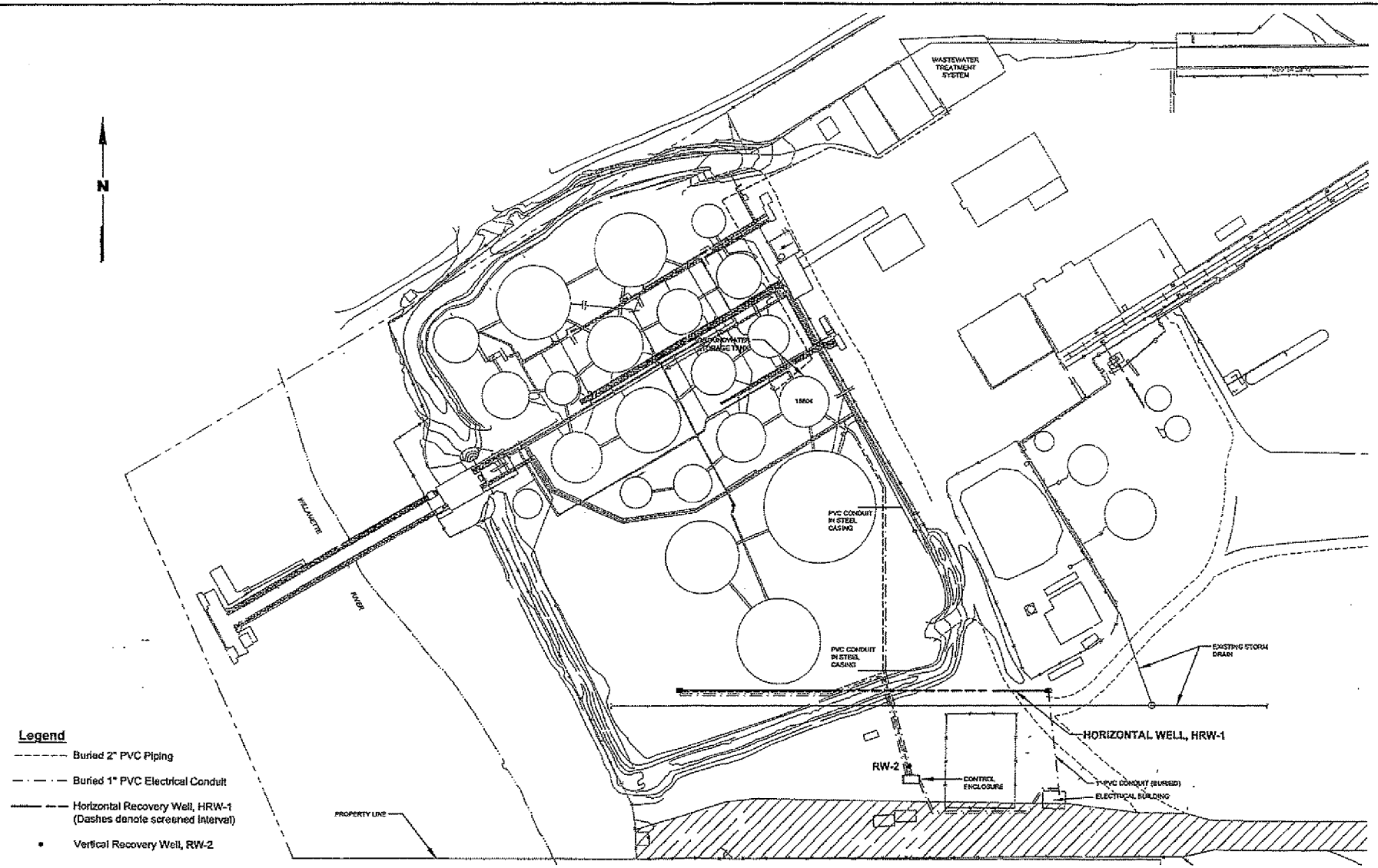

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Time Oil Northwest Terminal Portland, Oregon	**Groundwater Interim Action System**	Figure 1

Time Oil/Vac GW Pump Test Tech Memo | T:\231\001\139\Vac Enh Tech Memo\Fig1.dwg (A) "Figure 1" 10/10/2001

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Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Joe Kalmar & Rebekah Brooks

DATE October 11, 2001

RE: VACUUM-ENHANCED GROUNDWATER PUMPING TEST
TIME OIL NORTHWEST TERMINAL

This technical memorandum summarizes the results of a vacuum-enhanced groundwater pumping test conducted at the Time Oil Northwest Terminal from August 13 through 17, 2001. The purpose of the pumping test was to determine the feasibility of recovering groundwater from the upper zone. The testing procedures followed the *Vacuum-Enhanced Pumping Test Work Plan* dated August 2, 2001, that was prepared for the Oregon Department of Environmental Quality (DEQ).

Testing was performed on the upper zone horizontal recovery well, HRW-1, and the upper zone vertical recovery well, RW-1, using a 10-horsepower Atlantic Fluidics® liquid ring pump. The pumping tests were conducted over approximately a 2-day period at each well. The pumping test at HRW-1 began at 2 pm on August 13, 2001 and ended on the afternoon of August 15. The pumping test at RW-1 began the afternoon of August 15 and ended the afternoon of August 17. During each pumping test, the liquid ring pump system was monitored to record the applied vacuum, groundwater volume recovered, and the flow rate of the extracted vapor. Monitoring data are provided in Table 1.

The testing results indicate that a sustainable groundwater extraction rate from horizontal recovery well HRW-1 was approximately 0.4 gpm at an average applied vacuum of approximately 3.6 inches of mercury (inches Hg) or 49 inches of water. The sustainable groundwater extraction rate from vertical recovery well RW-1 was approximately 0.7 gpm at an average applied vacuum of approximately 1.7 inches Hg or 23 inches of water. The corresponding average vapor extraction rates were approximately 121 and 147 cubic feet per minute (cfm) for HRW-1 and RW-1, respectively. The low extraction rates may be due to the thin saturated thickness of the upper zone downgradient of the upper zone recovery wells, resulting, in part, from historically low precipitation rates over the last year. Water level data collected during quarterly groundwater events at the terminal indicate that groundwater elevations in the upper and lower wells during the last 3 quarterly events were at historically low levels since monitoring began in Spring 1997. Groundwater elevations collected at the wells used to monitor the performance of the groundwater interim action are provided in Table 2.

The groundwater recovered from both extraction wells during the testing was collected in a 5,000-gallon trailer-mounted tank. The extracted water was subsequently pumped into the groundwater

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storage tank (Tank 16804; Figure 1) where it will be biotreated at the onsite wastewater treatment system. At the conclusion of the pumping test, one sample of the combined recovered groundwater was collected from the trailer-mounted tank for analysis of pentachlorophenol (PCP) using U.S. Environmental Protection Agency (EPA) method 8270 - selected ion monitoring (SIM). The PCP concentration was determined to be 313 micrograms per liter (µg/L) as indicated in Table 3. Vapor samples were also collected from each recovery well during the operation of the liquid ring pumping tests. The results of the vapor analyses are listed in Table 3. These results indicate that the total volatile organic compound (VOC) emission rate would be well below 1 ton per year. Therefore, if vacuum-enhanced groundwater recovery is continued in the future, an air contaminant discharge permit (ACDP) would likely not be required from DEQ. An ACDP is typically only required when air emissions exceed a rate of 10 tons per year.

The low groundwater yield from HRW-1 and RW-1 observed during this test does not justify implementing a long-term vacuum enhanced groundwater extraction operation at these wells. Recent water quality data indicate that PCP concentrations in upper zone groundwater in the areas of HRW-1 and RW-1 have decreased significantly over the last 3 quarters and PCP has only been observed at locations downgradient of these wells at low (less than 10 µg/L) or nondetect concentrations. In addition, groundwater level data indicate that the saturated thickness of the upper zone is thin downgradient of HRW-1 and that the farthest downgradient wells (LW-9S and -10S) are dry due, in part, to low precipitation rates in the area over the past year. If water levels recover, groundwater extraction from the upper zone can be achieved using the existing HRW-1 extraction system either with or without vacuum-enhancement.

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TABLE 1
MONITORING DATA
VACUUM-ENHANCED PUMPING TEST - AUGUST 2001
TIME OIL NORTHWEST TERMINAL, PORTLAND, OREGON

Date	Time	Vacuum at Liquid Ring Pump (in. Hg)	Air Flow (cfm)	Flow Totalizer (gallons)	Groundwater Recovered (gallons)	Flow Rate (gpm) Since Previous Measurement	Notes
Recovery Well, HRW-1							
13-Aug-01	13:30	6.0	110	82,260	0		Began liquid ring pump operation at recovery well HRW-1
14-Aug-01	14:00	3.5	125	82,810	550	0.4	No apparent immediate effect on water levels at nearby monitoring and recovery wells
14-Aug-01	15:30	4.0	115	82,850	590	0.4	
15-Aug-01	9:50	2.0	—	83,228	968	0.3	
15-Aug-01	11:20	2.5	130	83,252	992	0.3	
15-Aug-01	13:25	3.5	123	83,286	1,026	0.3	
15-Aug-01	14:30	---	---	83,310	1,050	0.4	Vapor sampling performed at 14:00. Ended test at HRW-1 at 14:30.
				Total Recovered	**1,050**		**Overall average recovery rate of 0.4 gpm**
Recovery Well, RW-1							
15-Aug-01	15:30	4.0	150	83,310	0		Began liquid ring pump operation at recovery well RW-1
16-Aug-01	7:30	0.0	151	84,030	720	0.8	Vacuum 0 in. Hg; however, liquid ring pump is still recovering water in knockout tank
16-Aug-01	10:55	1.0	—	84,150	840	0.6	
16-Aug-01	13:30	1.5	145	84,252	942	0.7	
17-Aug-01	12:10	2.1	140	85,111	1,801	0.6	Collected vapor sample. Ended test at RW-1.
				Total Recovered	**1,801**		**Overall average recovery rate of 0.7 gpm**

Notes:

1. The liquid ring pump (LRP) used was 10 horsepower and manufactured by Atlantic Fluidics®.
2. Air flow monitoring was performed using a TSI Model 8350 thermal anemometer.

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TABLE 2
QUARTERLY GROUNDWATER ELEVATION DATA
GROUNDWATER INTERIM ACTION
APRIL 1997 - AUGUST 2001

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft)	LNAPL Thickness (ft)	NOTES
Shallow Wells:							
LW4S	03/31/97	09:20	30.26	12.77	17.49	----	
LW4S	07/16/97	07:40	30.26	14.66	15.60	----	
LW4S	10/21/97	16:25	30.26	16.88	13.38	----	
LW4S	01/27/98	12:00	30.26	15.13	15.13	----	
LW4S	05/18/98	17:32	30.26	16.08	14.18	----	
LW4S	08/17/98	11:07	30.26	17.30	12.96	----	
LW4S	11/13/98	09:56	30.26	17.96	12.30	----	
LW4S	02/16/99	13:16	30.26	13.10	17.16	----	
LW4S	05/18/99	15:03	30.26	15.43	14.83	----	
LW4S	09/21/99	11:44	30.26	17.61	12.65	----	
LW4S	12/06/99	14:19	30.26	17.08	13.18	----	
LW4S	02/16/00	10:31	30.26	15.84	14.42	----	
LW4S	05/23/00	16:55	30.26	16.71	13.55	----	
LW4S	08/29/00	13:39	30.26	17.78	12.48	----	
LW4S	11/09/00	12:53	30.26	18.17	12.09	----	
LW4S	02/12/01	16:38	30.26	17.08	13.18	----	
LW4S	06/04/01	12:08	30.26	17.81	12.45	----	
LW4S	08/16/01	11:14	30.26	18.39	11.87	----	
LW5S	03/25/97	12:29	30.79	10.57	20.22	----	
LW5S	03/31/97	11:35	30.79	10.84	19.95	----	
LW5S	07/16/97	08:53	30.79	12.29	18.50	----	
LW5S	10/21/97	15:16	30.79	15.00	15.79	----	
LW5S	01/27/98	13:36	30.79	12.90	17.89	----	
LW5S	05/18/98	18:05	30.79	14.19	16.60	----	
LW5S	08/17/98	11:09	30.79	15.54	15.25	----	
LW5S	11/13/98	10:38	30.79	16.55	14.24	----	
LW5S	02/16/99	13:16	30.79	10.59	20.20	----	
LW5S	05/18/99	16:01	30.79	13.12	17.67	----	
LW5S	09/21/99	12:40	30.79	16.00	14.79	----	
LW5S	12/06/99	14:47	30.79	15.64	15.15	----	
LW5S	02/16/00	09:56	30.79	13.54	17.25	----	
LW5S	05/23/00	17:51	30.79	14.80	15.99	----	
LW5S	08/29/00	14:37	30.79	16.35	14.44	----	
LW5S	11/09/00	13:45	30.79	16.98	13.81	----	
LW5S	02/12/01	15:13	30.79	16.51	14.28	----	
LW5S	06/04/01	13:23	30.79	16.43	14.36	----	
LW5S	08/16/01	12:07	30.79	17.03	13.76	----	
LW7S	03/31/97	11:05	28.10	6.75	21.35	----	
LW7S	07/16/97	08:05	28.10	8.62	19.48	----	
LW7S	10/21/97	16:45	28.10	11.26	16.84	----	
LW7S	01/27/98	12:47	28.10	8.85	19.25	----	
LW7S	05/18/98	17:48	28.10	10.34	17.76	----	
LW7S	08/17/98	10:48	28.10	11.85	16.25	----	
LW7S	11/13/98	10:12	28.10	12.90	15.20	----	Strong gasoline odor
LW7S	02/16/99	13:53	28.10	6.81	21.29	----	
LW7S	05/18/99	15:23	28.10	9.14	18.96	----	
LW7S	09/21/99	12:03	28.10	12.37	15.73	----	

TABLE 2
QUARTERLY GROUNDWATER ELEVATION DATA
GROUNDWATER INTERIM ACTION
APRIL 1997 - AUGUST 2001

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft)	LNAPL Thickness (ft)	NOTES
LW7S	12/06/99	14:27	28.10	12.00	16.10	----	
LW7S	02/16/00	10:46	28.10	9.60	18.50	----	
LW7S	05/23/00	17:09	28.10	10.70	17.40	----	
LW7S	08/29/00	13:53	28.10	12.64	15.46	----	
LW7S	11/09/00	13:14	28.10	13.36	14.74	----	
LW7S	02/12/01	15:39	28.10	12.94	15.16	----	
LW7S	06/04/01	12:17	28.10	12.87	15.23	----	
LW7S	08/16/01	11:33	28.10	13.58	14.52	----	
LW8S	05/18/99	14:55	31.28	14.84	16.44	----	
LW8S	09/21/99	12:24	31.28	16.94	14.34	----	
LW8S	12/06/99	14:40	31.28	16.63	14.65	----	
LW8S	02/16/00	10:16	31.28	15.18	16.10	----	
LW8S	05/23/00	17:42	31.28	15.88	15.40	----	
LW8S	08/29/00	14:26	31.28	17.06	14.22	----	
LW8S	11/09/00	13:32	31.28	17.55	13.73	----	
LW8S	02/12/01	15:58	31.28	17.24	14.04	----	
LW8S	06/04/01	13:05	31.28	17.14	14.14	----	
LW8S	08/16/01	12:00	31.28	17.70	13.58	----	
LW9S	05/18/99	14:57	31.04	19.58	11.46	----	Water level appears to be more representative of the lower zone
LW9S	09/21/99	11:36	31.04	dry	----	----	
LW9S	12/06/99	14:13	31.04	19.64	----	----	Water in endcap
LW9S	02/16/00	10:24	31.04	19.59	----	----	Water in endcap
LW9S	05/23/00	16:39	31.04	dry	----	----	
LW9S	08/29/00	13:28	31.04	dry	----	----	
LW9S	11/09/00	12:42	31.04	dry	----	----	
LW9S	02/12/01	16:12	31.04	dry	----	----	
LW9S	06/04/01	11:50	31.04	dry	----	----	
LW9S	08/16/01	11:01	31.04	dry	----	----	
LW10S	05/18/99	14:59	30.75	17.24	13.51	----	
LW10S	09/21/99	11:38	30.75	19.13	11.62	----	
LW10S	12/06/99	14:14	30.75	18.54	12.21	----	
LW10S	02/16/00	10:26	30.75	17.62	13.13	----	
LW10S	05/23/00	16:41	30.75	18.25	12.50	----	
LW10S	08/29/00	13:30	30.75	dry	----	----	
LW10S	11/09/00	12:45	30.75	dry	----	----	
LW10S	02/12/01	16:14	30.75	dry	----	----	
LW10S	06/04/01	11:53	30.75	dry	----	----	
LW10S	08/16/01	11:03	30.75	dry	----	----	
LW13S	05/23/00	16:51	30.17	17.23	12.94	----	
LW13S	08/29/00	13:37	30.17	18.27	11.90	----	
LW13S	11/09/00	12:51	30.17	18.75	11.42	----	
LW13S	02/12/01	16:30	30.17	18.26	11.91	----	
LW13S	06/04/01	12:06	30.17	18.30	11.87	----	
LW13S	08/16/01	11:13	30.17	18.81	11.36	----	
RW1	05/18/99	15:06	31.46	15.70	15.76	----	
RW1	09/21/99	11:46	31.46	18.02	13.44	----	

TABLE 2
QUARTERLY GROUNDWATER ELEVATION DATA
GROUNDWATER INTERIM ACTION
APRIL 1997 - AUGUST 2001

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft)	LNAPL Thickness (ft)	NOTES
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
Deep Wells:							
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	---	
LW10D	05/18/99	15:00	31.12	19.82	11.30	---	
LW10D	09/21/99	11:37	31.12	25.81	5.31	---	
LW10D	12/06/99	14:15	31.12	21.18	9.94	---	
LW10D	02/16/00	10:27	31.12	21.20	9.92	---	
LW10D	05/23/00	16:42	31.12	21.51	9.61	---	
LW10D	08/29/00	13:29	31.12	25.86	5.26	---	
LW10D	11/09/00	12:46	31.12	26.26	4.86	---	
LW10D	02/12/01	16:15	31.12	25.63	5.49	---	
LW10D	06/04/01	11:52	31.12	25.62	5.50	---	
LW10D	08/16/01	11:04	31.12	27.16	3.96	---	
LW14D	05/23/00	16:50	30.54	21.26	9.28	---	
LW14D	08/29/00	13:35	30.54	25.68	4.86	---	
LW14D	11/09/00	12:49	30.54	25.90	4.64	---	
LW14D	02/12/01	16:20	30.54	25.33	5.21	---	
LW14D	06/04/01	12:00	30.54	25.37	5.17	---	
LW14D	08/16/01	11:08	30.54	27.00	3.54	---	
LW15D	05/23/00	16:49	30.85	21.26	9.59	---	

TABLE 2
QUARTERLY GROUNDWATER ELEVATION DATA
GROUNDWATER INTERIM ACTION
APRIL 1997 - AUGUST 2001

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft)	LNAPL Thickness (ft)	NOTES
LW15D	08/29/00	13:34	30.85	25.54	5.31	----	
LW15D	11/09/00	12:48	30.85	25.98	4.87	----	
LW15D	02/12/01	16:18	30.85	25.43	5.42	----	
LW15D	06/04/01	11:59	30.85	25.41	5.44	----	
LW15D	08/16/01	11:07	30.85	27.05	3.80	----	
LW16D	05/23/00	16:48	28.4	18.79	9.61	----	
LW16D	08/29/00	13:32	28.4	23.07	5.33	----	
LW16D	11/09/00	12:47	28.4	23.59	4.81	----	
LW16D	02/12/01	16:17	28.4	22.94	5.46	----	
LW16D	06/04/01	11:57	28.4	23.00	5.40	----	
LW16D	08/16/01	11:05	28.4	24.43	3.97	----	
LW17D	08/29/00	13:21	27.82	22.96	4.86	----	
LW17D	11/09/00	12:36	27.82	23.17	4.65	----	
LW17D	02/12/01	16:04	27.82	22.44	5.38	----	
LW17D	06/04/01	11:44	27.82	22.42	5.40	----	
LW17D	08/16/01	10:55	27.82	23.80	4.02	----	
LW18D	08/29/00	13:25	27.82	22.79	5.03	----	
LW18D	11/09/00	12:40	27.82	22.91	4.91	----	
LW18D	02/12/01	16:10	27.82	22.56	5.26	----	
LW18D	06/04/01	11:47	27.82	22.28	5.54	----	
LW18D	08/16/01	11:00	27.82	23.81	4.01	----	
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	----	Groundwater interim action system operating
RW2	06/04/01	12:05	30.68	26.26	4.42	----	Groundwater interim action system operating
RW2	08/16/01	11:11	30.68	28.98	1.70	----	Groundwater interim action system operating

NM = Not measured.
NA = Not available.
-- = No measurable product or odor observed.

(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)].

TABLE 3
LABORATORY DATA FROM VACUUM-ENHANCED PUMPING TEST
TIME OIL NORTHWEST TERMINAL, PORTLAND, OREGON

Groundwater Sample	PCP (µg/L)
Combined groundwater from HRW-1 and RW-1 pumping tests	313

Vapor Samples	HRW-1 (mg/m^3)	RW-1 (mg/m^3)
Phenols (EPA method TO-8):		
PCP	ND	NS
Other Phenols	ND	NS
VOCs (EPA method TO-14):		
Toluene	ND	0.726
1,1,2-Trichloroethane	0.743	ND
Ethylbenzene	5.879	4.597
m,p-Xylenes	21.100	16.862
o-Xylene	2.225	3.331
4-ethyltoluene	12.765	9.797
1,3,5-Trimethylbenzene	21.080	4.790
1,2,4-Trimethylbenzene	60.351	12.186
Other VOCs	ND	ND
Total VOCs	124	52

ND = Analyte not detected at the method detection limit
NS = Not sampled
PCP = Pentachlorophenol
VOCs = Volatile Organic Compounds
Total VOCs = Summation of detected VOC concentrations

Second Quarter 2001 Groundwater Report
Time Oil Northwest Terminal
Portland, Oregon

October 12, 2001

Prepared for

Time Oil Co.
2737 West Commodore Way
Seattle, WA 98100-1233

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1.0 INTRODUCTION

This report provides the results of the second quarter 2001 groundwater sampling event, conducted as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal in June 2001. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report. The second quarter 2001 event was conducted during implementation of a groundwater interim action in the lower water-bearing zone at recovery well RW-2. The status and performance summary of the interim action during this period is summarized in the *Groundwater Interim Action Status Report, Second Quarter 2001* (Landau Associates 2001a).

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. (Time Oil). The facility is located in the industrialized Rivergate area of north Portland, Oregon (Figure 1). Quarterly groundwater sampling has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of the groundwater monitoring locations at the terminal are shown on Figure 2.

Modifications to the groundwater quality sampling and analysis requirements (Landau Associates 1998a, 1999a, 2000a,b, 2001b,c) were approved by the Oregon Department of Environmental Quality (DEQ) in letters dated May 15, 1998, May 18, 2000, February 21, 2001 (DEQ 1998, 2000a, 2001a), by verbal authorization to Rebekah Brooks of Landau Associates on February 12, 1999 (Landau Associates 1999b), and by e-mail on August 15, 2000 and May 30, 2001 (DEQ 2000b, 2001b). Beginning with this event, modifications to the sampling program included the reduction of the frequency of total petroleum hydrocarbons (TPH) analyses 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 analyses were eliminated in the following wells: upper zone wells D, L, LW-5S, LW-101S through -104S, and lower zone well LW-3D. Previous modifications were documented in the first quarter 2001 groundwater report (Landau Associates 2001d), and will be reiterated in the first quarter report each year hereafter.

Groundwater level measurements conducted at the terminal for the second quarter 2001 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-1. Analyses conducted during this sampling event for each sampling location are summarized in Table A-2. Groundwater quality data for the second quarter 2001 event are provided in Tables A-3 and A-4 for the shallow and deep wells, respectively. The data validation reports for these data are provided in Appendix B. Laboratory data packages are provided in Appendix C.

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 for each quarterly event and provided either electronically or on computer diskette.

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2.0 SECOND QUARTER 2001 GROUNDWATER SAMPLING EVENT

The second quarter 2001 groundwater sampling event was conducted from June 4 through June 6, 2001. 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, as well as the monitoring wells that are sampled as part of the groundwater interim action (LW-13S, LW-14D, LW-17D and LW-18D). 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.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the second quarter 2001 event on June 4, 2001. The presence of product was also checked in each well; no product was observed. 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 A-1. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided the Phase II RI Report (Landau Associates 2000b).

For evaluation purposes, the groundwater level measurements were converted from depth-to-water readings to groundwater elevations using the survey information for each location. The groundwater elevations for the upper zone were then contoured using SURFER for Windows. Groundwater elevation contours interpreted using SURFER kriging techniques are considered approximate, and were modified by hand where the contours did not appear to represent hydrogeologic conditions based on the current conceptual model at the terminal. Groundwater elevations for the lower zone were contoured manually in conjunction with the evaluations conducted for determination of the capture zone for the groundwater interim action. Groundwater elevation contour maps for the upper and lower water-bearing zones are shown on Figures 3 and 4, respectively.

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.

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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-1.

Water level measurements for the second quarter 2001 event were obtained beginning at about 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 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 1998b), aquifer test report (Landau Associates 1999c), and previous quarterly measurements.

2.1.2 Upper Water-Bearing Zone

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper water-bearing zone. Groundwater elevation contours for the upper zone are presented on Figure 3. The contours indicate that groundwater flow in the upper zone across the terminal is generally to the west-southwest toward the Willamette River, with a localized shift to the south in an area south of the former PCP mixing area. A change in the groundwater flow pattern in the upper zone also appears to occur on the east property, such that the groundwater flow direction in this area appears to be radial away from an area at the north property boundary near LW-103S. Groundwater flow patterns and direction in the upper zone do not appear to be impacted by pumping in the lower zone as part of the groundwater interim action, and vary little between the quarterly events.

2.1.3 Lower Water-Bearing Zone

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower water-bearing zone. Groundwater elevation contours for the lower zone are presented on Figure 4. The contours indicate that pumping of recovery well RW-2 for groundwater interim action has modified groundwater flow 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.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the second quarter 2001 event on June 4 through 6, 2001. During this sampling event, fourteen upper zone wells, seventeen lower zone wells, and one deep sand unit well were sampled. Monitoring wells LW-9S and LW-10S were dry and not sampled as part of this event. Except as shown in Table A-2, all groundwater samples were analyzed for the following constituents: semivolatile organic compounds [U.S. Environmental Protection Agency (EPA) method 8270]; pentachlorophenol (PCP) (EPA method 8270 SIM); volatile organic compounds (EPA method 8260); 6 priority pollutant metals (EPA methods 6010/7000 series); chloride (EPA method 325.2); total dissolved solids (EPA method 160.1); and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, TPH diesel range (NWTPH-D) was analyzed at twelve site monitoring wells. In addition to the TPH-D, TPH for gasoline and motor oil ranges (NWTPH-G and NWTPH-D extended) were analyzed in samples from wells B1, LW-8S, LW-11S, RW-1, and RW-2. Laboratory analyses were conducted by Analytical Resources, Inc. (Seattle, Washington). A summary of analyses conducted for each sampling location is provided in Table A-2.

Analytical results for the second quarter 2001 event are provided in Table A-3 for the upper zone wells and Table A-4 for the deep zone wells and deep sand unit well and 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. Data qualifier definitions are included in Table A-5.

2.2.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2) that were purged and sampled with a Grundfos® pump. The sample from RW-2 was collected using the in-line sampling port from the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three 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, specific conductance, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing during sampling for VOCs, a pumping rate was maintained below about 100 ml/min. All sampling was conducted in accordance with the Phase I/II RI/FS work plan and appropriate provisions of the quality assurance project plan and project health and safety plan (Landau

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Associates 1996). A more detailed description of groundwater sampling procedures is provided in the Phase II RI report submitted to DEQ on April 6, 2000 (Landau Associates 2000c).

2.2.2 Upper Water-Bearing Zone

The groundwater quality results from the upper water-bearing zone indicate the following:

- Except for low level arsenic concentrations, analytical results for wells D and LW-1S were nondetect.

- PCP was detected at three upper zone wells (LW-2S, LW-11S, and RW-1) using EPA method 8270. Concentrations ranged from 560 µg/L at well LW-11S to 2,000 µg/L at well RW-1. Using EPA method 8270 SIM (for those wells containing nondetect concentrations using method 8270 only), PCP was also detected at J1 and LW-13S at concentrations of 0.36 µg/L and 4.4 µg/L, respectively.

- Naphthalene, a noncarcinogenic polycyclic aromatic hydrocarbon (PAH), was detected in samples from six wells (J1, LW-2S, LW-4S, LW-8S, LW-11S, and RW-1) at concentrations ranging from 1.3 to 22 µg/L, using method 8270. Naphthalene was detected in five of these wells at concentrations ranging from 11 to 60 µg/L using method 8260.

- All other semivolatile results were reported as nondetect with the following exceptions: phenol (detected at wells LW-11S and RW-1 at 2.6 and 12 µg/L, respectively); 4-methylphenol (detected at four wells at concentrations ranging from 1.7 to 130J µg/L); 2,4-dimethylphenol (3.1 µg/L at LW-4S); 2-methylnaphthalene (detected at five wells at concentrations ranging from 1.5 to 14 µg/L); 2,4,5-trichlorophenol (13 µg/L at RW-1); di-n-butylphthalate (4.0 µg/L at RW-1); and bis(2-ethylhexyl)phthalate (25 µg/L at J1 and 1.5 µg/L at LW-8S).

- Several volatile compounds were detected in the upper zone wells including:

  - Acetone (detected at four wells at concentrations ranging from 13 to 1,100 µg/L)
  - Chloroform (1.9 µg/L at LW-7S)
  - 2-Butanone (6.4 µg/L at RW-1)
  - Benzene (detected at five wells with concentrations from 1.7 to 560 µg/L)
  - Toluene (detected at five wells at concentrations ranging from 1.1 to 3,400 µg/L)
  - Ethylbenzene (detected at eight wells at concentrations ranging from 1.2 to 220 µg/L)
  - m-, p-, and o-Xylene (detected at seven wells at total xylene concentrations ranging from 5.4 to 1,200 µg/L)
  - 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected at six wells at individual concentrations ranging from 15 to 490 µg/L)
  - Isopropylbenzene and n-propylbenzene (detected at eight wells at individual concentrations ranging from 1.3 to 130 µg/L)

- tert-Butylbenzene (6.0 µg/L at LW-8S and 1.3 M µg/L at LW-11S)
- sec-Butylbenzene (detected at four wells at concentrations ranging from 7.3 to 30 µg/L)
- 4-Isopropyltoluene (detected at four wells at concentrations ranging from 4.1 µg/L to 25 µg/L)
- n-Butylbenzene (LW-2S at 21 µg/L).

- TPH diesel-range concentrations were detected at all of the eight upper zone wells where analyzed. Concentrations ranged from 1.7 to 47 mg/L.

- TPH motor oil-range was reported at nondetect concentrations at the locations where analyzed (wells B1, LW-8S, LW-11S, and RW-1).

- TPH gasoline-range was detected at each well where analyzed (B1, LW-8S, LW-11S, and RW-1) at concentrations ranging from 2.9 to 25 mg/L.

- At least one priority pollutant metal was detected in each upper zone well as follows:

  - Arsenic (detected at all wells where analyzed, except well K), at concentrations ranging from 0.007 to 0.024 mg/L)
  - Copper (detected at well LW-4S at 0.002 mg/L)
  - Lead (detected at well B1 at 0.002 mg/L and well LW-7S at 0.001 mg/L)
  - Nickel (detected at well B1 at 0.12 mg/L and well K at 0.02 mg/L)
  - Zinc (detected at four wells at concentrations ranging from 0.006 to 0.054 mg/L).

The analytical results from the upper zone wells indicate that the highest PCP concentration in the upper zone during the second quarter 2001 event were observed in well RW-1 (2,000 µg/L by method 8270). Other semivolatile compounds were detected at low concentrations, with most detections at less than 25 µg/L and none exceeding 130 µg/L (methylphenol at well B1). The most elevated concentrations of volatile compounds (acetone, benzene, toluene, ethylbenzene, and m-, p-, and o-xylene) were generally observed at wells B1, LW-4S, and RW-1. No TPH fraction concentration exceeded 25 mg/L. The most elevated concentrations of metal constituents were generally detected in wells B1 (zinc) and LW-8S (arsenic).

2.2.3 LOWER WATER-BEARING ZONE

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for low level metal concentrations, analytical results at wells B2, J2, LW-1D, and LW-10D were nondetect. LW-3D analytical results were nondetect except for low level arsenic and acetone concentrations.

- PCP was detected at one lower zone well, RW-2, at a concentration of 0.68 µg/L using EPA method 8270 SIM.

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- Other semivolatile results were reported as nondetect for lower zone wells with the following exceptions:
  - 2-Methylnaphthalene (detected at well LW-4D at 3.6 µg/L and well RW-2 at 2.0 µg/L)
  - Fluorene (detected at well O at 1.6 µg/L)
  - bis(2-ethylhexyl)phthalate (detected at well O at 1.1 µg/L and well LW-12D1 at 1.0 µg/L).
- Several volatile compounds were detected at low concentrations, including:
  - Acetone (detected at five wells with concentrations ranging from 6.1 µg/L to 35 µg/L)
  - 2-Butanone (detected at wells G1A and LW-4D with concentrations of 6.2 and 14 µg/L, respectively)
  - Benzene (detected at well R at 3.1 µg/L)
  - Toluene (detected at wells O and R at 1.6 and 2.9 µg/L, respectively)
  - m- and p-Xylene (detected at three wells, at total concentrations ranging from 1.4 to 4.1 µg/L)
  - 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (at least one of the compounds was detected at six wells at individual concentrations ranging from 1.1 to 84 µg/L)
  - Isopropylbenzene and n-propylbenzene (at least one of the compounds was detected at eight wells at individual concentrations ranging from 1.1 to 150 µg/L)
  - tert-Butylbenzene (detected at three wells at concentrations ranging from 1.7 to 4.5 µg/L)
  - sec-Butylbenzene (detected at eight wells at concentrations ranging from 1.2 to 20 µg/L)
  - 4-Isopropyltoluene (detected at well LW-4D at 2.3 µg/L).
  - n-Butylbenzene (detected at three wells at concentrations ranging from 1.5 to 6.2 µg/L).
- TPH diesel-range concentrations were detected at seven lower zone wells at concentrations ranging from 0.25 to 3.5 mg/L.
- TPH gasoline-range and motor-oil range analyses were conducted only at RW-2. Only TPH gasoline-range was detected at a concentration of 0.66 mg/L.
- At least one priority pollutant metal was detected in each lower zone well tested, as follows:
  - Arsenic (detected at all lower zone wells tested, ranging at concentrations from 0.005 to 0.036 mg/L)
  - Chromium (detected at well LW-10D at 0.008 mg/L and well LW-12D1 at 0.012 mg/L)
  - Copper (detected at eight lower zone wells with concentrations ranging from 0.003 to 0.015 mg/L)
  - Lead (detected at five wells at concentrations ranging from 0.001 to 0.013 mg/L)

- Zinc (detected in nine lower zone wells at concentrations ranging from 0.008 to 0.189 mg/L).

The analytical results from the lower zone wells indicate that PCP was detected only in well RW-2 (0.68 µg/L by EPA method 8270 SIM) during the second quarter 2001 event. Only three other semivolatile compounds [2-methylnaphthalene, fluorene, and bis(2-ethylhexyl)phthalate] were detected in lower zone wells with maximum concentrations not exceeding 3.6 µg/L. Elevated concentrations of most volatile compounds were observed in wells GIA and LW-4D, with none exceeding 150 µg/L. No TPH fraction concentration exceeded 3.5 mg/L. The most elevated concentrations of metals were detected in wells GIA, LW-12D1, and RW-2.

2.2.4 Deep Sand Unit

Well LW-12D2 is the only well currently installed in the deep sand unit underlying the lower water-bearing zone. Only two detections were noted in well LW-12D2: PCP at 1.7 µg/L and arsenic at 0.022 mg/L.

2.2.5 Water Level and Contaminant Trends

Water levels and concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the period of time covered by the Phase II RI quarterly events (March 1997 through the current quarterly event). Plots of PCP concentrations (maximum concentration of EPA methods 8270 and 8040) versus time for selected upper zone wells (LW-2S, -4S, -11S, and RW-1), selected lower zone wells (LW-4D, -11D, and RW-2), and nested wells (LW-4S and -4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-2S, LW-4S, and LW-11S are shown on Figures 8 through 10. A plot of groundwater elevations and PCP concentrations at lower zone well LW-4D with Willamette River stage is shown on Figure 11.

As shown on Figure 5, PCP concentrations in the selected upper zone wells show variable concentration patterns. At well LW-2S, located within the former PCP mixing area, concentrations were elevated between April 1997 through February 1999, ranging from 3000 to 8500 µg/L, but have stabilized to about 560 to 2100 µg/L since that time. Results from the last three sampling events varied little between 1200 to 1500 µg/L. PCP concentrations in well LW-11S have decreased over time from 24,000 to 460 µg/L since the well's installation in May 1999, but, during the last two sampling events, the results have remained approximately the same (460 and 560 µg/L, respectively). However, product was observed in this well during November and December 2000 at thicknesses of up to 0.7 ft; about 8.5L of

product was recovered from the well. PCP concentrations in well RW-1 have generally increased over time from 150 to 11,000 µg/L, but decreased to about 2,000 µg/L for the June 2001 event. The elevated PCP concentrations observed at RW-1 (11,000 µg/L) in February 2001 using method 8040 is questionable because the PCP result using method 8270 for the same sample was 1,400 µg/L PCP. Concentrations in well LW-4S continue to be observed at nondetect concentrations since the November 2000 event. Plotted together, the PCP concentration patterns at wells LW-11S, RW-1, and LW-4S appear to represent a consecutive migration of the more elevated portions of the PCP plume in the upper zone in a downgradient direction over a six-quarter period from May 1999 to September 2000. Migration at this rate in the upper zone is supported by the low end approximation of groundwater velocities (0.7 ft/day) presented in the Phase II RI report (Landau Associates 2000e).

As shown on Figure 6 (note the logarithmic scale), current PCP concentrations at selected lower zone well locations where PCP has historically been detected are generally less than those concentrations in the upper zone at the same location or in proximity to that location. Since May 1999, PCP concentrations at well LW-4D have decreased significantly from a maximum concentration of 18,000 µg/L in October 1997 to concentrations ranging from nondetect to 9 µg/L since that time. Since August 2000, PCP results at LW-4D have been near or below the detection limit (0.25 µg/L). Similarly, concentrations in well LW-11D decreased from a maximum PCP concentration of 55 µg/L since its installation in May 1999, and have generally stayed at low level or nondetect concentrations since then. PCP concentrations in well RW-2 decreased initially from 210 µg/L to nondetect between May 1999 and December 1999, but have since fluctuated between nondetect and 680 µg/L. Plotted together, the PCP concentration pattern at the lower zone wells indicate that PCP concentrations have been decreasing over time in the lower zone. Additionally, PCP concentrations at well RW-2 (where pumping in the lower zone for the groundwater interim action has been occurring since October 2000) have been greater than the other two wells since February 2000, and the maximum PCP concentrations detected in the lower zone historically were observed at well LW-4D between July 1997 to February 1999. The PCP concentration patterns at nested wells LW-4S and -4D (Figure 7) indicate that contamination observed in the lower zone at this location does not appear to have originated from the upper zone at the same location.

Figures 8, 9, and 10 show that 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). Groundwater elevations observed during the last three quarterly events indicate historically low groundwater levels since monitoring began in spring, 1997. Figures 8 and 10 show PCP concentrations in the upper zone moderately following the water levels in that zone over time in wells LW-2S and LW-11S; however, Figure 9 indicates that no

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correlation is apparent between the two in the upper zone at well LW-4S. In the lower water-bearing zone, groundwater levels trend similarly with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at LW-4D with river stage on Figure 11; however, there appears to be no correlation between PCP concentrations and groundwater elevations at this location. As discussed previously, product was observed in well LW-11S in November-December 2000.

Contaminant and groundwater level trends will continue to be evaluated and updated for future quarterly events.

3.0 FUTURE GROUNDWATER TASKS

The third quarter 2001 event was conducted August 13-16, 2001. The groundwater analytical program for the third quarter 2001 included continuation of monitoring at wells LW-13S, LW-14D, LW-17D, and LW-18D during implementation of the groundwater interim action at RW-2. The results of the third quarter 2001 event will be provided in the *Third Quarter 2001 Groundwater Report*.

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4.0 USE OF THIS REPORT

This quarterly 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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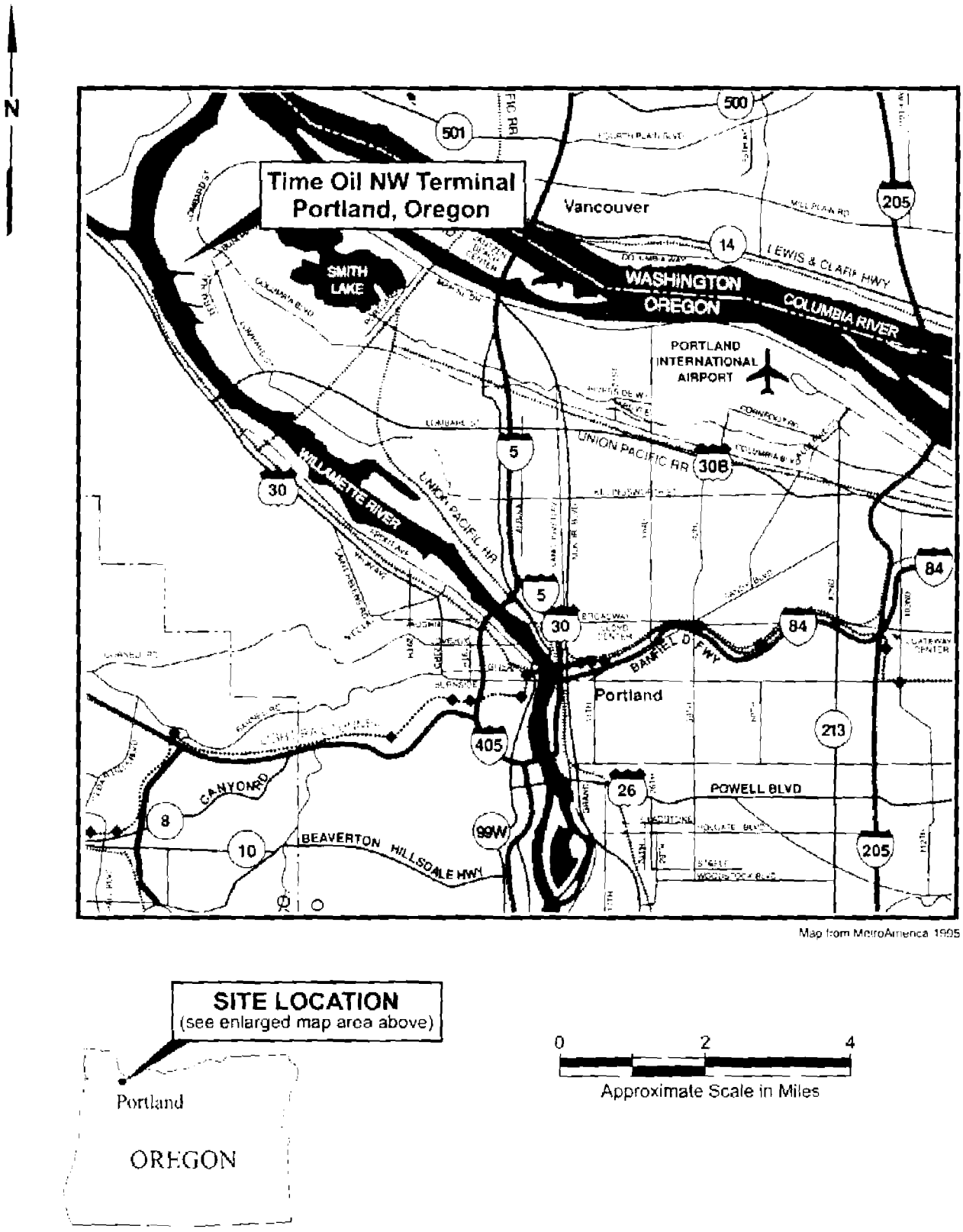

Map from MetroAmerica 1995

Time Oil/2nd Quarter 2001 Groundwater Report | T:\231\001\131\2Qtr2001Rpt\Fig 1.pdr (C) 9/17/2001

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Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

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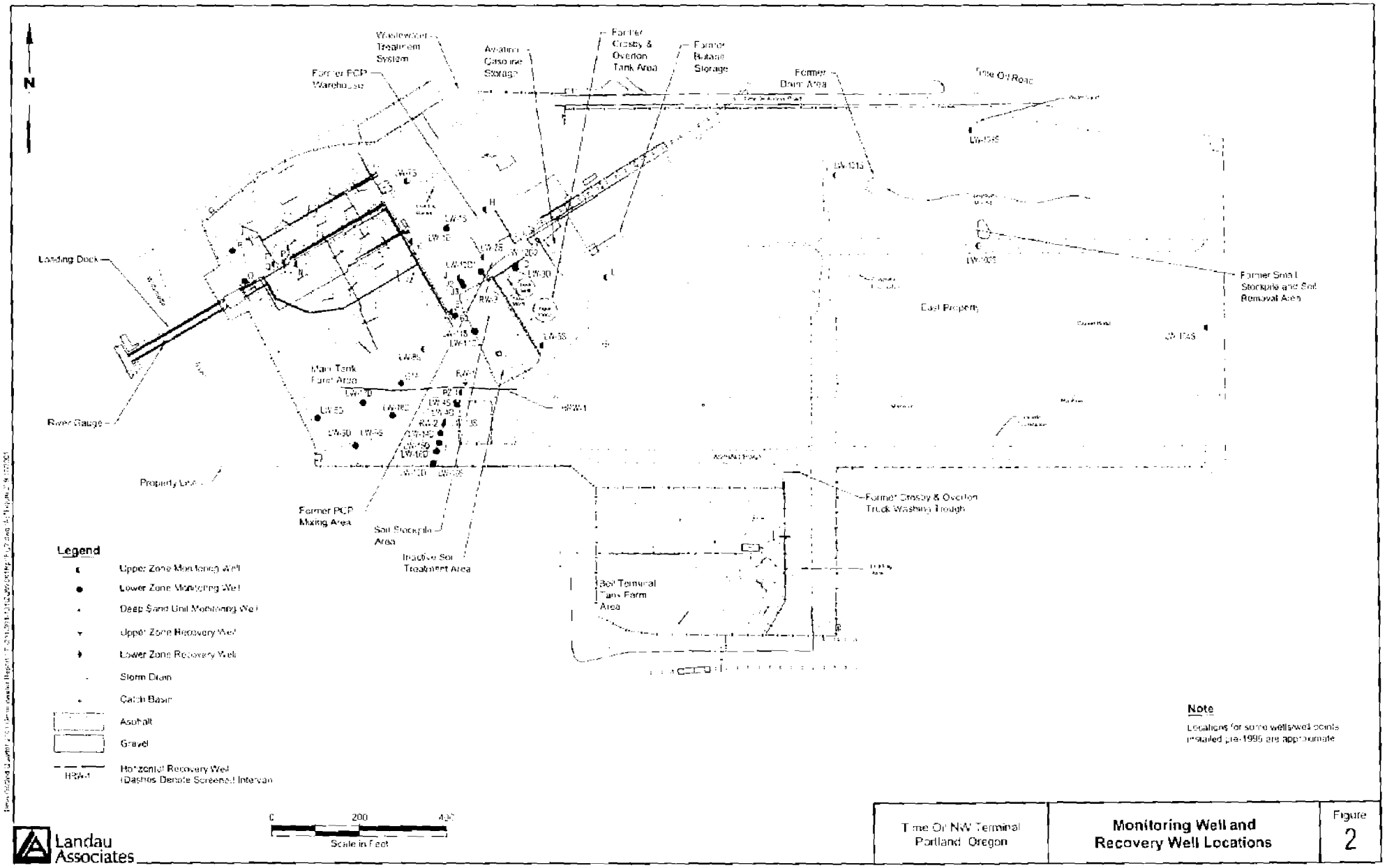

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Time Oil NW Terminal Portland, Oregon	**Monitoring Well and Recovery Well Locations**	Figure 2

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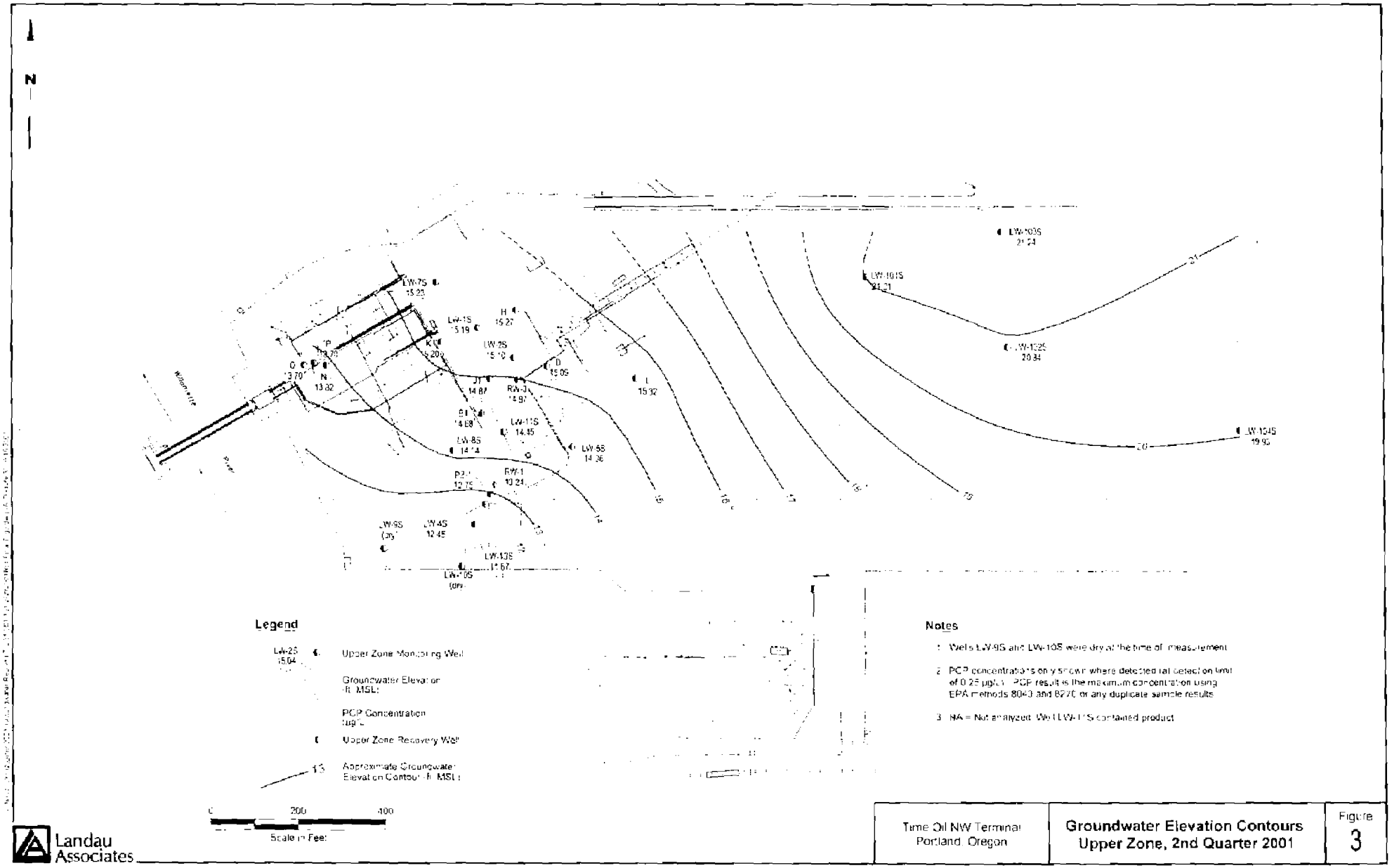

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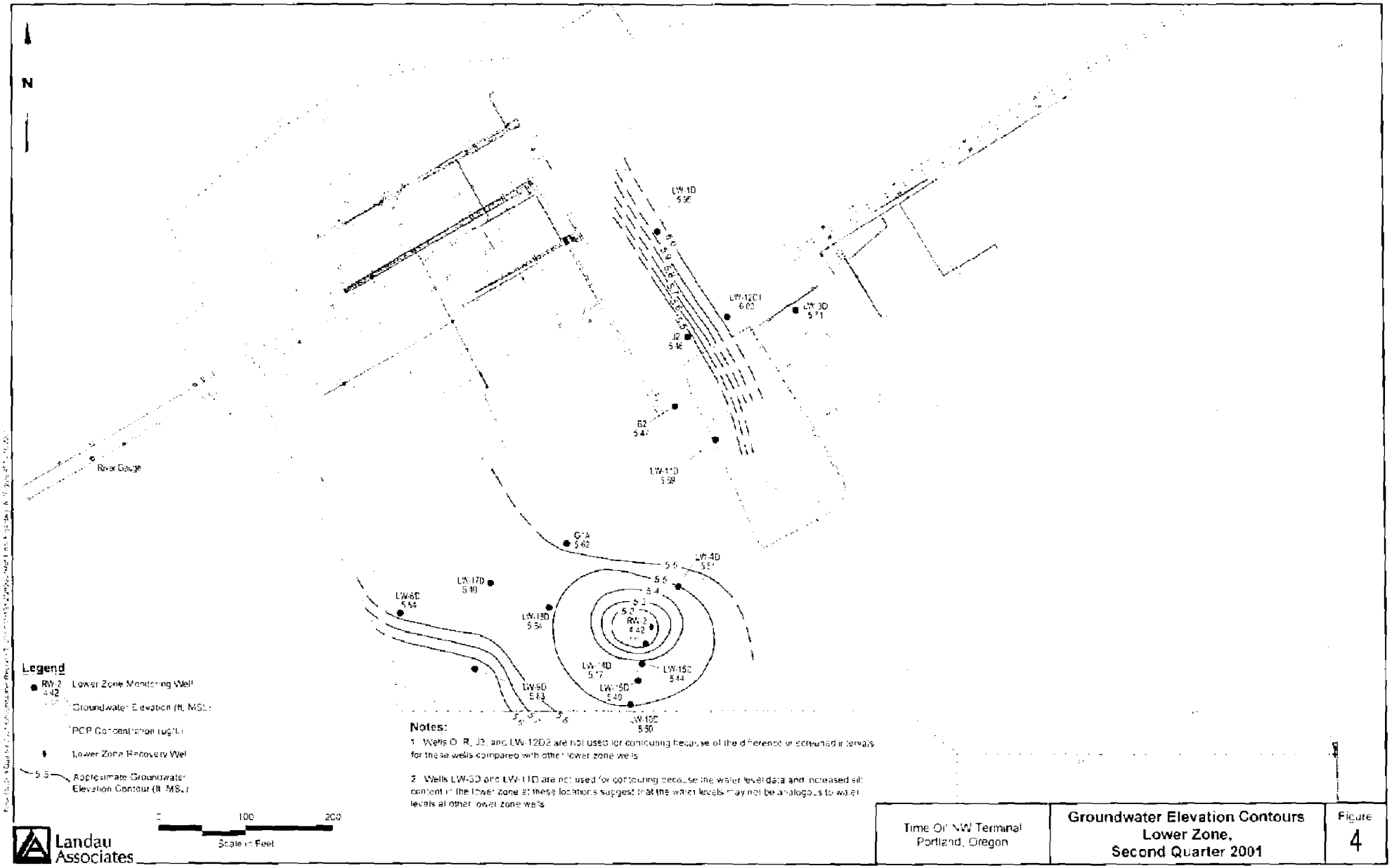

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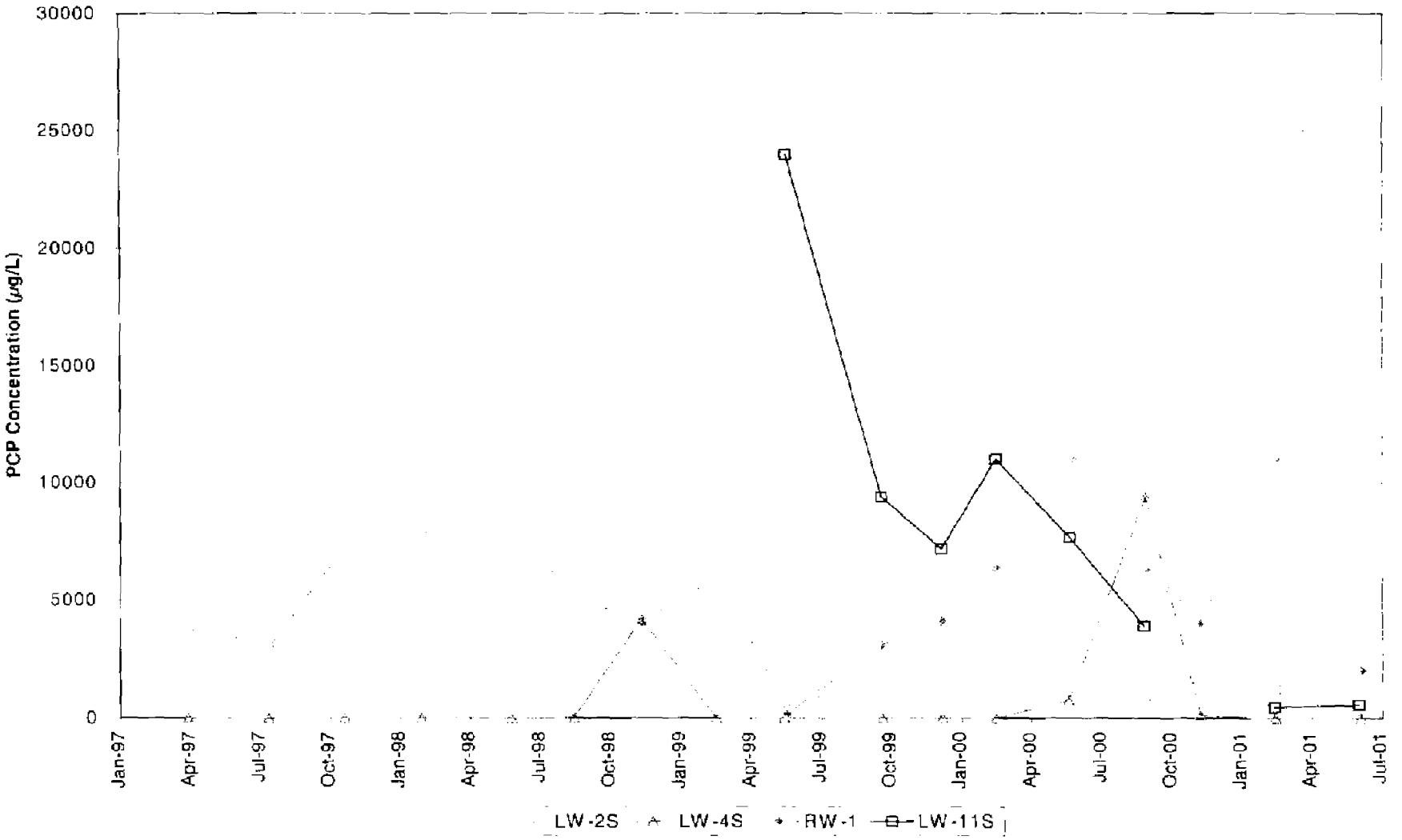

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Selected Upper Zone Wells April 1997 – June 2001**	Figure 5

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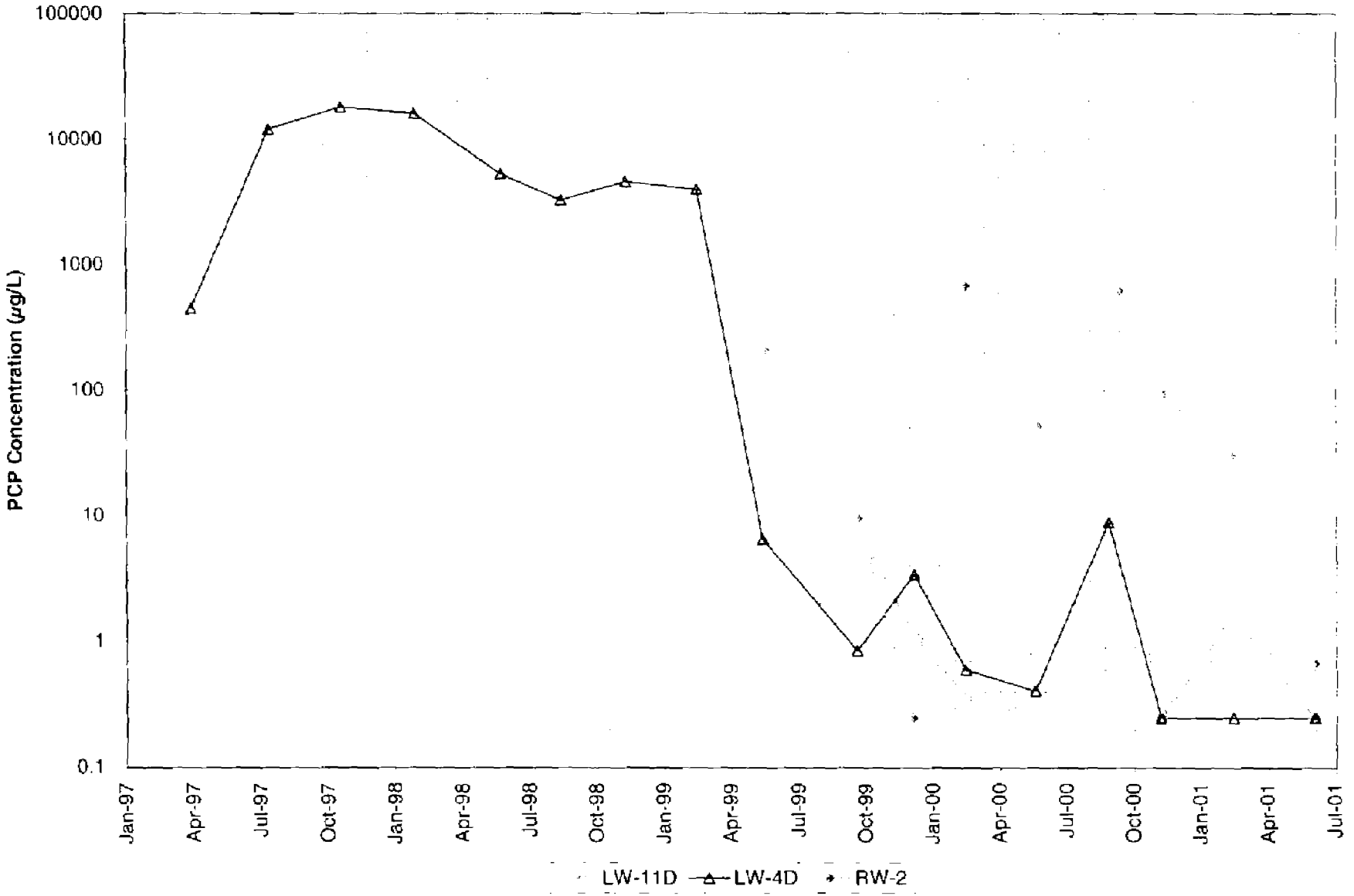

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Selected Lower Zone Wells April 1997 – June 2001**	Figure 6

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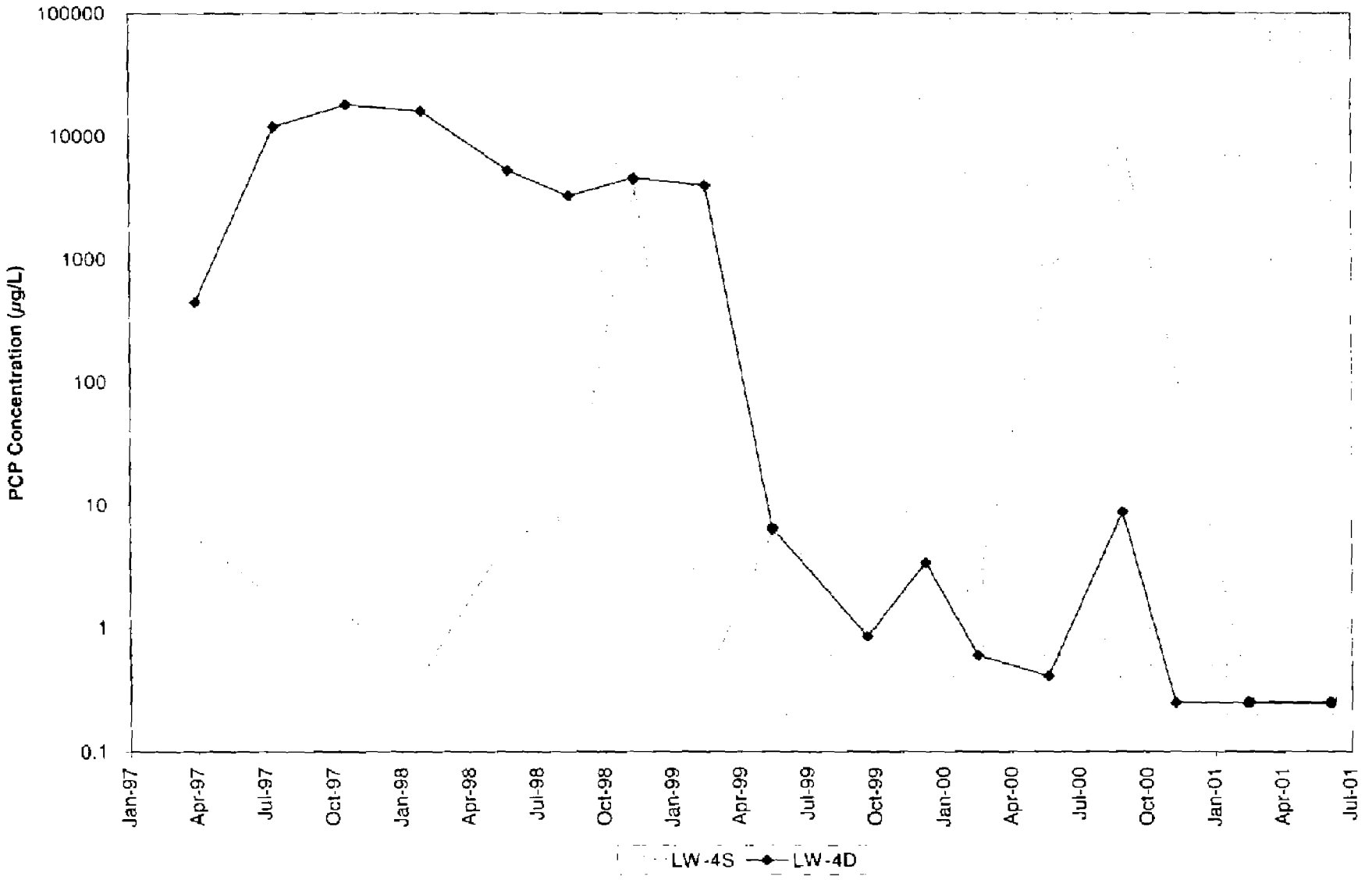

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Wells LW-4S and LW-4D April 1997 – June 2001**	Figure **7**

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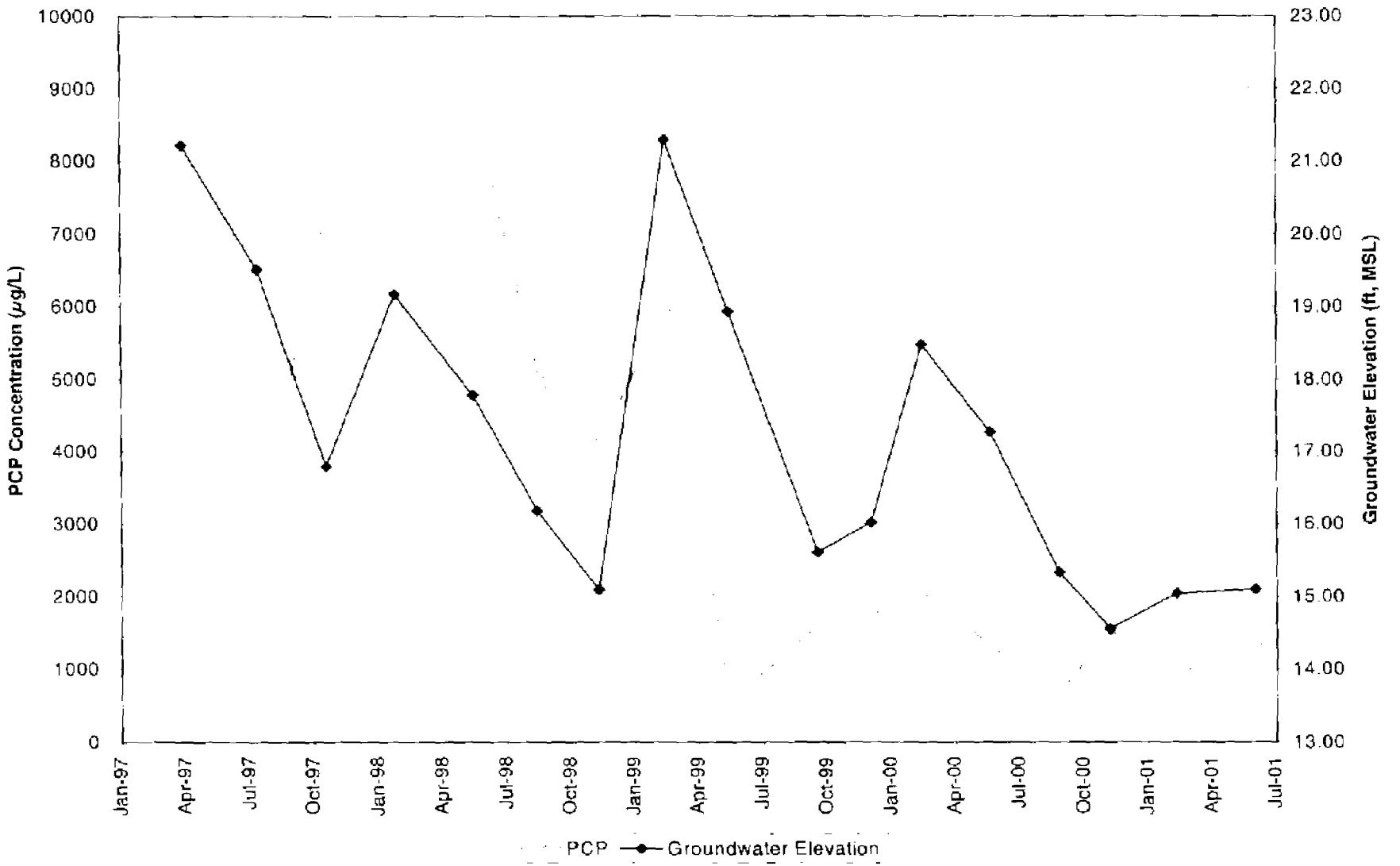

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-2S April 1997 – June 2001**	Figure 8

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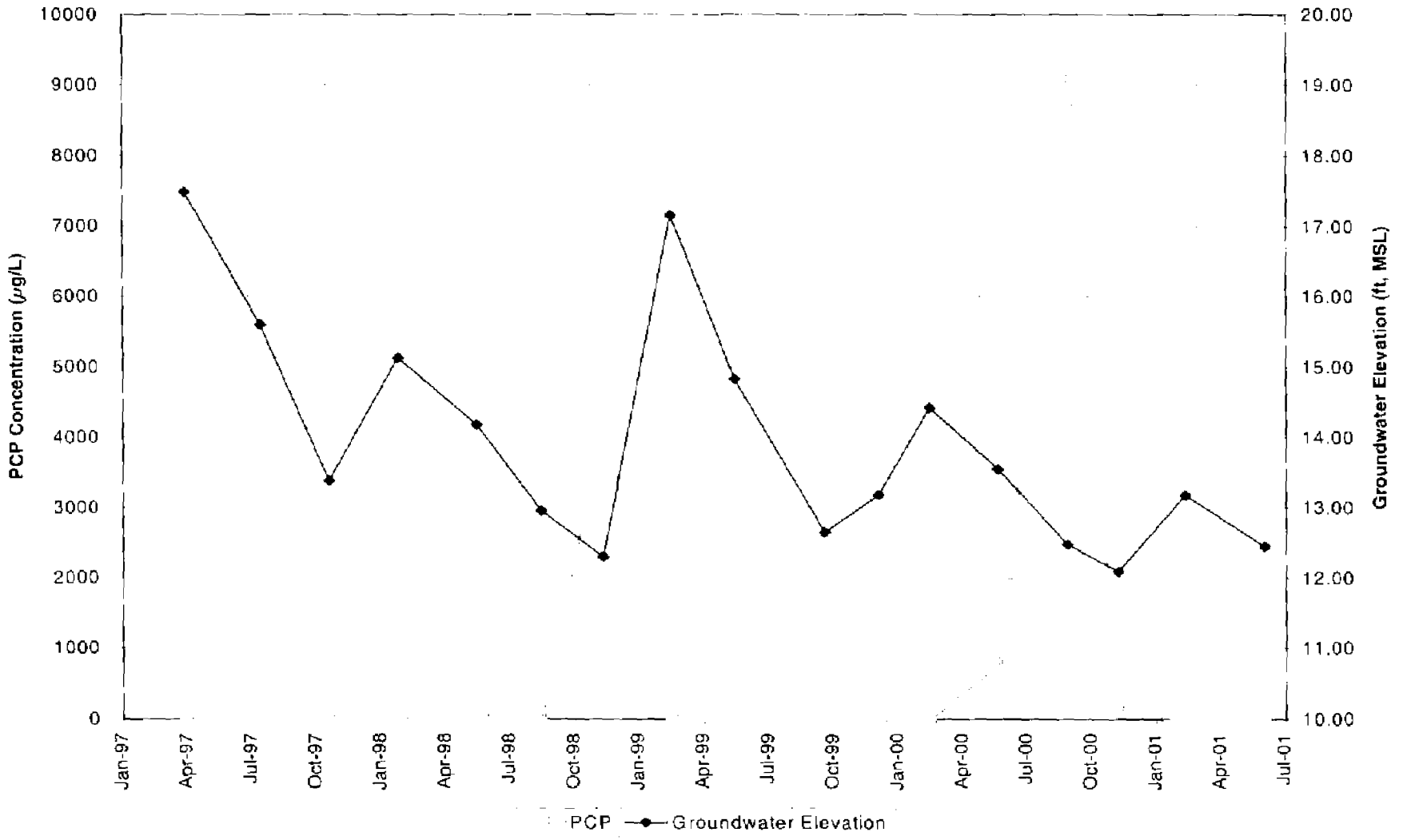

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-4S April 1997 – June 2001**	Figure 9

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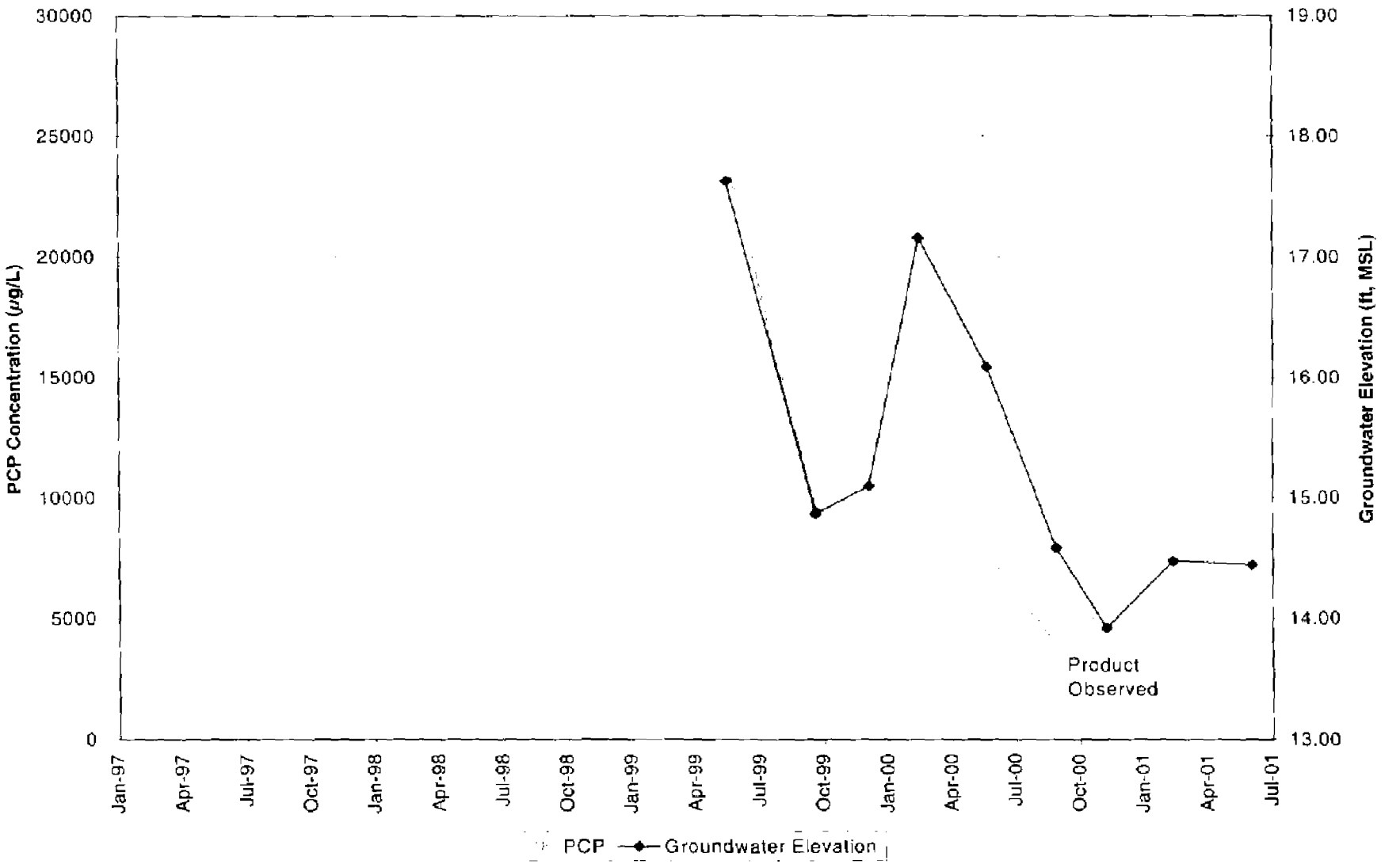

Landau Associates	Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elevations, LW-11S April 1997 – June 2001**

Figure
10

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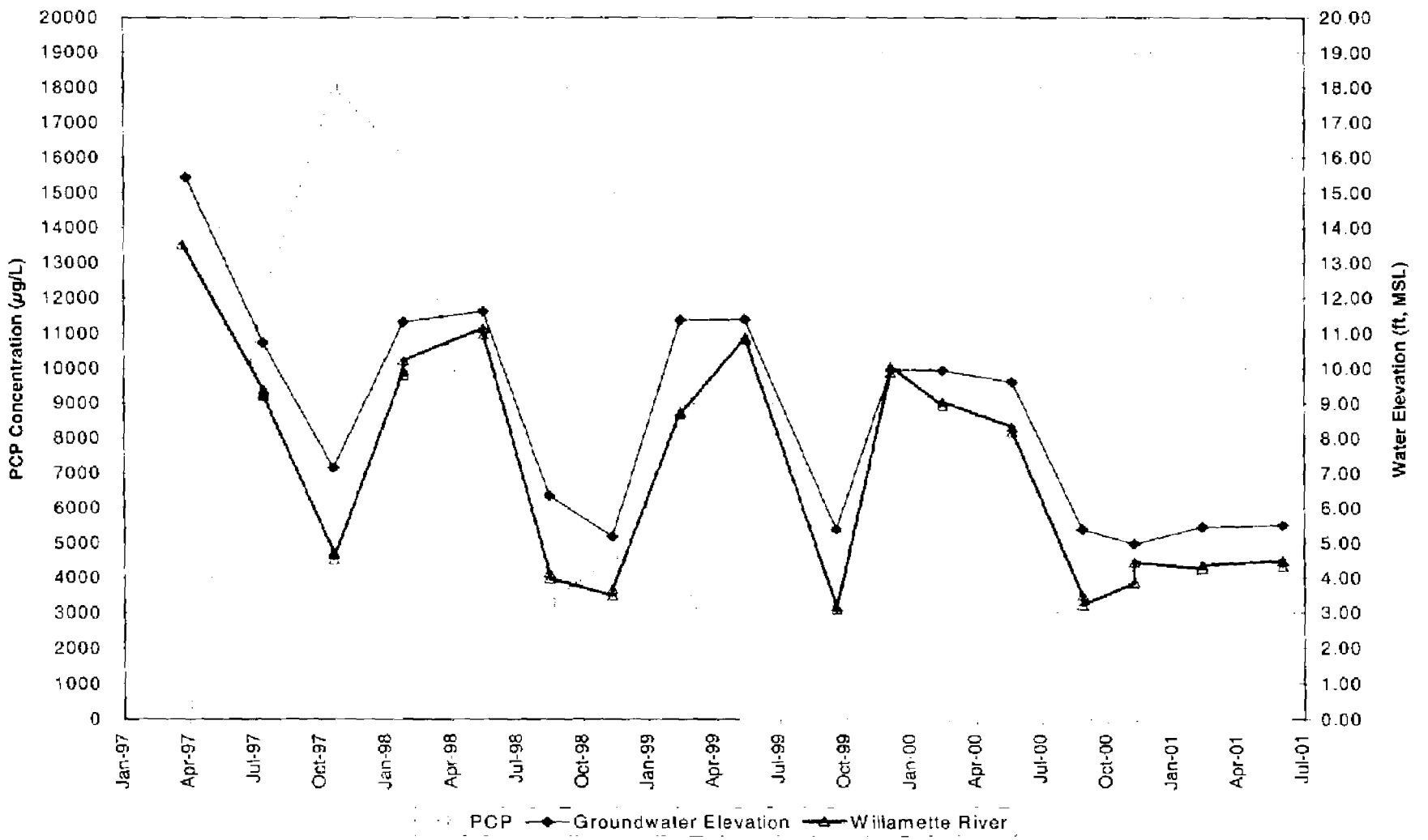

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations, Groundwater Elevations, and River Stage, LW-4D April 1997 – June 2001**	Figure **11**

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APPENDICES

APPENDIX A

Groundwater Level Measurements and Quality Data

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
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	---	
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	---	
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	---	
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	---	---	
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	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	—	
F*	08/18/98	08:10	NA	14.77	NA		
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	—	—	
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	-	—	
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	-	
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	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
J1	08/17/98	11:00	29.70	13.78	15.92	---	
J1	11/13/98	10:30	29.70	11.77	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	14.56	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	---	
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	---	
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	16:07	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		
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	15.33	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

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
N	05/18/99	14:47	31.40	15.79	15.04	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	—	No product
N	08/16/01	10:29	31.40	18.08	13.32	—	Trace product
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	15.33	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	—	No product
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	-	No product
Q	08/16/01	10:26	30.36	17.15	13.21	—	Trace product
LW1S	03/31/97	11:12	27.96	6.65	21.31	-	
LW1S	07/16/97	08:15	27.96	8.34	19.62	--	
LW1S	10/21/97	16:53	27.96	11.02	16.94	—	
LW1S	01/27/98	13:00	27.96	8.75	19.21	—	
LW1S	05/18/98	17:40	27.96	9.15	18.81	—	
LW1S	08/17/98	10:54	27.96	11.67	16.29	—	
LW1S	11/13/98	10:02	27.96	12.76	15.20	--	
LW1S	02/16/99	13:24	27.96	6.60	21.36	-	
LW1S	05/18/99	15:38	27.96	8.92	19.04	—	
LW1S	09/21/99	12:10	27.96	12.20	15.76	—	
LW1S	12/06/99	14:33	27.96	11.86	16.10	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW1S	02/16/00	10:50	27.96	9.42	18.54	----	
LW1S	05/23/00	17:18	27.96	10.52	17.44	----	
LW1S	08/29/00	13:58	27.96	12.51	15.45	--	
LW1S	11/09/00	13:17	27.96	13.26	14.70	--	
LW1S	02/12/01	15:33	27.96	12.82	15.14	----	
LW1S	06/04/01	12:24	27.96	12.77	15.19	----	
LW1S	08/16/01	11:37	27.96	13.45	14.51	----	
LW2S	03/25/97	12:22	29.56	8.06	21.50	----	
LW2S	03/31/97	11:27	29.56	8.34	21.22	----	
LW2S	07/16/97	08:33	29.56	10.05	19.51	----	
LW2S	10/21/97	17:04	29.56	12.77	16.79	-	
LW2S	01/27/98	13:25	29.56	10.39	19.17		
LW2S	05/18/98	18:02	29.56	11.78	17.78	----	
LW2S	08/17/98	10:56	29.56	13.38	16.18	----	
LW2S	11/13/98	10:32	29.56	14.47	15.09	----	
LW2S	02/16/99	13:42	29.56	8.27	21.29	----	
LW2S	05/18/99	15:45	29.56	10.63	18.93	-	
LW2S	09/21/99	12:34	29.56	13.95	15.61	----	
LW2S	12/06/99	15:11	29.56	13.54	16.02	----	
LW2S	02/16/00	10:38	29.56	11.08	18.48	----	
LW2S	05/23/00	17:24	29.56	12.29	17.27	----	
LW2S	08/29/00	14:12	29.56	14.23	15.33	----	
LW2S	11/09/00	13:04	29.56	15.00	14.56	--	
LW2S	02/12/01	15:30	29.56	14.52	15.04	----	
LW2S	06/04/01	12:34	29.56	14.46	15.10	----	
LW2S	08/16/01	11:45	29.56	15.16	14.40	----	
LW4S	03/31/97	09:20	30.26	12.77	17.49	----	
LW4S	07/16/97	07:40	30.26	14.66	15.60	----	
LW4S	10/21/97	16:25	30.26	16.88	13.38	----	
LW4S	01/27/98	12:00	30.26	15.13	15.13	--	
LW4S	05/18/98	17:32	30.26	16.08	14.18	----	
LW4S	08/17/98	11:07	30.26	17.30	12.96	----	
LW4S	11/13/98	09:56	30.26	17.96	12.30	----	
LW4S	02/16/99	13:16	30.26	13.10	17.16	----	
LW4S	05/18/99	15:03	30.26	15.43	14.83	---	
LW4S	09/21/99	11:44	30.26	17.61	12.65	- -	
LW4S	12/06/99	14:19	30.26	17.08	13.18	----	
LW4S	02/16/00	10:31	30.26	15.84	14.42	----	
LW4S	05/23/00	16:55	30.26	16.71	13.55	----	
LW4S	08/29/00	13:39	30.26	17.78	12.48	----	
LW4S	11/09/00	12:53	30.26	18.17	12.09	--	
LW4S	02/12/01	16:38	30.26	17.08	13.18	----	
LW4S	06/04/01	12:08	30.26	17.81	12.45	----	
LW4S	08/16/01	11:14	30.26	18.39	11.87	----	
LW5S	03/25/97	12:29	30.79	10.57	20.22	----	
LW5S	03/31/97	11:35	30.79	10.84	19.95	----	
LW5S	07/16/97	08:53	30.79	12.29	18.50	--	
LW5S	10/21/97	15:16	30.79	15.00	15.79	-	
LW5S	01/27/98	13:36	30.79	12.90	17.89	----	
LW5S	05/18/98	18:05	30.79	14.19	16.60	----	
LW5S	08/17/98	11:09	30.79	15.54	15.25	----	
LW5S	11/13/98	10:38	30.79	16.55	14.24	----	
LW5S	02/16/99	13:16	30.79	10.59	20.20	--	
LW5S	05/18/99	16:01	30.79	13.12	17.67	--	
LW5S	09/21/99	12:40	30.79	16.00	14.79	----	
LW5S	12/06/99	14:47	30.79	15.64	15.15	----	
LW5S	02/16/00	09:56	30.79	13.54	17.25	----	
LW5S	05/23/00	17:51	30.79	14.80	15.99	----	
LW5S	08/29/00	14:37	30.79	16.35	14.44	----	
LW5S	11/09/00	13:45	30.79	16.98	13.81	-	
LW5S	02/12/01	15:13	30.79	16.51	14.28	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW5S	06/04/01	13:23	30.79	16.43	14.36	---	
LW5S	08/16/01	12:07	30.79	17.03	13.76	---	
LW7S	03/31/97	11:05	28.10	6.75	21.35	---	
LW7S	07/16/97	08:05	28.10	8.62	19.48	---	
LW7S	10/21/97	16:45	28.10	11.26	16.84	---	
LW7S	01/27/98	12:47	28.10	8.85	19.25	---	
LW7S	05/18/98	17:48	28.10	10.34	17.76	---	
LW7S	08/17/98	10:48	28.10	11.85	16.25	---	
LW7S	11/13/98	10:12	28.10	12.90	15.20	--	Strong gasoline odor
LW7S	02/16/99	13:53	28.10	6.81	21.29	---	
LW7S	05/18/99	15:23	28.10	9.14	18.96	---	
LW7S	09/21/99	12:03	28.10	12.37	15.73	---	
LW7S	12/06/99	14:27	28.10	12.00	16.10	---	
LW7S	02/16/00	10:46	28.10	9.60	18.50	---	
LW7S	05/23/00	17:09	28.10	10.70	17.40	---	
LW7S	08/29/00	13:53	28.10	12.64	15.46	---	
LW7S	11/09/00	13:14	28.10	13.36	14.74	---	
LW7S	02/12/01	15:39	28.10	12.94	15.16	---	
LW7S	06/04/01	12:17	28.10	12.87	15.23	---	
LW7S	08/16/01	11:33	28.10	13.58	14.52	---	
LW8S	05/18/99	14:55	31.28	14.84	16.44	---	
LW8S	09/21/99	12:24	31.28	16.94	14.34	---	
LW8S	12/06/99	14:40	31.28	16.63	14.65	---	
LW8S	02/16/00	10:16	31.28	15.18	16.10	---	
LW8S	05/23/00	17:42	31.28	15.88	15.40	---	
LW8S	08/29/00	14:26	31.28	17.06	14.22	---	
LW8S	11/09/00	13:32	31.28	17.55	13.73	---	
LW8S	02/12/01	15:58	31.28	17.24	14.04	---	
LW8S	06/04/01	13:05	31.28	17.14	14.14	---	
LW8S	08/16/01	12:00	31.28	17.70	13.58	---	
LW9S	05/18/99	14:57	31.04	19.58	11.46	---	Water level appears to be more representative of lower zone
LW9S	09/21/99	11:36	31.04	dry	---	---	
LW9S	12/06/99	14:13	31.04	19.64	---	---	Water in endcap
LW9S	02/16/00	10:24	31.04	19.59	---	---	Water in endcap
LW9S	05/23/00	16:39	31.04	dry	---	---	
LW9S	08/29/00	13:28	31.04	dry	---	---	
LW9S	11/09/00	12:42	31.04	dry	---	---	
LW9S	02/12/01	16:12	31.04	dry	---	---	
LW9S	06/04/01	11:50	31.04	dry	---	---	
LW9S	08/16/01	11:01	31.04	dry	---	---	
LW10S	05/18/99	14:59	30.75	17.24	13.51	---	
LW10S	09/21/99	11:38	30.75	19.13	11.62	---	
LW10S	12/06/99	14:14	30.75	18.54	12.21	---	
LW10S	02/16/00	10:26	30.75	17.62	13.13	---	
LW10S	05/23/00	16:41	30.75	18.25	12.50	---	
LW10S	08/29/00	13:30	30.75	dry	---	---	
LW10S	11/09/00	12:45	30.75	dry	---	---	
LW10S	02/12/01	16:14	30.75	dry	---	---	
LW10S	06/04/01	11:53	30.75	dry	---	---	
LW10S	08/16/01	11:03	30.75	dry	---	---	
LW11S	05/18/99	15:10	29.10	11.47	17.63	---	
LW11S	09/21/99	11:51	29.10	14.23	14.87	---	
LW11S	12/06/99	15:05	29.10	14.00	15.10	---	
LW11S	02/16/00	11:01	29.10	11.94	17.16	---	
LW11S	05/23/00	11:01	29.10	13.01	16.09	---	
LW11S	08/29/00	14:55	29.10	14.51	14.59	---	
LW11S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well
LW11S	02/12/01	15:18	29.10	14.62	14.48	---	No product
LW11S	06/04/01	13:12	29.10	14.65	14.45	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW11S	08/16/01	11 24	29 10	15 46	13 86	0 28	
LW13S	05/23/00	16 51	30 17	17 23	12 94	----	
LW13S	08/29/00	13 37	30 17	18 27	11 90	----	
LW13S	11/09/00	12 51	30 17	18 75	11 42	----	
LW13S	02/12/01	16 30	30 17	18 26	11 91	----	
LW13S	06/04/01	12 06	30.17	18 30	11 87	----	
LW13S	08/16/01	11 13	30 17	18.81	11 36	----	
LW101S	03/31/97	09 54	29 41	4 51	24 90	----	
LW101S	07/16/97	09 01	29 41	6 91	22 50	----	
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	---	
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	--	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW103S	08/16/01	12:23	29.07	9.07	20.00	- -	
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	—	
LW104S	06/04/01	13:30	26.57	6.64	19.93	—	
LW104S	08/16/01	12:15	26.57	7.56	19.01	—	
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
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	—	
PZ-1	05/23/00	17:47	28.04	14.21	13.83	—	
PZ-1	08/29/00	14:30	28.04	15.33	12.71	—	
PZ-1	11/09/00	12:55	28.04	15.68	12.36	—	
PZ-1	02/12/01	16:42	28.04	15.30	12.74	—	
PZ-1	06/04/01	13:20	28.04	15.29	12.75	—	
PZ-1	08/16/01	11:17	28.04	15.94	12.10	—	
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	- -	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	09/21/00	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	----	
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	---	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	—	
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	—	
O	03/25/97	11:40	32.03	17.01	15.02	—	
O	03/31/97	08:40	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	—	No product
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	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
LW1D	03/31/97	11:11	28.31	12.71	15.60	---	
LW1D	07/16/97	08:12	28.31	17.65	10.66	---	
LW1D	10/21/97	16:55	28.31	21.29	7.02	---	
LW1D	01/27/98	13:07	28.31	17.06	11.25	---	
LW1D	05/18/98	17:39	28.31	16.53	11.78	---	
LW1D	08/17/98	10:30	28.31	21.82	6.49	---	
LW1D	11/13/98	10:01	28.31	22.77	5.54	---	
LW1D	02/16/99	13:21	28.31	17.30	11.01	---	
LW1D	05/18/99	15:36	28.31	16.76	11.55	---	
LW1D	09/21/99	12:12	28.31	22.91	5.40	---	
LW1D	12/06/99	14:34	28.31	18.00	10.31	---	
LW1D	02/16/00	10:49	28.31	18.16	10.15	---	
LW1D	05/23/00	17:19	28.31	18.62	9.69	---	
LW1D	08/29/00	13:59	28.31	22.81	5.50	---	
LW1D	11/09/00	13:20	28.31	22.98	5.33	---	
LW1D	02/12/01	15:35	28.31	22.23	6.08	---	
LW1D	06/04/01	12:23	28.31	22.36	5.95	---	
LW1D	08/16/01	11:38	28.31	23.73	4.58	---	
LW3D	03/31/97	11:45	30.80	19.38	11.42	---	Time estimated
LW3D	07/16/97	08:38	30.80	28.09	2.71	--	
LW3D	10/21/97	17:07	30.80	23.36	7.44	-	
LW3D	01/27/98	13:30	30.80	21.66	9.14	---	
LW3D	05/18/98	17:35	30.80	19.21	11.59	---	
LW3D	08/17/98	10:24	30.80	24.62	6.18	---	
LW3D	11/13/98	09:03	30.80	25.56	5.24	---	
LW3D	02/16/99	13:44	30.80	20.00	10.80	---	
LW3D	05/18/99	15:58	30.80	19.42	11.38	---	Purged dry at 11:00
LW3D	09/21/99	10:40	30.80	25.76	5.04	---	
LW3D	12/06/99	14:45	30.80	20.69	10.11	---	
LW3D	02/16/00	09:54	30.80	20.98	9.82	---	
LW3D	05/23/00	14:40	30.80	21.16	9.64	---	Purged dry at 13:10
LW3D	08/29/00	14:36	30.80	----	----	----	Well purged dry 8/28, sampled a m. on 8/29
LW3D	11/09/00		30.80	----	----	----	Well sampled 11/8/00 - water level not representative
LW3D	02/12/01	15:11	30.80	24.85	5.95	---	
LW3D	06/04/01	12:35	30.80	25.09	5.71	---	
LW3D	08/16/01	11:47	30.80	26.43	4.37	---	
LW4D	03/31/97	09:18	30.17	14.73	15.44	---	
LW4D	07/16/97	07:42	30.17	19.43	10.74		
LW4D	10/21/97	16:27	30.17	23.02	7.15	---	
LW4D	01/27/98	11:56	30.17	18.84	11.33	---	
LW4D	05/18/98	17:33	30.17	18.54	11.63	---	
LW4D	08/17/98	10:18	30.17	23.81	6.36	---	
LW4D	11/13/98	09:57	30.17	24.99	5.18	---	
LW4D	02/16/99	13:17	30.17	18.79	11.38	-	
LW4D	05/18/99	15:04	30.17	18.77	11.40	---	Completed sampling at 13:40
LW4D	09/21/99	11:41	30.17	24.78	5.39	---	
LW4D	12/06/99	14:18	30.17	20.21	9.96	---	
LW4D	02/16/00	10:30	30.17	20.23	9.94	---	
LW4D	05/23/00	16:54	30.17	20.55	9.62	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW4D	08/29/00	13:38	30.17	24.78	5.39	---	
LW4D	11/09/00	12:52	30.17	25.19	4.98	---	
LW4D	02/12/01	16:39	30.17	24.71	5.46	--	
LW4D	06/04/01	12:07	30.17	24.66	5.51	-	
LW4D	08/16/01	11:15	30.17	26.27	3.90	---	
LW6D	03/25/97	11:52	30.84	16.51	14.33	-	
LW6D	03/31/97	09:05	30.84	15.53	15.31	-	Faint odor
LW6D	07/16/97	07:30	30.84	20.74	10.10	---	
LW6D	10/21/97	16:16	30.84	24.05	6.79	---	
LW6D	01/27/98	11:38	30.84	19.94	10.90	---	
LW6D	05/18/98	17:28	30.84	19.36	11.48	---	
LW6D	08/17/98	10:05	30.84	24.92	5.92	---	
LW6D	11/13/98	09:50	30.84	25.94	4.90	---	
LW6D	02/16/99	13:11	30.84	20.40	10.44	---	
LW6D	05/18/99	14:53	30.84	19.81	11.03	---	
LW6D	09/21/99	11:32	30.84	25.92	4.92	---	
LW6D	12/06/99	14:09	30.84	20.86	9.98	---	
LW6D	02/16/00	10:20	30.84	21.27	9.57	---	
LW6D	05/23/00	16:35	30.84	21.64	9.20	---	
LW6D	08/29/00	13:20	30.84	25.93	4.91	---	
LW6D	11/09/00	12:35	30.84	26.21	4.63	---	
LW6D	02/12/01	16:03	30.84	25.37	5.47	---	
LW6D	06/04/01	11:42	30.84	25.30	5.54	---	
LW6D	08/16/01	10:54	30.84	26.72	4.12	---	
LW9D	05/18/99	14:56	30.98	20.02	10.96	---	
LW9D	09/21/99	11:34	30.98	25.23	5.75	---	
LW9D	12/06/99	14:11	30.98	21.04	9.94	---	
LW9D	02/16/00	10:23	30.98	21.17	9.81	---	
LW9D	05/23/00	16:39	30.98	21.15	9.83	---	
LW9D	08/29/00	13:27	30.98	25.36	5.62	---	
LW9D	11/09/00	12:43	30.98	25.96	5.02	---	
LW9D	02/12/01	16:11	30.98	25.13	5.85	---	
LW9D	06/04/01	11:49	30.98	25.15	5.83	---	
LW9D	08/16/01	11:02	30.98	26.57	4.41	---	
LW10D	05/18/99	15:00	31.12	19.82	11.30	--	
LW10D	09/21/99	11:37	31.12	25.81	5.31		
LW10D	12/06/99	14:15	31.12	21.18	9.94	---	
LW10D	02/16/00	10:27	31.12	21.20	9.92	---	
LW10D	05/23/00	16:42	31.12	21.51	9.61	---	
LW10D	08/29/00	13:29	31.12	25.86	5.26	---	
LW10D	11/09/00	12:46	31.12	26.26	4.86	---	
LW10D	02/12/01	16:15	31.12	25.63	5.49	--	
LW10D	06/04/01	11:52	31.12	25.62	5.50	---	
LW10D	08/16/01	11:04	31.12	27.16	3.96	---	
LW11D	05/18/99	15:09	29.04	18.59	10.45	---	
LW11D	09/21/99	11:50	29.04	20.76	8.28	---	
LW11D	12/06/99	15:06	29.04	21.81	7.23	---	
LW11D	02/16/00	11:02	29.04	20.35	8.69	---	
LW11D	05/23/00	17:37	29.04	19.50	9.54		
LW11D	08/29/00	14:54	29.04	---	---	-	Well purged dry 8/28, sampled a m. on 8/29
LW11D	11/09/00		29.04	---	---	---	Well sampled 11/8/00 - water level not representative
LW11D	02/12/01	15:16	29.04	23.14	5.90	---	
LW11D	06/04/01	13:11	29.04	23.35	5.69	---	
LW11D	08/16/01	11:25	29.04	26.94	2.10	---	
LW12D1	05/18/99	15:13	30.02	18.45	11.57	---	
LW12D1	09/21/99	11:54	30.02	24.44	5.58	---	
LW12D1	12/06/99	14:21	30.02	19.72	10.30	---	
LW12D1	02/16/00	10:35	30.02	19.89	10.13	-	
LW12D1	05/23/00	17:00	30.02	20.23	9.79	--	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW12D1	08/29/00	13:45	30.02	24.38	5.64	--	
LW12D1	11/09/00	13:00	30.02	24.66	5.36	----	
LW12D1	02/12/01	15:57	30.02	23.92	6.10	----	
LW12D1	06/04/01	12:32	30.02	23.99	6.03	----	
LW12D1	08/16/01	11:42	30.02	25.39	4.63	----	
LW12D2	05/18/99	15:14	29.24	18.23	11.01	----	
LW12D2	09/21/99	11:53	29.24	24.69	4.55	----	
LW12D2	12/06/99	14:22	29.24	19.40	9.84	--	
LW12D2	02/16/00	10:36	29.24	19.90	9.34	--	
LW12D2	05/23/00	16:59	29.24	20.38	8.86	----	
LW12D2	08/29/00	13:44	29.24	24.68	4.56	----	
LW12D2	11/09/00	13:01	29.24	24.56	4.68	----	
LW12D2	02/12/01	15:56	29.24	23.88	5.36	----	
LW12D2	06/04/01	12:31	29.24	24.10	5.14	-	
LW12D2	08/16/01	11:43	29.24	25.43	3.81	----	
LW14D	05/23/00	16:50	30.54	21.26	9.28	--	
LW14D	08/29/00	13:35	30.54	25.68	4.86	----	
LW14D	11/09/00	12:49	30.54	25.90	4.64	----	
LW14D	02/12/01	16:20	30.54	25.33	5.21	----	
LW14D	06/04/01	12:00	30.54	25.37	5.17	----	
LW14D	08/16/01	11:08	30.54	27.00	3.54	----	
LW15D	05/23/00	16:49	30.85	21.26	9.59	----	
LW15D	08/29/00	13:34	30.85	25.54	5.31	----	
LW15D	11/09/00	12:48	30.85	25.98	4.87	----	
LW15D	02/12/01	16:18	30.85	25.43	5.42	----	
LW15D	06/04/01	11:59	30.85	25.41	5.44	----	
LW15D	08/16/01	11:07	30.85	27.05	3.80	----	
LW16D	05/23/00	16:48	28.4	18.79	9.61	----	
LW16D	08/29/00	13:32	28.4	23.07	5.33	----	
LW16D	11/09/00	12:47	28.4	23.59	4.81	----	
LW16D	02/12/01	16:17	28.4	22.94	5.46	----	
LW16D	06/04/01	11:57	28.4	23.00	5.40	----	
LW16D	08/16/01	11:05	28.4	24.43	3.97	----	
LW17D	08/29/00	13:21	27.82	22.96	4.86	----	
LW17D	11/09/00	12:36	27.82	23.17	4.65	----	
LW17D	02/12/01	16:04	27.82	22.44	5.38	----	
LW17D	06/04/01	11:44	27.82	22.42	5.40	----	
LW17D	08/16/01	10:55	27.82	23.80	4.02	----	
LW18D	08/29/00	13:25	27.82	22.79	5.03	----	
LW18D	11/09/00	12:40	27.82	22.91	4.91	----	
LW18D	02/12/01	16:10	27.82	22.56	5.26	----	
LW18D	06/04/01	11:47	27.82	22.28	5.54	----	
LW18D	08/16/01	11:00	27.82	23.81	4.01	----	
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	----	
							Groundwater interim action pumping began 10/5/00 in the lower zone at this well. Pump not running at time of measurement
RW2	11/09/00	12:50	30.68	25.83	4.85	-	
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
River Gauge	08/11/93	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	01/16/95	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
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	-	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	05/04/01	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	---	

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-Talone 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]

TABLE A-2
SUMMARY OF ANALYSES
TIME OIL NORTHWEST TERMINAL

Well	Semivolatiles (8270)	Volatiles (8260)	PCP (8270 S'M)	TPH-D	TPH-D (extended)	TPH-G	PP Metals (6010/7000)	TDS	Chloride	QA/QC Samples
B1	X	X	X		X	X	X	X	X	
B2	X	X	X				X	X	X	
D	X	X	X				X	X	X	ms/msd
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								
LW1S	X	X	X				X	X	X	
LW1D	X	X	X				X	X	X	ms/msd
LW2S	X	X	X	X			X	X	X	
LW3D	X	X	X				X	X	X	
LW4S	X	X	X	X			X	X	X	
LW4D	X	X	X	X			X	X	X	
LW6D	X	X	X	X			X	X	X	
LW7S	X	X	X	X			X	X	X	
LW8S	X	X	X		X	X	X	X	X	
LW9S	X	X	X	X			X	X	X	
LW9D	X	X	X	X			X	X	X	
LW10S	X	X	X	X			X	X	X	
LW10D	X	X	X	X			X	X	X	
LW11S	X	X	X		X	X	X	X	X	
LW11D	X	X	X	X			X	X	X	
LW12D1	X	X	X	X			X	X	X	
LW12D2	X	X	X				X	X	X	
LW13S			X							
LW14D			X							
LW17D			X							
LW18D			X							
RW1	X	X	X		X	X	X	X	X	duplicate
RW2	X	X	X		X	X	X	X	X	duplicate

BZTO104(e)015941

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							SHALLOW WELLS					
Sample Identification	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
CHLORINATED PHENOLS (µg/L)													
EPA Method 8270 SIM													
Pentachlorophenol	0.25 U	0.25 U	0.36	NA	0.25 U	NA	0.25 U	0.25 U	0.25 U	NA	4.4	NA	NA
SEMIVOLATILES (µg/L)													
EPA Method SW8270													
Phenol	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.6	NA	12	12
Bis-(2-Chloroethyl) Ether	100 UJ	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	NA	2.0 U	2.0 U
2-Chlorophenol	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 J	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	50 UJ	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	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	50 UJ	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	NA	1.0 U	1.0 U
Benzyl Alcohol	250 UJ	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	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	50 UJ	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	NA	1.0 U	1.0 U
2-Methylphenol	50 UJ	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	NA	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	50 UJ	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	NA	1.0 U	1.0 U
4-Methylphenol	130 J	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.7	1.0 U	1.0 U	2.3	NA	1.7	1.8
N-Nitroso-Di-N-Propylamine	100 UJ	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	NA	2.0 U	2.0 U
Hexachloroethane	100 UJ	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	NA	2.0 U	2.0 U
Nitrobenzene	50 UJ	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	NA	1.0 U	1.0 U
Isophorone	50 UJ	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	NA	1.0 U	1.0 U
2-Nitrophenol	250 UJ	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	NA	5.0 U	5.0 U
2,4-Dimethylphenol	150 UJ	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.1	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U
Benzoic Acid	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	50 UJ	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	NA	1.0 U	1.0 U
2,4-Dichlorophenol	150 UJ	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	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	50 UJ	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	NA	1.0 U	1.0 U
Naphthalene	50 UJ	1.0 J	1.3	NA	1.0 U	21	19	2.0	22	3.1	NA	9.3	9.8
4-Chloroaniline	150 UJ	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	NA	3.0 U	3.0 U
Hexachlorobutadiene	100 UJ	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	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	100 UJ	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	NA	2.0 U	2.0 U
2-Methylnaphthalene	50 UJ	1.0 U	1.5	NA	1.0 U	1.0 U	9.5	1.0 U	14	2.0	NA	3.7	4.0
Hexachlorocyclopentadiene	250 UJ	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	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	250 UJ	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	NA	5.0 U	5.0 U
2,4,5-Trichlorophenol	250 UJ	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	NA	13	13
2-Chloronaphthalene	50 UJ	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	NA	1.0 U	1.0 U
2-Nitroaniline	250 UJ	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	NA	5.0 U	5.0 U
Dimethylphthalate	50 UJ	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	NA	1.0 U	1.0 U
Acenaphthylene	50 UJ	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	NA	1.0 U	1.0 U
3-Nitroaniline	300 UJ	6.0 U	6.0 U	NA	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	50 UJ	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	NA	1.0 U	1.0 U
2,4-Dinitrophenol	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U
4-Nitrophenol	250 UJ	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	NA	5.0 U	5.0 U
Dibenzofuran	50 UJ	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	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	250 UJ	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	NA	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								SHALLOW WELLS				
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification	DE68L	DE68G	DE68I	DE68C	DE68F	DE68C	DE87J	DE68A	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
2,4-Dinitrotoluene	250 UJ	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	NA	5.0 U	5.0 U
Diethylphthalate	50 UJ	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	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	50 UJ	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	NA	1.0 U	1.0 U
Fluorene	50 UJ	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	NA	1.0 U	1.0 U
4-Nitroaniline	250 UJ	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	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U
N-Nitrosodiphenylamine	50 UJ	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	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	50 UJ	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	NA	1.0 U	1.0 U
Hexachlorobenzene	50 UJ	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	NA	1.0 U	1.0 U
Pentachlorophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	1300	5.0 U	5.0 U	5.0 U	560	NA	1900	2000
Phenanthrene	50 UJ	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	NA	1.0 U	1.0 U
Carbazole	50 UJ	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	NA	1.0 U	1.0 U
Anthracene	50 UJ	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	NA	1.0 U	1.0 U
Di-n-Butylphthalate	50 UJ	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	NA	4.0	1.0 U
Fluoranthene	50 UJ	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	NA	1.0 U	1.0 U
Pyrene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	NA	1.0 UJ	1.0 UJ
Butylbenzylphthalate	50 UJ	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	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	250 UJ	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	NA	5.0 U	5.0 U
Benzo(a)anthracene	50 UJ	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	NA	1.0 U	1.0 U
Bis(2-Ethylhexyl)phthalate	50 UJ	1.0 U	25	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.5	1.0 U	NA	1.0 U	1.0 U
Chrysene	50 UJ	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	NA	1.0 U	1.0 U
Di-n-Octylphthalate	50 UJ	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	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	50 UJ	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	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	50 UJ	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	NA	1.0 U	1.0 U
Benzo(a)pyrene	50 UJ	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	NA	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	50 UJ	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	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	50 UJ	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	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	50 UJ	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	NA	1.0 U	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								SHALLOW WELLS				
Sample Identification	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A	DE68N	DE68M	DE87F	DE87C	DE87M
Date Collected	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
VOLATILES (µg/L)													
EPA Method SW8260													
Chloromethane	20 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	NA	1.0 U	1.0 U
Bromomethane	20 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	NA	1.0 U	1.0 U
Vinyl Chloride	20 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	NA	1.0 U	1.0 U
Chloroethane	20 U	1.0 U	1.0 J	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 J	NA	1.0 U	1.0 U
Methylene Chloride	40 U	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	NA	2.0 U	2.0 U
Acetone	1100	5.0 U	12 U	NA	5.0 U	33	5.0 U	5.0 U	5.0 U	17	NA	13	13
Carbon Disulfide	20 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	NA	1.0 U	1.0 U
1,1-Dichloroethene	20 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	NA	1.0 U	1.0 U
1,1-Dichloroethane	20 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	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	20 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	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	20 U	1.0 J	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 J	1.0 U	1.0 J	NA	1.0 U	1.0 U
Chloroform	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 J	1.0 U	1.9	1.0 U	1.0 U	NA	1.0 U	1.0 J
1,2-Dichloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 J	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Butanone	100 J	5.0 U	5.0 U	NA	5.0 U	34 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	3.7	6.4
1,1,1-Trichloroethane	20 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	NA	1.0 U	1.0 U
Carbon Tetrachloride	20 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	NA	1.0 U	1.0 U
Vinyl Acetate	100 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	NA	5.0 U	5.0 U
Bromodichloromethane	20 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	NA	1.0 U	1.0 U
1,2-Dichloropropane	20 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	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	20 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	NA	1.0 U	1.0 U
Trichloroethene	20 U	1.0 J	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 J	NA	1.0 U	1.0 U
Dibromochloromethane	20 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	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	20 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	NA	1.0 U	1.0 U
Benzene	560	1.0 U	1.0 U	NA	1.0 U	1.0 U	80	1.0 U	9.0	1.7	NA	3.4	3.4
trans-1,3-Dichloropropene	20 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	NA	1.0 U	1.0 U
Bromoform	20 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	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	100 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	NA	5.0 U	5.0 U
2-Hexanone	100 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	NA	5.0 U	5.0 U
Tetrachloroethene	20 U	1.0 J	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 J	1.0 U	1.0 J	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	20 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	NA	1.0 U	1.0 U
Toluene	3400	1.0 U	1.0 U	NA	1.0 U	1.1	41	1.0 U	1.0 U	5.3	NA	14	15
Chlorobenzene	20 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	NA	1.0 U	1.0 U
Ethylbenzene	220	1.0 U	1.2	NA	1.0 J	26	190	4.6	51	33	NA	71	72
Styrene	20 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	NA	1.0 U	1.0 U
Trichlorofluoromethane	20 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	NA	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	40 U	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	NA	2.0 U	2.0 U
m,p-Xylene	830	1.0 J	1.0 U	NA	1.0 U	36	600	5.4	17	57	NA	140	140
o-Xylene	370	1.0 U	1.0 U	NA	1.0 U	87	240	1.0 U	1.0 U	50	NA	100	100
1,2-Dichlorobenzene	20 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	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	20 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	NA	1.0 U	1.0 U

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								SHALLOW WELLS				
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S	LW13S	RW1	Dup of RW-1 W
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
1,4-Dichlorobenzene	20 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	NA	1.0 U	1.0 U
Acrolein	1000 U	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U	50 U	NA	50 U	50 U
Methyl Iodide	20 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	NA	1.0 U	1.0 U
Bromoethane	40 U	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	NA	2.0 U	2.0 U
Acrylonitrile	100 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	NA	5.0 U	5.0 U
1,1-Dichloropropene	20 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	NA	1.0 U	1.0 U
Dibromomethane	20 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	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	20 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	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	100 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	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	60 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	NA	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	100 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	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	37	1.0 U	1.0 U	NA	1.0 U	94	130	1.0 U	15	32	NA	37	38
1,2,4-Trimethylbenzene	160	1.0 U	1.0 U	NA	1.0 U	490	350	1.0 U	23	120	NA	160	160
Hexachlorobutadiene	100 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	NA	5.0 U	5.0 U
Ethylene Dibromide	20 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	NA	1.0 U	1.0 U
Bromochloromethane	20 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	NA	1.0 U	1.0 U
2,2-Dichloropropane	20 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	NA	1.0 U	1.0 U
1,3-Dichloropropane	20 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	NA	1.0 U	1.0 U
Isopropylbenzene	20 U	1.0 U	4.7	NA	1.0 U	32	62	1.3	130	12	NA	28	28
n-Propylbenzene	33	1.0 U	8.3	NA	1.0 U	67	79	1.3	110	21	NA	34	36
Bromobenzene	20 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	NA	1.0 U	1.0 U
2-Chlorotoluene	20 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	NA	1.0 U	1.0 U
4-Chlorotoluene	20 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	NA	1.0 U	1.0 U
tert-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	6.0	1.3 M	NA	1.0 U	1.0 U
sec-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	30	1.0 U	1.0 U	16	7.3	NA	7.7	7.8
4-Isopropyltoluene	20 U	1.0 U	1.0 U	NA	1.0 U	25	9.9	1.0 U	1.0 U	6.6	NA	4.1	4.2
n-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	21	10 J	1.0 U	6.0 U	7.6 U	NA	6.0 U	6.2 U
1,2,4-Trichlorobenzene	100 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	NA	5.0 U	5.0 U
Naphthalene	100 U	5.0 U	5.0 U	NA	5.0 U	60	43	5.0 U	35	11	NA	25	28
1,2,3-Trichlorobenzene	100 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	NA	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								SHALLOW WELLS				
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)													
Method OR-DEQ													
TPH-Diesel Range	47	NA	NA	NA	NA	9.4	7.9	20	4.4	1.7	NA	4.9	4.5
TPH-Motor Oil Range	5.0 U	NA	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U	NA	0.50 U	0.50 U
TPH-Gasoline Range	35	NA	NA	NA	NA	NA	NA	NA	4.7	2.9	NA	5.4	5.3
PRIORITY POLLUTANT													
METALS (mg/L)													
Arsenic (7060)	0.010	0.016	0.011	0.001 U	0.009	0.018	0.008	0.016	0.024	0.007	NA	0.007	0.007
Chromium (6010)	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.05 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	0.002 U	0.002	0.002 U	0.002 U	0.002 U	NA	0.002 U	0.002 U
Lead (7421)	0.002	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	NA	0.001 U	0.001 U
Nickel (6010)	0.12	0.01 U	0.01 U	0.02	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)	0.054	0.006 U	0.006 U	0.006	0.006 U	0.005 U	0.006 U	0.009	0.007	0.006 U	NA	0.006 U	0.005 U
CONVENTIONALS													
Calcium (mg/L)	88.1	43.4	20.5	65.3	28.4	42.2	149	37.4	31.1	28.6	NA	36.1	37.3
Magnesium (mg/L)	40.8	14.9	7.38	16.0	10.6	10.1	48.2	13.4	8.18	9.34	NA	11.9	12.2
Potassium (mg/L)	5.1	2.2	2.4	6.9	2.4	3.4	5.9	3.1	2.8	2.7	NA	2.8	3.4
Sodium (mg/L)	13.3	7.64	6.15	11.2	7.87	5.23	9.35	15.6	8.47	6.10	NA	6.01	5.59
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	1400	240	160	NA	180	300	720 J	250	250	190	NA	220 J	220 J
Chloride (mg/L) (EPA 325.2)	2.8	2.4	2.6	NA	3.1	38	5.3	3.3	2.8	3.2	NA	4.7	5.1
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 354.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS													
pH (avg)	4.70	6.65	6.64	6.22	6.75	6.33	6.80	6.70	6.49	6.50	6.54	6.62	6.61
Temperature (° C) (avg)	14.0	14.4	13.6	13.6	14.6	12.7	14.2	14.1	14.4	14.1	12.8	14.4	14.4
Conductivity (mS/cm) (avg)	1883	344	226	531	250	427	1400	419	402	270	336	377	377
Dissolved oxygen (mg/L) (avg)	1.42	1.29	1.51	1.80	1.99	1.32	0.00	1.37	1.58	0.96	2.52	0.97	0.94
Turbidity (NTU)	42	7	6	8	4	93	6	8	25	65	0	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									DEEP WELLS
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68F	DE87K	DE87G	DE87H
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/5/01	6/4/01	6/5/01	6/6/01	6/5/01	6/5/01
CHLORINATED PHENOLS (µg/L)										
EPA Method 8270 SIM										
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	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	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	2.0 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	1.0 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	1.0 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	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	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	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	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	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	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	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	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	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	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	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	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	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	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	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	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	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.6	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	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	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	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	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	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	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	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	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	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

								DEEP WELLS	
Sample Identification:	LW10D	LW11C	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87C	DE87F	DE87O
Date Collected:	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01	6/6/01	6/6/01
CHLORINATED PHENOLS (µg/L)									
EPA Method 8270 SIM									
Pentachlorophenol	0.25 U	0.25 U	0.25 U	1.7	0.25 U	0.25 U	0.25 U	0.25 J	0.68
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0	2.0
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	NA	NA	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U

BZTO104(e)015948

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									DEEP WELLS
Sample Identification	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G	DE87H
Date Collected	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01	6/5/01
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	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	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	1.0 U
Fluorene	1.0 U	1.0 U	1.6	1.0 J	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	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 J	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 J	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	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	1.0 U
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
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	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	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	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	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	1.0 U
Pyrene	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
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	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	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	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 J	1.0 U	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 J	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl 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
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	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 J	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	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	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	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	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

							DEEP WELLS		
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	DE87I	DE68B	DE67M	DE87R	DE87E	DE87C	DE87D	DE87P	DE87O
Date Collected:	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01	6/6/01	6/6/01
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pyrene	1.0 UJ	1.0 U	1.0 UJ	1.0 UJ	NA	NA	NA	1.0 UJ	1.0 UJ
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Octylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	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	NA	NA	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									DEEP WELLS
Sample Identification	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification	DE88K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G	DE87H
Date Collected	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01	6/5/01
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	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	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	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	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	2.0 U
Acetone	5.0 U	5.0 U	8.7	5.0 U	5.0 U	5.0 U	23	22	5.0 U	6.1
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
1,1-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	1.0 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	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	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	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	1.0 U
1,2-D 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	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	6.2	5.0 U	5.0 U	14	5.0 U	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	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	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	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	1.0 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	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	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	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	1.0 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	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	3.1	1.0 U	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	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	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	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	5.0 U
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	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	1.0 U
Toluene	1.0 U	1.0 U	16	2.9	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	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	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	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	1.0 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	2.0 U
m,p-Xylene	1.0 U	1.0 U	19	4.1	1.0 U	1.0 U	1.0 U	1.4	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	1.0 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	1.0 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	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

Sample Identification	LW10D	LW11C	LW12D1	LW12D2	LW14D	LW17D	LW18D	DEEP WELLS RW2	Dup of RW2 X
Laboratory Identification:	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D	DE87P	DE87O
Date Collected:	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01	6/6/01	6/6/01
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Acetone	5.0 U	35	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									DEEP WELLS
Sample Identification:	B2	J2	O	R	GIA	LW1D	LW3D	LW4D	LW5D	LW9D
Laboratory Identification:	DE68K	DE68J	DE67A	DE67B	DE67L	DE68E	DE68H	DE67K	DE67G	DE67H
Date Collected	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01	6/5/01
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	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-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	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-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	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	5.0 U	5.0 U	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	3.0 U	3.0 U	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	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	14	11	1.0 U	1.0 U	1.0 U	13	1.0 U	1.0 U
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	84	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	5.0 U	5.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	37	26	150	1.0 U	1.0 U	31	10	1.0 U
n-Propylbenzene	1.0 U	1.0 U	22	9.1	140	1.0 U	1.0 U	39	1.1	1.0 U
Bromobenzene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	4.5	1.0 U	1.0 U	1.7	3.4	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	5.7	4.7	20	1.0 U	1.0 U	7.4	4.7	1.0 U
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.3	1.0 U	1.0 U
n-Butylbenzene	1.0 U	1.0 U	2.2	1.4 U	14 U	1.0 U	1.0 U	6.2	1.3 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	5.0 U	5.0 U	5.0 U	5.0 U
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
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

								DEEP WELLS	
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D	DE87P	DE87O
Date Collected:	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01	6/6/01	6/6/01
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U	NA	NA	NA	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	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	NA	NA	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	3.4	1.9	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,2,4-Trimethylbenzene	1.0 U	5.7	13	1.0 U	NA	NA	NA	3.6	3.5
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	1.6	1.0 U	NA	NA	NA	11	11
n-Propylbenzene	1.0 U	1.2	2.0	1.0 U	NA	NA	NA	12	12
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	1.2	1.3	1.0 U	NA	NA	NA	1.6	1.7
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
n-Butylbenzene	1.0 U	1.5	1.0 U	1.0 U	NA	NA	NA	1.2 U	1.2 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									DEEP WELLS
Sample Identification	B2	C2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G	DE87H
Date Collected	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01	6/5/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)										
Method OR-DEQ										
TPH-Diesel Range	NA	NA	NA	NA	2.3	NA	NA	3.5	1.4	0.25
TPH-Motor Oil Range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT										
METALS (mg/L)										
Arsenic (7060)	0.005	0.010	NA	NA	0.036	0.005	0.016	0.028	0.017	0.033
Chromium (6010)	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	NA	NA	0.003	0.002 U	0.002 U	0.003	0.003	0.009
Lead (7421)	0.001 U	0.001 U	NA	NA	0.001	0.001 U	0.001 U	0.001 U	0.002	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	0.01 U
Zinc (6010)	0.009	0.006 U	NA	NA	0.009	0.006 U	0.006 U	0.011	0.008	0.012
CONVENTIONALS										
Calcium (mg/L)	46.0	57.1	NA	NA	60.3	53.9	62.1	74.5	44.2	37.0
Magnesium (mg/L)	23.8	33.2	NA	NA	20.2	33.0	28.4	31.0	18.4	13.2
Potassium (mg/L)	3.4	2.1	NA	NA	3.4	1.3	3.5	1.4	3.2	1.9
Sodium (mg/L)	12.1	15.2	NA	NA	12.1	12.9	13.4	14.5	11.5	5.47
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	260	370	NA	NA	340 J	360	370	460 J	240 J	210 J
Chloride (mg/L) (EPA 325.2)	3.2	4.2	NA	NA	8.2	3.2	6.2	7.8	2.2	2.1
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS										
pH (avg)	6.80	6.72	6.43	6.88	6.83	6.96	6.56	6.91	6.56	6.81
Temperature (° C) (avg)	14.0	13.7	14.5	14.5	14.4	15.6	13.6	14.7	14.1	14.3
Conductivity (mS/cm) (avg)	611	619	510	694	651	484	655	778	428	330
Dissolved oxygen (mg/L) (avg)	1.59	1.12	2.40	1.49	1.84	1.99	0.92	0.48	2.06	1.87
Turbidity (NTU)	10	5	39	191	0	26	33	24	23	41

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

								DEEP WELLS	
Sample Identification	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D	DE87P	DE87O
Date Collected:	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01	6/6/01	6/6/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	0.25 U	1.0	0.77	NA	NA	NA	NA	0.86	0.88
TPH-Motor Oil Range	NA	NA	NA	NA	NA	NA	NA	0.50 U	0.50 U
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	0.60	0.65
PRIORITY POLLUTANT									
METALS (mg/L)									
Arsenic (7060)	0.023	0.007	0.020	0.022	NA	NA	NA	0.017	0.016
Chromium (6010)	0.008	0.005 U	0.012	0.005 U	NA	NA	NA	0.005 U	0.005 U
Copper (6010)	0.009	0.002	0.015	0.002 U	NA	NA	NA	0.003	0.002 U
Lead (7421)	0.003	0.002	0.013	0.001 U	NA	NA	NA	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.01 U	NA	NA	NA	0.01 U	0.01 U
Zinc (6010)	0.018	0.018	0.029	0.006 U	NA	NA	NA	0.058 J	0.189 J
CONVENTIONALS									
Calcium (mg/L)	20.4	61.5	60.5	38.3	NA	NA	NA	36.5	40.7
Magnesium (mg/L)	10.3	31.0	29.5	17.3	NA	NA	NA	17.2	19.1
Potassium (mg/L)	1.2	1.9	1.8	2.4	NA	NA	NA	3.1	3.0
Sodium (mg/L)	9.80	16.6	12.3	17.6	NA	NA	NA	12.6	13.6
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	150 J	370	340 J	280 J	NA	NA	NA	300 J	290 J
Chloride (mg/L) (EPA 325.2)	1.9	6.8	3.7	3.2	NA	NA	NA	7.7	7.4
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS									
pH (avg)	6.86	6.75	7.15	6.89	6.65	6.53	6.38	6.66	6.65
Temperature (° C) (avg)	13.7	13.3	14.0	13.9	13.5	14.0	14.7	13.6	13.6
Conductivity (mS/cm) (avg)	228	493	461	473	371	488	486	573	573
Dissolved oxygen (mg/L) (avg)	2.70	1.45	2.10	0.50	1.17	2.27	0.69	0.83	0.82
Turbidity (NTU)	15	30	198	0	999	27	53	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-5
KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS FOR TABLES A-3 AND A-4

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.

APPENDIX B

Data Validation Report

TABLE 1
SUMMARY OF DATA QUALIFIERS
2nd QUARTER 2001 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES DE68 and DE87

Data Package No.	Analyte	Qualifier	Sample Number	Reason
DE68	All SVOCs	J, detects UJ, nondetects	B1	Holding time exceeded by 2 days
DE87	All SVOCs	DNR	O re-extract, R re-extract, LW6D re-extract, LW9D re-extract, LW10D re-extract, LW4S re-extract, LW4D re-extract, G1A re-extract, LW12D1 re-extract, W re-extract, X re-extract, RW1 re-extract, RW2 re-extract, LW12D2 re-extract	Holding time exceeded by 2 to 3 days; report results from initial analysis
DE87	Pyrene	J, detects UJ, nondetect	O, R, LW6D, LW9D, LW10D, LW4S, LW4D, G1A, LW12D1, W, X, RW1, RW2, LW12D2	Low recovery in LCS
DE87	Pentachlorophenol (Method 8270 SIM)	DNR	LW17D re-extract, LW18D re-extract, LW14D re-extract, LW6D re-extract, LW9D re-extract, LW10D re-extract, LW4S re-extract, LW4D re-extract, G1A re-extract, LW12D1 re-extract, X re-extract, RW2 re-extract, LW12D2 re-extract, LW13S re-extract	Holding time exceeded by 2 to 3 days; Report results from initial analysis.
DE87	Total Dissolved Solids	J, detects	G1A, LW4S, LW4D, LW6D, LW9D, LW10D, LW12D1, LW12D2, RW1, RW2, W, X	Holding time exceeded by 3 to 4 days
DE87	Zinc	J, detects	RW2, X	Low precision in field duplicate

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.
DNR = Do not report
LCS = Laboratory control sample

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Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Rebekah Brooks, Project Manager, Landau Associates

cc: Tom Roick, Oregon Department of Environmental Quality (DEQ)
Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tiskuk, Beazer East, Inc.

FROM: Denise Nieman and Stacy Pischer, Landau Associates

DATE: July 26, 2001

RE: SECOND QUARTER 2001 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 collected at the Time Oil Northwest Terminal between June 4 and June 6, 2001 for the Phase II remedial investigation (RI) second quarter 2001 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 [VOC; U.S. Environmental Protection Agency (EPA) method 8260]; pentachlorophenol [EPA method 8270 with selected ion monitoring (SIM)]; semivolatile compounds (SVOC; EPA method 8270); 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 DE68 and DE87. 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 U.S. Environmental Protection Agency (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
- Blank results (laboratory, method, and field)
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates (MS/MSD) (including laboratory control samples)

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- Duplicate analyses (field and laboratory)
- Quantitation limits
- Conclusions 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.

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 exceptions.

- For the analyses of SVOCs reported in data package DE68, sample B1 was extracted 2 days outside of the specified holding time of 7 days. Because of this holding time exceedance, the SVOC results for this sample were qualified as estimates (J/UJ), as indicated in Table 1.

- For the analyses of SVOCs reported in data package DE87, all samples were re-extracted 2 to 3 days outside of the specified holding time of 7 days. Because of this holding time exceedance, it is recommended that the re-extract results not be reported and instead the results from the initial analysis be used. Additional discussion regarding this determination is provided throughout this memorandum.

- For the PCP analyses reported in data package DE87, all samples were re-extracted 2 to 3 days outside of the specified holding time of 7 days. Because of this holding time exceedance, it is recommended that the re-extract results not be reported and instead the results from the initial analysis be used. Additional discussion regarding this determination is provided later in this memorandum.

- The laboratory data reports included in data package DE68 indicate that the analysis of TDS occurred on 6/12/01, which is 1 day past the method recommended holding time of 7 days. However, the case narrative indicates that the TDS analysis of these samples began on 6/11/01 and completed on 6/12/01. Because the TDS analyses of these samples began within the holding time, no qualifiers were added to the data.

- For the analysis of TDS reported in data package DE87, all samples were analyzed 3 to 4 days outside of the specified holding time of 7 days. The results were qualified as estimated (J) based on the holding time exceedance (see Table 1).

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SURROGATE SPIKE RECOVERIES

All of the surrogate recoveries were within the project-specified control limits with the following exceptions:

- All surrogates were diluted out during reanalysis of diluted samples LW-2S, LW-11S, W re-extract, and RW-1 re-extract for SVOCs. Because recoveries during the initial (nondiluted) analysis of these samples were within the laboratory and/or project-specified control limits, no data were qualified.

- Recoveries for all eight surrogates, spiked in the laboratory control samples (LCS) duplicate associated with the initial SVOC analyses reported in data package DE87, were less than the laboratory lower control limits specified for each individual surrogate. No qualifiers were assigned to the data due to these low surrogate recoveries because all eight surrogates spiked into the parent LCS and into each individual project sample were within the laboratory control limits, which indicates that the analytical problems were isolated to the LCS duplicate sample and not the entire batch of samples. This is further supported by the fact that SVOC results for the initial analysis of the project samples were consistent with results obtained during a re-extract and reanalysis of the project samples.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

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 chloride analyses. For all analyses, each MS/MSD was performed using a project sample. Recoveries and relative percent difference (RPDs) for the MS/MSDs were within the project-specified control limits with the following exceptions.

- For the VOC analyses associated with data package DE68, recoveries for the spiking compound, toluene, in the MS/MSD samples were below the project-specified control limits. However, because the recoveries are within current laboratory control limits, no qualifiers were assigned to the data.

- For the SVOC analyses associated with data package DE68, recoveries of the spiking compounds, pyrene and 4-nitrophenol, in the MS/MSD samples analyzed on 6/12/01 and 6/13/01, respectively, were slightly less than the project-specified control limits. However, because the recoveries are within current laboratory control limits, no qualifiers were assigned to the data.

LABORATORY DUPLICATE

At least one laboratory duplicate sample was analyzed for TDS and chloride. All RPDs were within the laboratory and project-specified control limits. No qualification of the data was necessary.

LABORATORY CONTROL SAMPLE RESULTS

At least one LCS/blank spike was analyzed with each batch of samples (except for the total dissolved solids and chloride analyses). LCS duplicates were performed with the OTPH-G analyses associated with data package DE68 and the SVOC analyses associated with data package DE87. Recoveries of each spiked compound in the LCS were within the current laboratory control limits with the following exceptions:

- Recoveries of several spiked compounds in the LCS duplicate associated with the initial SVOC analyses of the project samples included in data package DE87 were less than the lower laboratory control limits, indicating a potential low bias. However, the low bias appears to be isolated to the LCS duplicate because recoveries of all the spiked compounds, except pyrene, in the parent LCS were within the current laboratory control limits. No qualifiers were assigned to the data due to these low recoveries in the LCS duplicate.

- Recovery of pyrene spiked into the parent LCS associated with the initial SVOC analyses of the project samples included in data package DE87 was less than the lower laboratory control limits. Recovery of this compound in the associated LCS duplicate was within current laboratory control limits; however, due to the analytical problems associated with the LCS duplicate, all pyrene results for the associated project samples were qualified as estimates (J detects, UJ nondetects) as indicated in Table 1.

The RPDs between the LCS duplicate results for the OTPH-G analyses met the laboratory criteria of 30 percent or less. No qualification of the data was necessary. The RPDs between the LCS duplicate results for the SVOC analyses did not meet the laboratory criteria; however, as previously mentioned, the analytical problems appear to be isolated to the LCS duplicate, therefore, the quality of the project sample data does not appear to be jeopardized and no qualifiers were assigned.

METHOD BLANKS

Method blanks were analyzed with each batch of samples. No contamination was detected in the method blanks, with the following exceptions:

- Methylene chloride was detected in the method blank(s) associated with the VOC analyses reported in data packages DE68 and DE87. Methylene chloride was not detected in any of the associated samples; therefore, the project sample data was not qualified.

FIELD BLANKS

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 with each shipment of samples. No VOCs were detected in the trip blanks that were submitted for analysis. No trip blanks were analyzed for gasoline-range hydrocarbons; therefore, potential contamination of the samples due to sources outside of the laboratory could not be evaluated.

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FIELD DUPLICATE RESULTS

Four blind field duplicate water samples (RW-1/W and RW-2/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 all four duplicate sample pairs submitted for analysis were within the project-specified control limits with the following exceptions

- The RPD for the 2-methylnaphthalene re-extract results for samples RW-1 and W included in data package DE87 exceeded the project-specified control limit of 20 percent; however, due to holding time exceedances associated with the re-extract results and other factors previously discussed, it has been recommended that the SVOC results for the re-extract of these samples not be reported and that the results from the initial analysis be used instead.

- Zinc results for samples RW-2 and X in data package DE87 were qualified as estimated (J) based on low precision demonstrated by a high RPD between the sample and sample duplicate results (see Table 1).

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples except for the following:

- The reporting limits for pentachlorophenol (analyzed using EPA method 8270) were higher than the project-specified quantitation limit (5.0 vs. 1.0 ppb); however, for any sample that contained nondetect concentrations using EPA method 8270, the selected ion monitoring (SIM) analysis method was used to lower the reporting limit to the project-specified quantitation limit of 0.25 ppb. Samples LW-2S and LW-11S included in data package DE68 were analyzed for pentachlorophenol only by EPA method 8270; because of detected concentrations in the samples, therefore, the reporting limits for pentachlorophenol for these two samples exceed the project-specified quantitation limits.

- The reporting limit for acrolein (50 ppb) in all samples was above the project-specified quantitation limits of 1-10 ppb. This is the current laboratory quantitation limit for acrolein; therefore, no corrective action was taken.

- The reporting limits for VOCs for samples LW-4S and LW-2S were about two to five times higher, respectively, than project-specified quantitation limits due to dilution requirements. In addition, the reporting limits for VOCs for sample B1 were also elevated due to dilution requirements.

- The reporting limits for n-butylbenzene in samples R, LW6D, LW4S, G1A, W, X, RW2, and RW- 1 were raised due to background interference.

- The reporting limits for the motor oil range (500 ppb) in the TPH-D extended analysis were twice the project-specified quantitation limits of 250 ppb with the exception of sample B1, which was 20 times higher than the project-specified quantitation limits. The current laboratory quantitation limit for the motor oil range is 500 ppb; therefore, no corrective action

was taken on samples with reporting limits of 500 ppb. The reporting limit for sample B1 was raised due to dilution of the extract.

- The reporting limits for calcium, magnesium, potassium, and sodium were above the project-specified quantitation limits. Because these analytes were detected in all associated project samples, no corrective action was taken.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory, field, and matrix spike 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.

Other factors that may affect the use of the data include the following:

- As previously mentioned, all of the project samples included in data package DE87 were initially analyzed for SVOCs within the recommended holding times of 7 days. However, due to low recoveries of spiked compounds and surrogates in the LCS duplicate associated with these analyses, the project samples were re-extracted and re-analyzed. The re-extraction occurred 2 to 3 days past the recommended holding time. Because the analytical problems during the initial analysis appear to be isolated to the LCS duplicate and because the re-extractions for the reanalysis occurred beyond the holding time and SVOCs could have been lost due to volatilization, it is recommended that the results for the initial analysis be reported and qualifiers added as recommended in this memorandum.

- The initial analysis of project samples included in data package DE87 for PCP using EPA method 8270 SIM occurred within the recommended holding times of 7 days. However, due to low recoveries of spiked compounds in the LCS associated with these analyses, the project samples were re-extracted and re-analyzed. The re-extraction occurred 2 to 3 days past the recommended holding time. Because results for PCP during the initial analyses are generally slightly higher than the results from the reanalyses, it is recommended that the results from the initial analyses be reported. No qualifiers were added to the data because, although the recoveries for the LCS were low, the recoveries were within the laboratory control limits.

The completeness for this set of data is 100 percent, which exceeds the project specified goal of 90 percent.

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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.

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Landau Associates
Environmental and Geotechnical Services

REC'D OCT 17 2001

TRANSMITTAL

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

Date: October 16, 2001

Attn: Mr. Kevin Murphy

Project No.: 231001.151

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Draft, Soil Stockpile Removal Action Plan, Time Oil Northwest Terminal, Portland, Oregon (10/16/01)

Message:

Please find enclosed 1 copy of the above-referenced document for your review and comment. Appendices will be included with final document. Please call me if you have any questions.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
10/10/01 S:\WPROC\231\TRANSMIT.FAX\murphy et al trn.doc

Enclosure

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

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Draft

Soil Stockpile Removal Action Plan
Time Oil Northwest Terminal
Portland, Oregon

October 16, 2001

Prepared for

Time Oil Co.
2737 Commodore Way
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1.0 INTRODUCTION

This Phase I Removal Action Plan (RAP) provides details on the methods to be utilized to complete the removal action for the soil stockpile present at the Time Oil Northwest Terminal (terminal) in Portland, Oregon. The removal action, as recommended in a feasibility study (FS; Landau Associates 2001a), includes the loading of soil stockpile materials into dump trucks and transporting the material to a treatment/disposal facility located in Richmond, British Columbia, Canada. The FS was submitted to the Oregon Department of Environmental Quality (DEQ) on September 4, 2001. In a letter dated September 25, 2001 (DEQ 2001), DEQ approved the FS and approved completion of the proposed stockpile disposal as a removal action as defined by Oregon Revised Statistics (ORS) 465.2000 (24). The removal action is scheduled to commence following the receipt of final approval from Environment Canada and from the United States Environmental Protection Agency (EPA) to dispose of the material at the recommended facility. The removal action will be completed under the provisions of a voluntary cleanup program (VCP) agreement between DEQ and Time Oil Co.(Time Oil) (DEQ No. WMCVC-NWR-96-07).

The remainder of this introductory section of the RAP provides information on the project background, a description on the material to be addressed by removal action, and a summary of the analytical results of soil samples collected from the soil stockpile in May 2001.

1.1 PROJECT BACKGROUND

The terminal is a bulk petroleum storage and transfer facility currently owned and operated 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 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). 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.

Since 1943, the terminal has been operated by Time Oil as the Northwest Terminal petroleum products facility. Since operations began, the terminal has been used for the receipt, storage, and distribution of petroleum and petroleum-related products. From 1967 to 1984, pentachlorophenol (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

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area; 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.

Time Oil is currently implementing closure procedures for the Northwest Terminal. The terminal is anticipated to be closed in October 2001.

1.2 SOIL STOCKPILE BACKGROUND AND DESCRIPTION

Releases of PCP, carriers, additives, and PCP formulations to soil in the former PCP mixing area appear to have 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 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. The excavated soil was stockpiled onsite in a bermed and lined area. The stockpile was then covered to minimize dust generation and contact with precipitation. The excavated area was backfilled to the present ground surface elevation with clean fill.

Resource Conservation and Recovery Act (RCRA) land disposal restrictions in effect at the time of excavation prevented offsite disposal of PCP-contaminated soil without treatment. Therefore, 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, the management of the stockpile was upgraded by Time Oil 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 the Phase II remedial investigation (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.

The stockpile is currently lined, covered, and surrounded by a concrete wall or earth berm (Figure 4). Based on volume calculations conducted for the soil characterization and biotreatability assessment in May 2001 (Landau Associates 2001a), the soil stockpile has been volumetrically reduced (from about

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3,600 yd^3 to about 2,400 yd^3), likely due to compaction from construction equipment use on the stockpile and longer-term settlement since original construction. The total mass of the stockpile has not changed. For purposes of completing the removal action described herein, the mass of the soil stockpile is assumed to be 4,000 tons. Soil samples collected from the stockpile in May 2001 indicated that the material present in the soil stockpile is predominantly fine- to medium-grained sand, with traces of silt and gravel.

1.3 SUMMARY OF STOCKPILE ANALYTICAL RESULTS

Soil samples were collected from 18 locations in the soil stockpile in May 2001 to determine the current concentrations of several constituents of potential concern (COPC) and constituents of potential environmental concern (CPEC). [Other earlier stockpile investigations are described in the Phase I FS (Landau Associates 2001a)]. Each of the eighteen soil samples (and one duplicate soil sample) was analyzed for semivolatile organic compounds (SVOCs) using EPA method 8270C. Six composite samples were prepared from the 18 sample locations and the composite samples were analyzed for metals (EPA method 6010B/7000 Series) and dioxin/furan compounds (EPA method 8290). The laboratory analytical results are summarized in the following three sections. Detailed information regarding the sample collection and analysis completed for the May 2001 sampling event is provided in the Phase I FS (Landau Associates 2001a).

1.3.1 SEMIVOLATILE ORGANIC COMPOUNDS

Benzo(a)pyrene and PCP were identified as COPC and CPEC in the soil stockpile (Landau Associates 1999). The analytical data from the May 2001 soil samples indicated that PCP was detected in each of the 18 grid sample locations. PCP concentrations ranged from 3.7 milligrams per kilogram (mg/kg) to 570 mg/kg. Benzo(a)pyrene concentrations ranged from non-detectable to 1.5 mg/kg. Using the 95 percent upper confidence limit (95% UCL) on the arithmetic mean calculation, the soil stockpile concentrations of PCP and benzo(a)pyrene were reported to be 110 mg/kg and 0.39 mg/kg, respectively. The 95% UCL is considered by United States and some Canadian soil disposal facilities to be a representative concentration for the total volume of the stockpile.

1.3.1 METALS

The metals cadmium, silver, lead, and selenium were also identified as CPEC in the soil stockpile (Landau Associates 1999). The analytical results from the May 2001 soil sampling event indicated the presence of cadmium, lead, and silver in the composite samples collected. Selenium was not detected in

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the samples collected in May 2001. Based on the 95% UCL calculation, the representative concentrations of metals identified as CPEC, that are contained in the soil stockpile, were reported to be as follows:

Metal	95% UCL (mg/kg)
Cadmium	0.5
Lead	38.9
Silver	0.6

1.3.2 DIOXIN/FURAN COMPOUNDS

Chemical compounds designated as dioxins and furans were previously classified as COPC and CPEC for the soil stockpile (Landau Associates 1999). Laboratory analytical results from the six composite soil samples collected in May 2001 indicated that dioxin and furan compounds were detected in all six of the composite samples analyzed. Based on a 95% UCL calculation, the representative concentrations of dioxin and furan compounds reported to be contained in the soil stockpile were as follows:

Compound or Group Of Cogeners	95% UCL (mg/kg)
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.153
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.033
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.002
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	0.578
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	0.099
Hexachlorodibenzo-p-dioxins (Total)	0.029
Hexachlorodibenzofurans (Total)	0.027
Pentachlorodibenzo-p-dioxins (Total)	0.004
Pentachlorodibenzofurans (Total)	0.003
Tetrachlorodibenzo-p-dioxins (Total)	0.0008
Tetrachlorodibenzofurans (Total)	0.0005

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2.0 DESCRIPTION OF PLANNED REMOVAL ACTION

As indicated in the FS (Landau Associates 2001a), the planned removal action for the soil stockpile will include the removal of the stockpile material (soil, liner, cover, tires, etc.) from the site for offsite treatment and/or disposal. Oversight of remedial activities to be completed for removal of the soil stockpile will be provided by authorized employees of Time Oil or Landau Associates. The soil removed from the soil stockpile will be transported to the Richmond Biotreatment Facility (RBF) located in Richmond, British Columbia, Canada for treatment, followed by disposal at the Richmond Landfill. The RBF is operated by HAZCO Environmental Services, LLC (HAZCO) and the Richmond Landfill is operated by Ecowaste Industries Ltd. (Ecowaste). The miscellaneous materials associated with the stockpile (stockpile covers, liner, water tubes, tires, traffic bollards, etc.) will be disposed at the Richmond Landfill; however, any of the stockpile liner material that cannot be segregated from the soil will be deposited at the RBF. In addition, the stormwater and leachate collection systems associated with the soil stockpile will be permanently disabled and abandoned.

As stated in the FS, the remedial action objectives (RAOs) for the soil stockpile are as follows:

- To prevent exposure of COPCs/CPECs within the stockpile to human and ecological receptors at concentrations that are not protective during future terminal use
- To prevent migration of COPCs/CPECs currently contained within the stockpile
- To eliminate the need for long-term management of the stockpile.

It is anticipated that the RAOs identified will be achieved with the physical removal of the soil stockpile material from the site for treatment at the RBF and disposal at the Richmond Landfill. In the absence of a site-specific risk analysis at this time, EPA Region 9 Preliminary Remediation Goals (PRGs) established for industrial site soil (EPA 2001) will be used as screening levels for COPC and CPEC present in the soil underlying the stockpile following removal. The industrial soil PRGs for the primary COPC/CPEC are as follows:

Chemical Constituent	EPA Region 9 PRG (mg/kg) Industrial Soil
Arsenic (a)	440
Cadmium	810
Lead	750
Selenium	10,000
Silver	10,000
Dioxin (TEQ for 2,3,7,8-TCDD)	0.000027
Pentachlorophenol	11
Benzo(a)pyrene	0.29

(a) Noncancer endpoint

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A terminal-wide risk assessment will be conducted following completion of Phase III remedial investigation activities. The risk assessment evaluations will be used to establish site-specific cleanup levels that are protective of human health and the environment for all constituents of concern for use in evaluations for a terminal-wide FS and recommendations for a terminal-wide removal action.

2.1 REMOVAL ACTION ACTIVITIES

The removal action to be completed for the removal of the soil stockpile material will consist of the following items:

- Pre-mobilization activities (Section 2.2) – Includes the remediation contractor's preparation and review of a site-specific health and safety plan, receipt of import/export approvals, and preparation of manifest documents.

- Mobilization and site preparation (Section 2.3) – Includes the protection of existing site features, set up of work zones, abandonment of a groundwater monitoring well in the stockpile area, and alteration of the stormwater collection system in the vicinity of the stockpile.

- Removal of stockpile material (Section 2.4) – Includes the removal of stockpile soil, two stormwater collection catch basins, one leachate collection sump, and miscellaneous stockpile materials.

- Material loading (Section 2.5) – Includes truck loading, decontamination of trucks, stormwater and decontamination water handling, and dust suppression.

- Material transport (Section 2.6) – Includes project manifesting, identification of an onsite truck route, and designation of the haul route to be taken from the site to the disposal facility.

- Disposal of stockpile material (Section 2.7) Includes deposition of soil and miscellaneous material at the disposal facility, truck decontamination prior to exiting the treatment disposal facility, and records to be collected by the truck drivers.

- Site demobilization (Section 2.8) – Includes removal of removal action heavy equipment and assessing and restoring the site egress route, as necessary.

2.2 PRE-MOBILIZATION ACTIVITIES

Prior to the mobilization of construction equipment and personnel to the site, various documents must be reviewed and/or obtained by Time Oil including: a site-specific health and safety plan that addresses remedial activities related to the stockpile removal, final approvals for the export of the stockpile material from the United States and import of the material to the British Columbia province of Canada, and pre-printed waste manifests for tracking the material removed from the site. Each of these documents is discussed separately below.

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2.2.1 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 2001b). The health and safety plan, presented in Appendix A, is provided herein to identify 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 stockpile removal action. The remediation contractor will be required to prepare a site-specific health and safety plan that is to be reviewed and signed by the remediation contractor's onsite personnel prior to mobilization to the site. The remediation contractor will 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 plan prepared by the remediation contractor will include, at a minimum, information related to the personal protection equipment (PPE) to be utilized by onsite personnel, air monitoring equipment required in the work zones, and provisions for daily tailgate safety meetings to be conducted by the site safety coordinator.

Other personnel anticipated to be present onsite during the stockpile removal action, in addition to remediation contractor personnel, include project oversight personnel (Time Oil and/or Landau Associates personnel); truck drivers; drilling contractor; and regulatory agency personnel. Personnel present onsite that are not involved with the removal of the stockpile material will be restricted to the "clean zone" as defined in Section 2.3.2. 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".

2.2.2 IMPORT/EXPORT APPROVAL OF WASTE

Time Oil and Beazer East Inc. have submitted requests for permission from the EPA to export the stockpile material from the United States of America (USA) to Canada. Additionally, a request was made to Canadian authorities to permit the importation of the stockpile material for treatment at the RBF and disposal at the Richmond Landfill. Stockpile removal activities will not commence until written approvals are received from the EPA, Environment Canada, and the British Columbia Ministry of Water, Land, and Air. Following the receipt of approvals from the three regulatory bodies, the guidelines provided within the approvals (e.g., inclusion of an Agreement of Consent Identification Number on each disposal manifest) will be incorporated into the requirements for the removal action.

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2.2.3 MANIFEST DOCUMENTATION

Following the receipt of written approvals for the import/export of the stockpile material from the USA and Canadian authorities, manifest documents will be prepared by the operator of the RBF (HAZCO). The required number of manifests will be prepared by HAZCO for the transport and disposal of up to 4,000 tons of soil and the associated materials (tires, liner, cover, etc.). The manifests will be typed in quadruplicate with one copy each for the generator, the transporter, the disposal facility, and a final copy returned to the generator after the material has been deposited at the RBF or the Richmond Landfill. Time Oil personnel will sign the manifests as the generator of the waste material and project oversight personnel will be responsible for estimating the volume (cubic yards) of material present in each load as it exits the terminal. Project oversight personnel will also be responsible for overseeing that each truckload of material is accompanied by three copies of the manifest prior to exiting the site and that the generator's copy of the manifest is collected at the site. Each manifest will also be accompanied by additional paperwork (e.g., copies of the import/export approval notifications), as necessary, to expedite the transport of the stockpile material across the USA-Canadian border.

2.3 MOBILIZATION AND SITE PREPARATION

This section describes mobilization and site preparation activities to be undertaken at the terminal prior to the loading and removal of stockpile material for offsite treatment and disposal. These activities include: 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 a monitoring well, and alteration of the current stormwater collection system located near the stockpile.

2.3.1 PROTECTION OF EXISTING SITE FEATURES

Prior to the initiation of stockpile removal activities, project oversight personnel will identify site features that are not to be disturbed by the removal action. 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 also require protection during the removal action. The features to be protected will be reviewed with the remediation contractor responsible for the removal of the stockpile material from the site prior to mobilization of soil removal equipment. Photos may be taken of the features to document the conditions prior to remedial activities.

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2.3.2 ZONE DEFINITIONS

Prior to commencement of stockpile removal activities, work zones will be established to designate areas for specific tasks associated with the removal action. The work zones will include: the removal action (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 soil stockpile 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.

Truck Decontamination Zone – The area located to the south-southeast 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 stockpile material. 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.

Personnel Decontamination Zone – Two personnel decontamination stations will be designated for the completion of remedial activities. The two personnel decontamination stations comprise the Personnel Decontamination Zone. One personnel decontamination station will be located adjacent to the northeastern corner of the RA Zone and the second personnel decontamination station will be located adjacent to the southeastern corner of the Truck Decontamination Zone. 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. 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.

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 5, 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.

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2.3.3 Truck Loading Area Setup

The remediation contractor will prepare a truck loading area on the southeastern side of the stockpile, as indicated on Figure 4. The truck loading area will be prepared by placing polyethylene sheeting (10 mil thickness) over an area measuring approximately 60 ft by 20 ft. A six-inch layer of crushed stone will be placed on top of the polyethylene sheeting to allow for trucks to drive into and out of the loading area. Alternatively, the remediation contractor may install an asphalt pad in lieu of the polyethylene liner and crushed stone. 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 2.8.1)

2.3.4 Truck Decontamination Station Setup

The remediation contractor will prepare a truck decontamination station immediately south-southwest of the truck loading area (Figure 4). The truck decontamination station will include a containment sump underlying a grated metal driveway. Truck decontamination will be completed entirely over the grated metal drive. 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 and collection of the material in the sump located beneath the grated metal drive. 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 hot water or steam pressure washer and collection of the wastewater in the sump beneath the grated metal drive. The truck decontamination sump will be cleaned out, as necessary, with the liquid being pumped to an existing aboveground storage tank (AST Tank 38009; see Figure 4) to be treated in the existing onsite wastewater treatment system and the solid material being incorporated into the materials from the stockpile for transportation to the offsite treatment/disposal facility.

2.3.5 Personnel Decontamination Stations Setup

The remediation contractor will prepare two personnel decontamination stations. One station will be located near the northeastern corner of the RA Zone and the second station will be located near the southeastern corner of the Truck Decontamination Zone (Figures 4 and 5). The personnel decontamination stations will be utilized for the donning and doffing of PPE utilized by onsite workers. Upon exiting the RA Zone or Truck Decontamination Zone, personnel must pass through the personnel

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decontamination area to remove PPE, which will be placed into trash bags for disposal at an appropriate facility. If feasible, the trash bags containing the used PPE will be incorporated with the miscellaneous stockpile material to be transported offsite for disposal at the Richmond Landfill. 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.

2.3.6 WELL ABANDONMENT

A groundwater monitoring well (Well F) is currently located near the southeastern edge of the stockpile (Figure 4). The monitoring well is 2 inches in diameter, extends to approximately 19 ft below grade, and is constructed of polyvinyl chloride (PVC) well screen and riser. A well construction log for Well F is provided in Appendix B. Prior to stockpile removal activities, Well F will be abandoned in accordance with State of Oregon monitoring well regulations, as published in Oregon Administrative Rules (OAR), Chapter 690, Division 220, Paragraph 060 – Abandonment of Cased Wells. Well abandonment procedures will include the following:

- Overdrilling the existing well to the bottom of the well using 8-inch outer diameter (OD) hollow-stem augers
- Removing the PVC well casing
- Sealing the boring with hydrated bentonite chips to the surface.

Well abandonment activities will be supervised by Landau Associates or Time Oil personnel and the well abandonment records will be provided to the Oregon Water Resources Department (WRD) by the drilling contractor conducting the work.

2.3.7 STORMWATER SYSTEM ALTERATION

Currently, two stormwater catch basins are in place near the southeastern and northeastern corners of the stockpile (Figure 4). The catch basins are currently configured such that stormwater runoff from the cover of the stockpile and the former soil treatment area is collected into the catch basins. The catch basins are connected to a stormwater drain line that discharges to the Willamette River. The flow of water through the discharge pipes is controlled by a ball valve located within each catch basin. During implementation of stockpile removal activities, stormwater will not be permitted to discharge directly to the stormwater drain line without treatment and will be routed through the existing onsite wastewater treatment system. To accomplish this, during site mobilization activities, the discharge valves located in the stormwater catch basins will be shut off, causing any surface water accumulating in the RA Zone,

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Truck Decontamination Zone, or the Personnel Decontamination Zone during the removal action to be collected in the catch basins without movement to the stormwater drain line. The remediation contractor will set up pumps, capable of transferring the water from the catch basins to the stockpile leachate collection sump (Figure 4), in each of the stormwater catch basins. The remediation contractor will pump out the catch basins, as necessary, during the implementation of the removal action. At the conclusion of the removal action, the remediation contractor will remove the catch basins from the subsurface. Catch basin removal is discussed further in Section 2.4.2.

2.4 REMOVAL OF STOCKPILE MATERIAL

Following completion of the site preparation activities, the stockpile removal portion of the removal action will be conducted. Removal of the stockpile material will include the removal of soil for offsite treatment and disposal, the removal of two stormwater collection basins located near the stockpile, removal of the stockpile leachate collection sump, and the removal of other miscellaneous items (stockpile liner, covers, tires, traffic bollards, water tubes, etc.) associated with stockpile for disposal offsite. It is anticipated that stockpile removal activities may require the use of the following construction-related equipment:

- Track-Mounted Excavator
- Track-Mounted Bulldozer
- Front-End Loader
- Water Pumps
- Pressure Washer
- Tire Shredder.

A description of each removal activity is provided below.

2.4.1 SOIL REMOVAL

Soil removal will consist of removing up to 4,000 tons of stockpile material and the earthen berm surrounding the stockpile, and loading the material on dump trucks for transport to the offsite treatment and disposal facility. At the beginning of each work day, the remediation contractor will remove the stockpile cover to allow access to the soil for loading and will reinstall the cover over the stockpile at the conclusion of each work day. The remediation contractor will utilize heavy equipment to load the soil into dump trucks in the designated truck loading area (Figure 4).

Following the removal of the soil stockpile, the stockpile liner will be removed and the oversight personnel will examine the soil below the liner within the stockpile footprint. At a minimum, the remediation contractor will remove additional soil in the stockpile footprint to a depth of approximately 6

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inches below grade. The project oversight personnel will collect verification soil samples from within the stockpile footprint to confirm that the material meets the screening levels as described in Section 2.0. Sample collection methods are described in Section 3.0.

2.4.2 STOCKPILE STORMWATER COLLECTION SYSTEM REMOVAL

As referenced in Section 2.3.7, two stormwater catch basins are currently located near the southeastern and northeastern edge of the stockpile. Following the completion of the soil removal activities (stockpile and underlying soil as needed), the catch basins will be removed from the subsurface without damaging the catch basins. The piping leading from the catch basins to the stormwater drain line will be abandoned in place with concrete. The catch basins will be cleaned with a pressure washer and will be stored at the terminal in an area designated by the project oversight personnel.

2.4.3 STOCKPILE LEACHATE COLLECTION SYSTEM REMOVAL

Currently, a leachate collection sump is located near the northeastern stormwater catch basin (Figure 4). The leachate sump is a collection point for the leachate that originates from beneath the stockpile. The leachate entering the sump is pumped to an AST (Tank 38009) for storage and is subsequently transferred to the onsite wastewater treatment system. Following the removal of the soil stockpile, the remediation contractor will abandon the leachate collection system. Leachate collection piping will be removed from beneath the stockpile or abandoned in place and the leachate collection sump will be removed from the subsurface, decontaminated with a pressure washer, and stored at the terminal in a location designated by the project oversight personnel. Following the removal of the leachate collection sump, the project oversight personnel may direct the remediation contractor to remove potentially impacted soil (not to exceed 10 yd^3) from around and beneath the former sump location. Following the removal of soil, project oversight personnel will collect a verification soil sample from the extent of the excavation for analysis to determine if RAOs are achieved (see Section 3.0).

2.4.4 MISCELLANEOUS ITEMS REMOVAL

In addition to the removal and offsite treatment/disposal of the soil from the stockpile, the remediation contractor will remove the following material that is associated with the soil stockpile for disposal at the Richmond Landfill:

- Stockpile covers
- Stockpile liner
- Water tubes used to hold the base of the cover in place
- Tires used to hold the surface of the cover in place

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- Traffic bollards set around the perimeter of the stockpile
- Soiled PPE.

The cover and liner may be cut into smaller sections prior to disposal. The water tubes will be drained of water prior to loading for disposal. The tires will be shredded prior to disposal. The traffic bollards may be broken prior to loading for disposal. The soiled PPE will be containerized in trash bags prior to disposal. The miscellaneous items will be manifested as non-hazardous waste for disposal.

2.5 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 6). In conjunction with the loading of material, the remediation contractor will be responsible for the proper management of stormwater and decontamination water, as well as implementing dust control methods, as necessary.

2.5.1 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 4 and 6. Truck drivers will be permitted to exit their trucks in the staging area 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 stockpile 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. Truck drivers are to remain in the cab of the truck with the windows closed while the truck is being loaded. After the truck is loaded with stockpile material, remediation contractor personnel will direct the truck driver to pull forward into the truck decontamination station (Figures 4 and 6).

2.5.2 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

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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 body, 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 hot water or steam pressure washer and brushes to remove visual observations of soil or debris from the exterior of the truck, trailer bed body, 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 are to 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 and to exit the site. Truck drivers can inspect the security of the load in the Clean Zone prior to exiting the site.

2.5.3 Stormwater and Decontamination Water Handling

Stormwater will be diverted from the RA Zone and Decontamination Zones to two stormwater collection basins located near the southeast and northeast corners of the stockpile. As referenced in Section 2.3.7, the discharge piping from the catch basins will be closed during site preparation activities to prevent stormwater from flowing into the stormwater drain line that discharges to the Willamette River. Decontamination water will be contained in a sump located beneath a grated metal drive in the truck decontamination station. As necessary, wastewater will be pumped from the stormwater catch basins and the decontamination water sump to the leachate collection sump located near the northeastern side of the stockpile (Figure 4). A pump currently located in the leachate collection sump will transfer the water to an AST (Tank 38009), which is used as a holding tank, prior to treatment at the existing onsite wastewater treatment system. The water level within Tank 38009 will be monitored by the remediation contractor utilizing a dip stick inserted into the access manway at the top of the tank. As necessary, project oversight personnel will notify Time Oil personnel to arrange for the transfer of water from Tank 38009 into a larger storage tank (Tank 16804) located within the tank farm area at the terminal, where it will be subsequently treated at the onsite wastewater treatment system.

2.5.4 DUST SUPPRESSION

During stockpile material removal 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 respirators to continue stockpile removal activities.

2.6 MATERIAL TRANSPORT

The transportation of stockpile materials from the site for offsite treatment and disposal will require that the remediation contractor use safe practices for transport of the materials by properly manifesting each truckload and designating safe truck routes for exiting the terminal and for the transport to the offsite treatment/disposal facility. The material will be transported according to Oregon and Washington State Department of Transportation requirements and guidelines, as well as regulations enforced in British Columbia.

2.6.1 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 2.2.3. The waste manifests will be issued to truck drivers prior to exit of the loaded trucks from the site. The waste manifest will include information related to the generator of the material, the transporter of the material, 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.

2.6.2 ROUTE OF SITE EGRESS

The proposed route of egress from the truck decontamination area to the terminal exit gate is provided on Figure 6. The route will be followed by all trucks leaving the site, unless otherwise directed by the project oversight personnel.

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2.6.3 ROUTE TO DISPOSAL FACILITY

A preferred truck route from the terminal to the RBF and Richmond Landfill is provided on Figure 7. The route identified will be followed by all trucks transporting material from the terminal to the treatment/disposal facility, unless an alternate route is approved by Time Oil.

2.7 DISPOSAL OF STOCKPILE MATERIAL

Upon arrival at the Richmond Landfill, truck drivers will follow a standard facility procedure 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 and provide direction to the proper deposition location. Trucks transporting soil will be directed to the RBF facility located at the landfill. Trucks transporting material other than soil (tires, water tubes, stockpile covers, etc.) will be directed to a disposal location in the landfill.

2.7.1 SOIL DEPOSITION AT TREATMENT AREA

All soil transported from the stockpile must be disposed into the RBF. HAZCO personnel at the RBF will direct the truck drivers to the proper location to unload the soil. HAZCO personnel will also sign the waste manifest and retain one copy at the disposal facility. The trucks will dispose of the soil and the trailer bed liner for the load at the same location. Truck drivers should remain in their cabs during the unloading process.

2.7.2 NON-SOIL MATERIAL DISPOSAL

Miscellaneous stockpile related material (stockpile liner, stockpile covers, tires, etc.) will be disposed within the Richmond Landfill as directed by personnel at the entry gate to the facility. Richmond Landfill personnel will sign the waste manifest for these materials and retain one copy at the disposal facility.

2.7.3 TRUCK DECONTAMINATION

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

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2.7.4 RECORDKEEPING

Prior to exiting the Richmond Landfill, 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.

2.8 SITE DEMOBILIZATION

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

2.8.1 TRUCK LOADING AREA

Following the completion of stockpile materials (soil and miscellaneous material), the truck loading area will be decommissioned. Spillage soil present in the loading area will be removed with the 6-inch layer of crushed stone and will be loaded onto trucks for transport and disposal at the RBF. The spillage soil and crushed rock will be loaded into trucks parked on top of the polyethylene liner installed in the truck loading area. Following the removal of crushed rock and spillage soil, the polyethylene liner will be removed and loaded on a truck for transport and disposal at the Richmond Landfill. In the event that the remediation contractor installs an asphalt pad in the truck loading area, the asphalt pad will be cleaned with a broom at the conclusion of the material loading operation and the pad will be left in place. Material collected from the cleaning of the pad will be incorporated with material to be disposed at the RBF.

2.8.2 EQUIPMENT REMOVAL

Following the removal of stockpile materials and miscellaneous associated materials for offsite treatment and disposal and the removal of the stormwater catch basins and leachate sump from the subsurface, the remediation contractor will decontaminate all heavy equipment used during the removal action at the truck decontamination station. Decontamination water generated will be containerized in the truck decontamination station sump and pumped to Tank 38009. Following decontamination of the equipment, the sump and the metal grate will be decontaminated in place and the sump and heavy equipment will be loaded onto flatbed transport trucks for removal from the site.

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2.8.3 SITE EGRESS ROUTE RESTORATION

During stockpile 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 a minimum of once per week during the removal action and following the completion of soil loading activities. Water used in the operation of the power broom will be disposed into Tank 38009 and any dry material will be incorporated with the soil removed from the stockpile for offsite disposal at the RBF.

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3.0 VERIFICATION SAMPLE COLLECTION

This section discusses collection procedures and management of verification soil samples to be collected within the footprint of the stockpile and beneath the leachate sump after the removal of the stockpile and the leachate sump. This section also describes decontamination procedures to be used for sampling equipment. 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 2001b).

3.1 SAMPLE COLLECTION/ANALYSIS

Following the removal of the soil stockpile (including the removal of up to 6 inches of material beneath the liner) and associated materials, the project oversight personnel will collect verification soil samples from the area within and adjacent to the stockpile footprint. Soil samples will be collected for analysis from six locations evenly distributed over the stockpile footprint area and from one location below the leachate sump where elevated PCP concentrations were observed during the Phase II RI to verify that the stockpile removal has resulted in the achievement of the RAOs. The samples will be collected from approximately 0 to 6 inches below grade at each sample location using a stainless steel-spoon or a hand auger. The proposed verification sample locations are presented on Figure 8. The 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 three 8-ounce, clean sample containers provided by the laboratory. Each of the three sample jars collected at each location will be labeled and packed in ice in a cooler. The samples will be submitted to offsite analytical laboratories with appropriate chains of custody accompanying the samples. The samples will be analyzed for SVOCs using EPA method 8270C and metals using EPA method 6010B/7000 series at Specialty Analytical Inc. in Portland, Oregon. Three of the samples (including two within the stockpile footprint and one beneath the leachate sump) will be analyzed for dioxin/furan compounds using EPA method 8290 at Pace Analytical Laboratory in St. Paul, Minnesota.

3.2 SAMPLE EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated by scrubbing the equipment with a liquid mixture of tap water and biodegradable soap (e.g., Alconox or Liquinox), rinsing with tap water, and rinsing with distilled water. All water and water-soap mixtures will be contained in 5-gallon buckets. Nitrile gloves will be changed between sample collection locations. After the completion of sample collection

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activities, all decontamination soap-water mixtures and water will be transferred into Tank 38009. PPE worn by personnel during sample collection and decontamination procedures will be placed in a trash bag for disposal at the Richmond Landfill, if feasible. Decontamination procedures to be utilized for the collection of verification samples are discussed further in the sampling and analysis plan established for the terminal (Landau Associates 2001b).

4.0 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 for Well F
- Daily Tailgate Safety Meeting forms signed by personnel present
- Air Monitoring Data forms to be completed by remediation contractor personnel
- Original generator waste manifests for each load of stockpile material taken offsite for treatment/disposal
- Final copies of waste manifests returned by the truck drivers after each load of stockpile material has been deposited at the RBF or Richmond Landfill
- Copies of weight tickets returned by the truck drivers after each load of stockpile material has been deposited at the RBF or Richmond Landfill
- 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 stockpile footprint after soil removal
- 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 C.

5.0 REMOVAL ACTION COMPLETION REPORT

Following the completion of stockpile removal activities and the receipt of verification soil sample analytical results, Landau Associates will prepare a Removal Action Completion Report on behalf of Time Oil. At a minimum, the Removal Action Completion Report will provide the following information:

- Summary of work completed during stockpile removal activities
- Total quantity (mass) of the stockpile material disposed
- Presentation of stockpile removal records including daily logs, waste manifests, and weight tickets
- Description of work area following the completion of stockpile removal and equipment demobilization
- Verification soil sample results
- Recommendations for additional excavation in the vicinity of the soil stockpile or the leachate sump, if necessary.

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6.0 SCHEDULE

Time Oil and the remediation contractor are prepared to commence the removal action within 3 weeks of Time Oil receiving written authorization for the import and export of the stockpile material to the treatment/disposal facility. 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 the anticipated schedule of working at the facility 5 days per week, it is anticipated that the soil stockpile and related materials can be removed from the site and disposed within a period of approximately 28 calendar days, including mobilization, site preparation, and demobilization activities.

BZTO104(e)015993

7.0 USE OF THIS REPORT

This Phase I Removal Action Plan has been prepared by Landau Associates for the exclusive use of Time Oil Co. for specific application to the soil stockpile 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.

By:

Rebekah Brooks
Senior Hydrogeologist

And:

Martin T. Powers, P.E.
Senior Engineer

BZTO104(e)015994

8.0 REFERENCES

DEQ. 2001. Letter to K.Murphy, Time Oil Co., Seattle, Washington, re: *Soil Stockpile FS, Time Oil Co. Northwest Terminal.* T.Roick, Project Manager, Voluntary Cleanup and Portland Harbor, Oregon Department of Environmental Quality. September 25.

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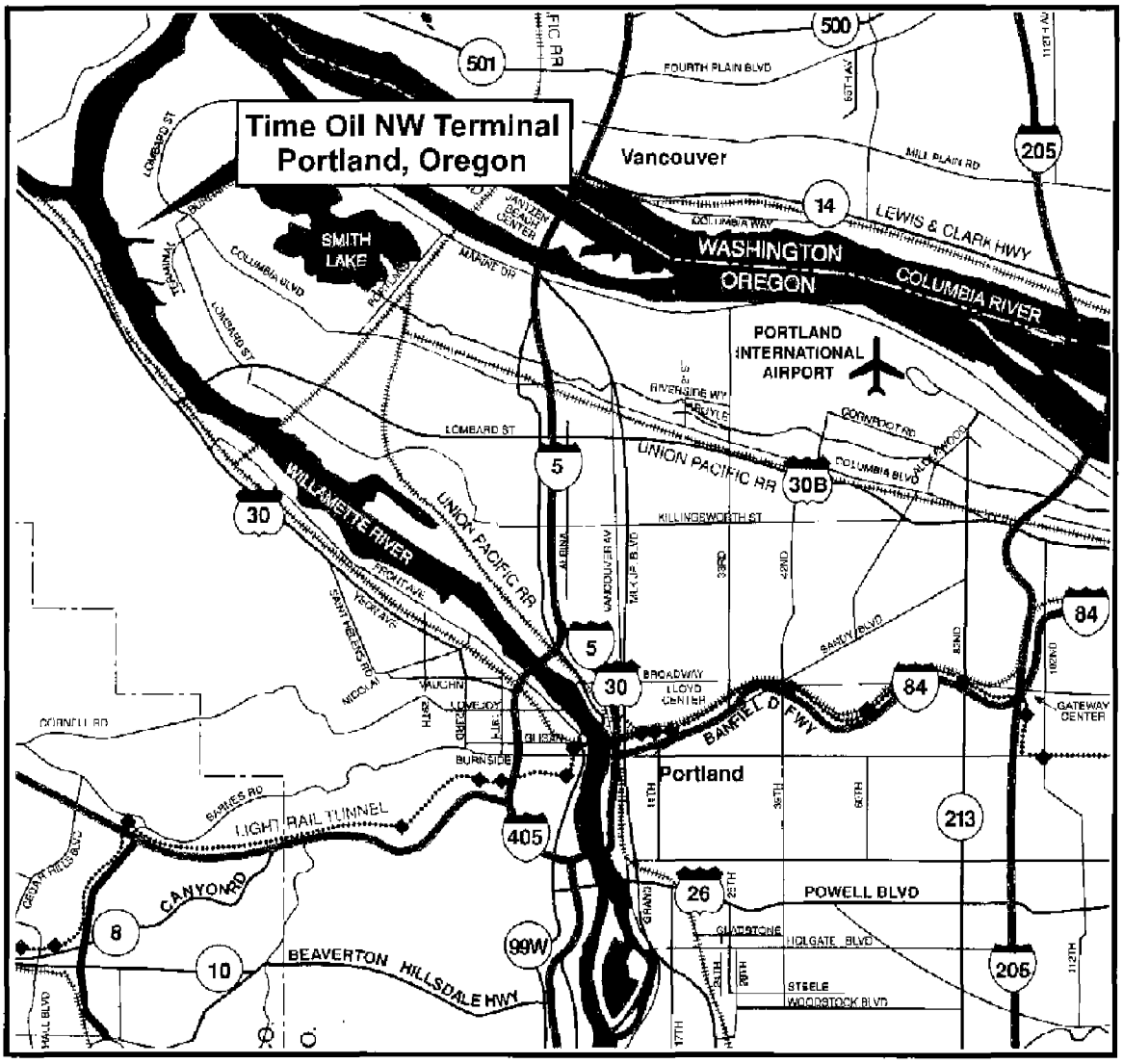
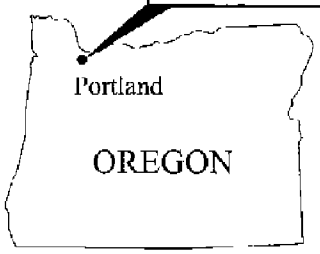
BZTO104(e)015995



Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



0 2 4
Approximate Scale in Miles

DRAFT

Landau Associates Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

Time Oil\Phase I Remedial Action Plan | TX231\001115\Phase I RAP\Fig1.cdr (C) 10/3/2001

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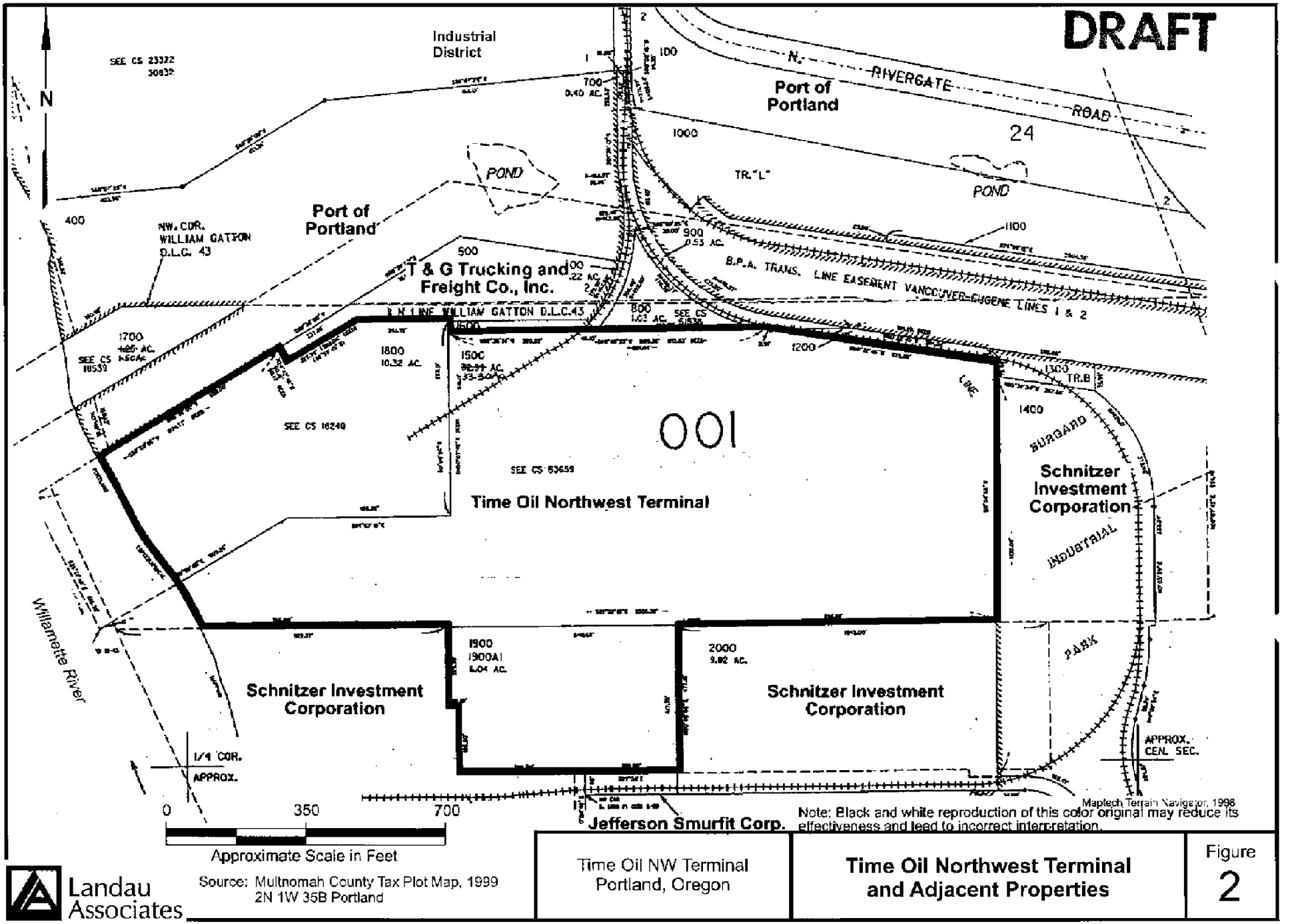
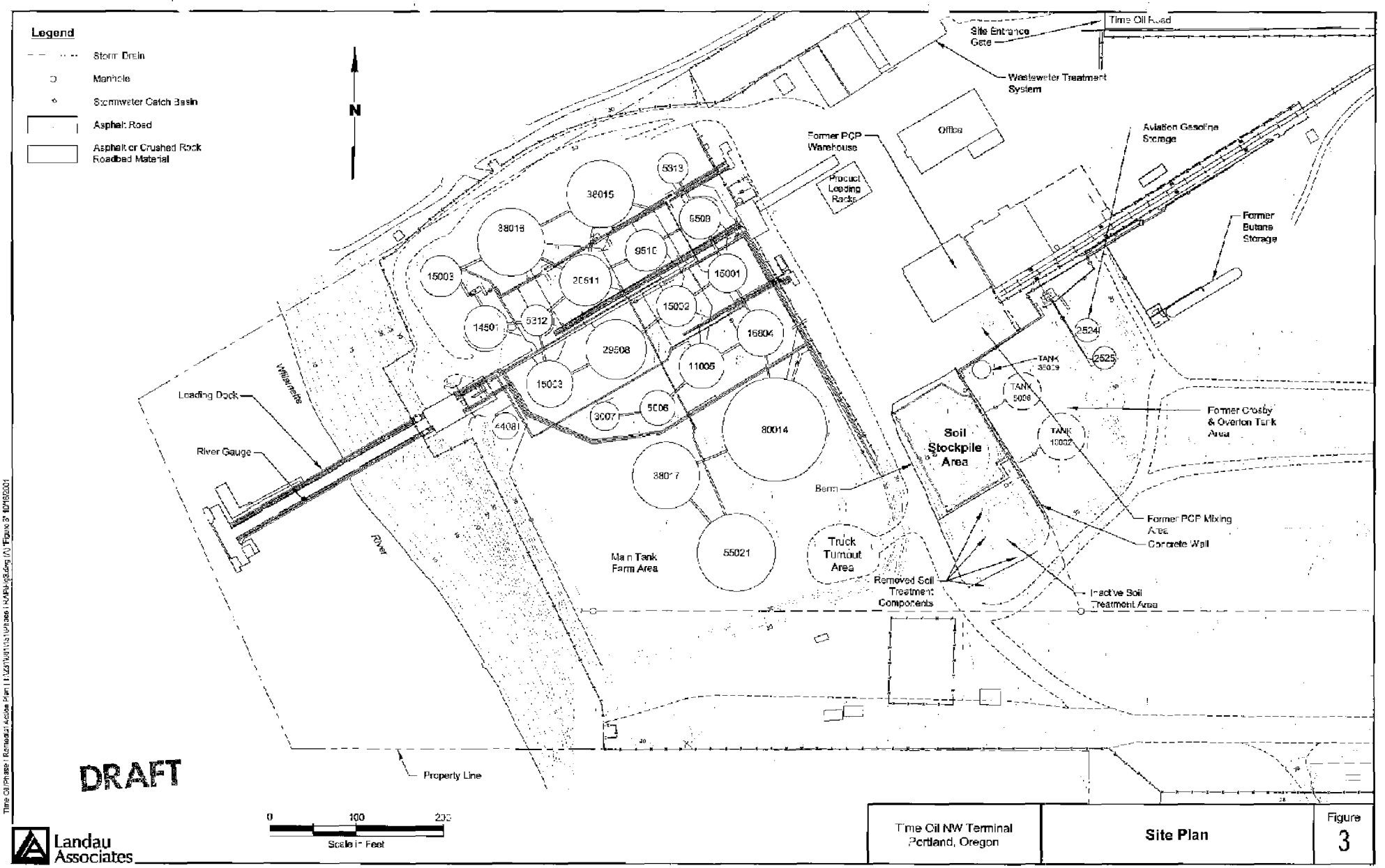


Source: Multnomah County Tax Plot Map, 1999
2N 1W 35B Portland

Landau Associates

Time Oil NW Terminal Portland, Oregon	**Time Oil Northwest Terminal and Adjacent Properties**	Figure 2

BZT0104(e)015997



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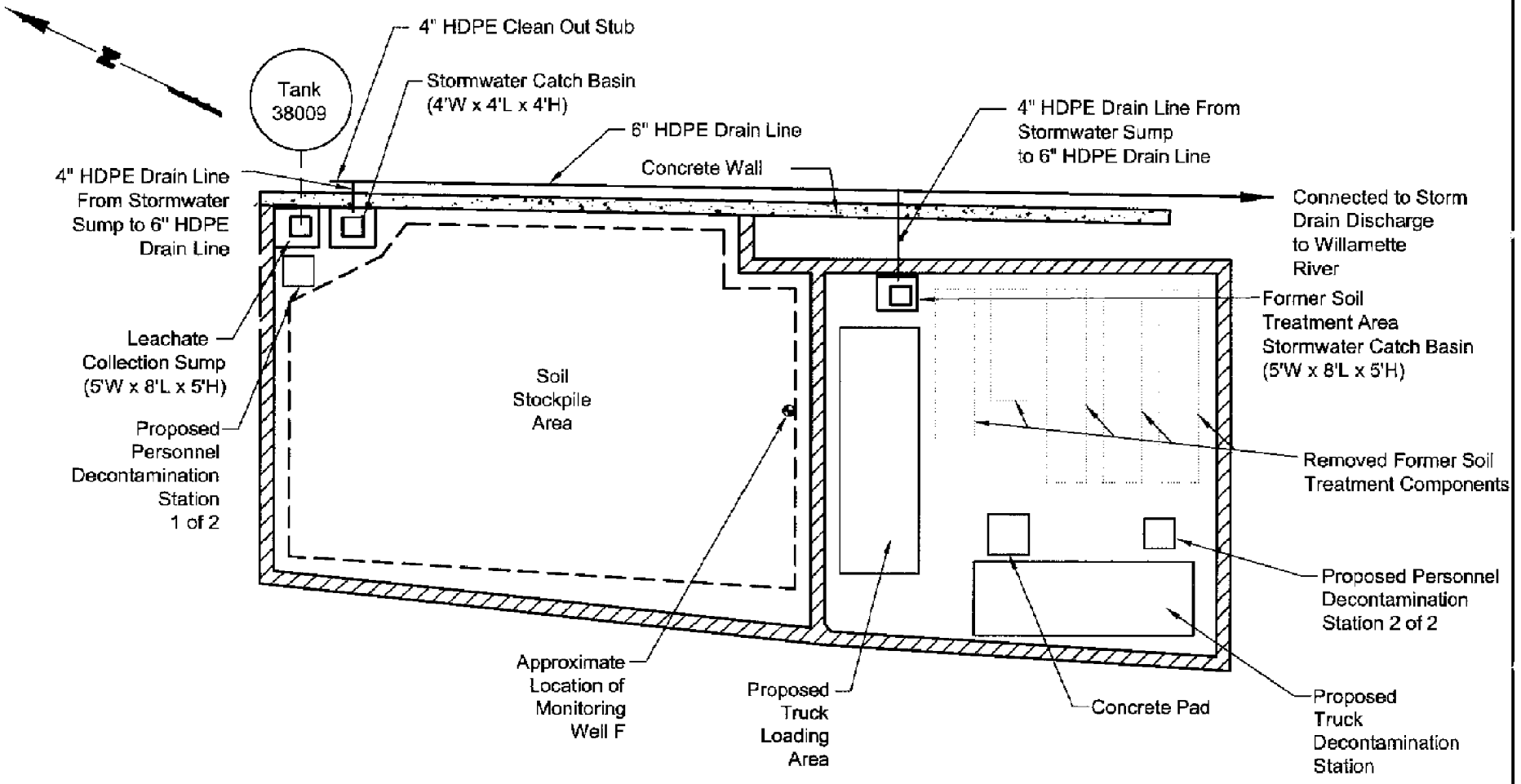
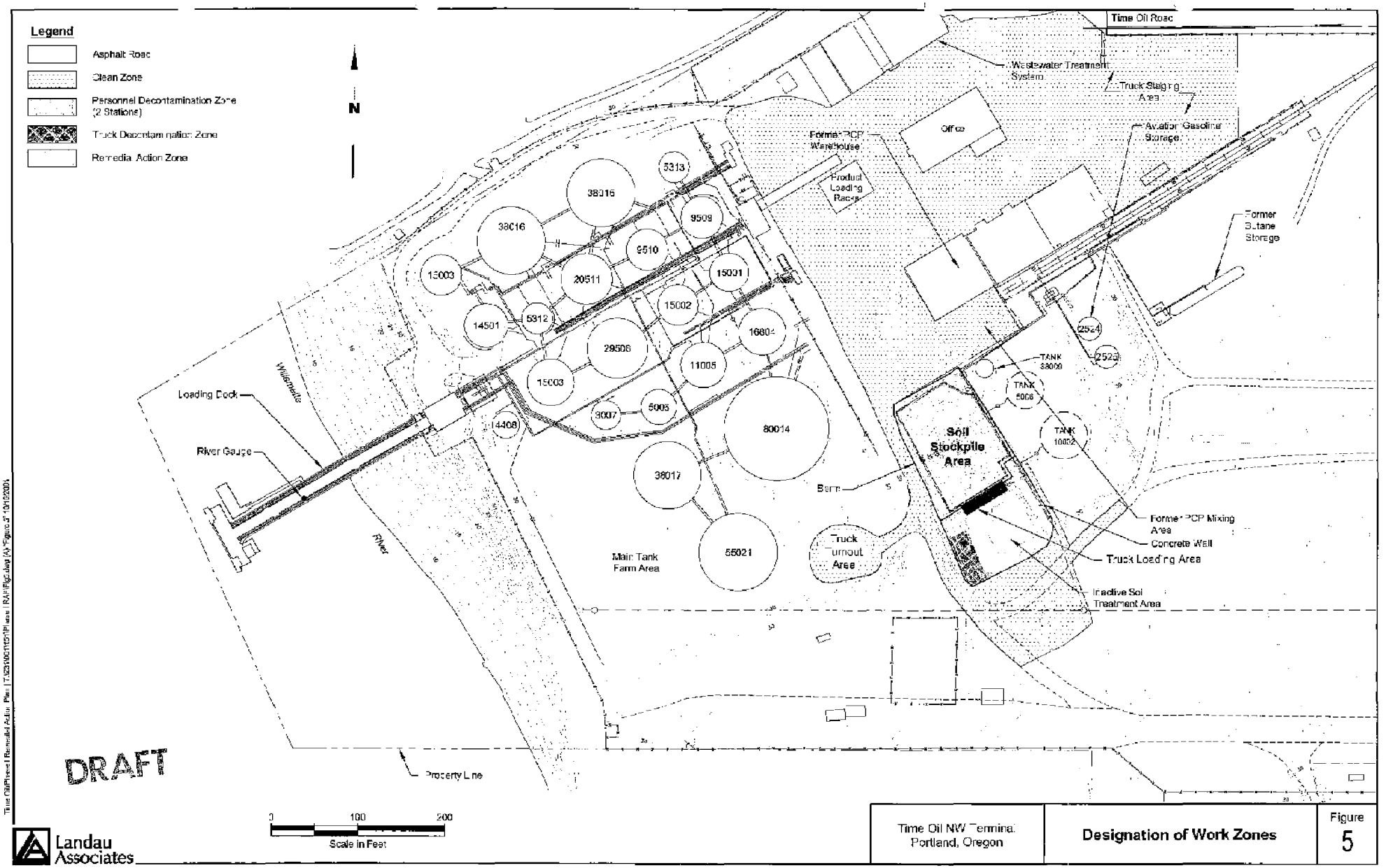


DRAFT

Landau Associates

Time Oil NW Terminal Portland, Oregon	**Map Showing Stockpile, Loading, and Decontamination Locations**	Figure 4

BZTO104(e)015999



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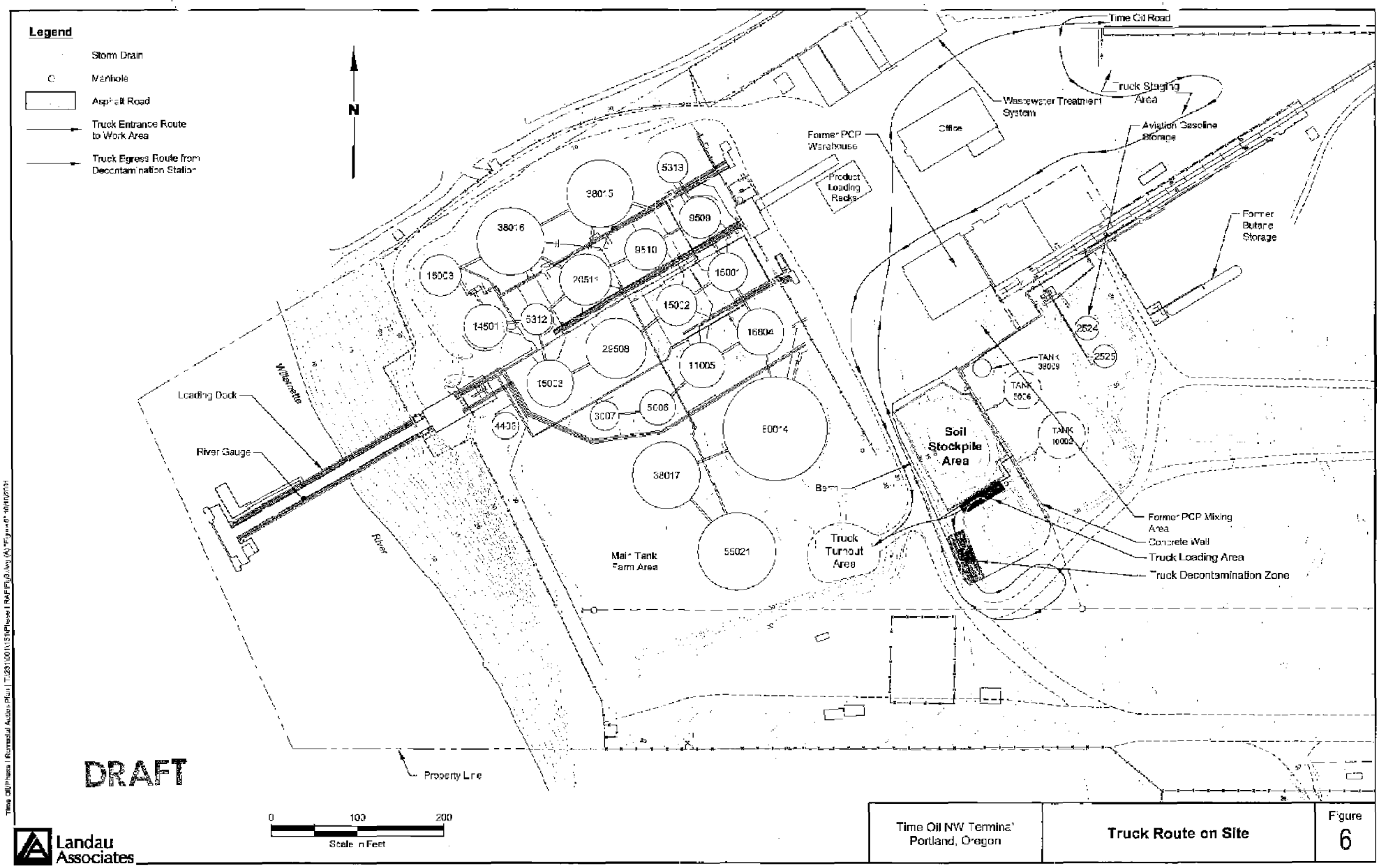

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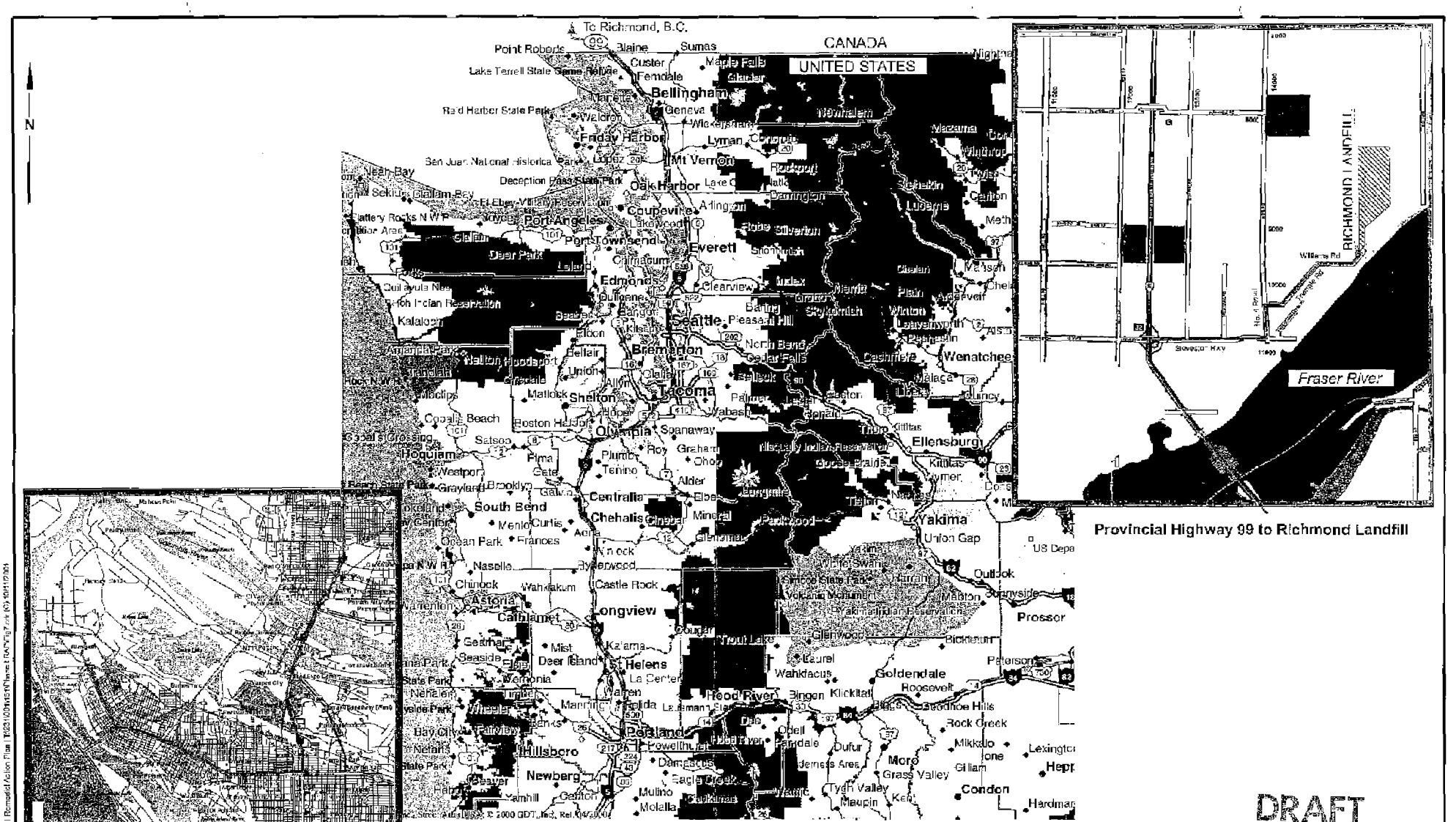
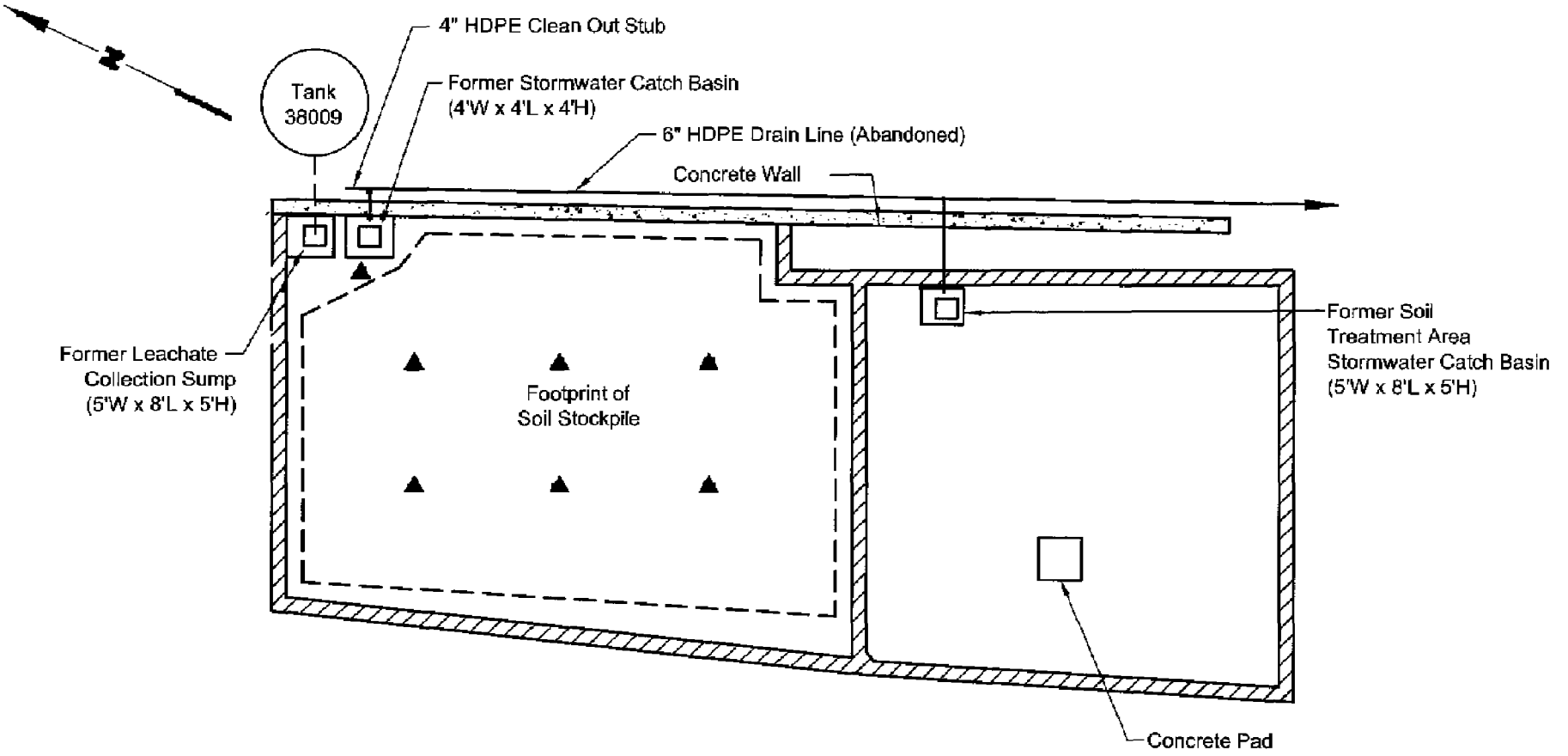


Time Oil NW Terminal Portland, Oregon	Route from Terminal to Richmond Landfill	Figure 7

Landau Associates

BZTO104(e)016002



LEGEND

- Approximate Footprint of Soil Stockpile
- Existing Earthen Berm (to be Removed)
- Proposed Verification Soil Sample Locations

DRAFT

0 40' 80'

Scale in Feet

Landau Associates

Time Oil NW Terminal Portland, Oregon	**Proposed Locations of Verification Soil Samples**	Figure 8

BZTO104(e)016003

Landau Associates
Environmental and Geotechnical Services

REC'D OCT 15 2001

October 9, 2001

86-102
(E) D

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
10/9/01 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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Seattle (Edmonds) Tacoma Portland (Lake Oswego) Spokane

BZTO104(e)016004

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
September 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the August 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 4.65 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.
- Incorporated client's comments on the *Phase I Feasibility Study Report* for the soil stockpile and submitted to DEQ. Received approval of the report from DEQ without additional revisions.
- Began preparation of the *Soil Stockpile Remedial Action Plan.*
- Completed internal review of the *Second Quarter 2001 Groundwater Report* and *Second Quarter 2001 Groundwater Interim Action Status Report* and provided to client for review.
- Received and began processing the third quarter 2001 groundwater data.
- Submitted a Request for Proposal (RFP) to potential bidders to convert the data from the Time Oil Northwest Terminal projects to a GIS database format.
- Evaluated data results, and prepared a technical memorandum providing the results from the vacuum-enhanced pumping tests at upper zone recovery wells, HRW-1 and RW-1; provided to client for review.
- Completed field work for the Phase II supplemental sampling and the Phase III preliminary evaluation.
- Completed collection of soil samples for the pre-remediation investigation on the east property. Preliminary sample results from the fourth round of sampling indicated that the extent of contamination around the previously identified soil removal areas has been defined.
- Began preparation of the *East Property Remedial Action Plan.*
- Removed underground diesel storage tank at the Bell Terminal and collected associated soil samples.
- Conducted cleaning and closure activities for the main terminal.

RESULTS COLLECTED

- Third quarter 2001 groundwater data and preliminary data from the Phase III preliminary evaluation. These data will be provided to DEQ following validation or with the respective reports.

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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. Continue full-scale treatment and discharge to POTW.
- Receive response from EPA regarding the export of hazardous material from the United States. Receive response from Environment Canada and the British Columbia Ministry of Environment regarding the import of the material to Canada.
- Complete preparation of the *Soil Stockpile Remedial Action Plan* and provide to client for review.
- Receive and incorporate client comments on the *Second Quarter 2001 Groundwater Report* and *Second Quarter 2001 Groundwater Interim Action Status Report* and submit to DEQ.
- Validate and evaluate data, and begin preparation of *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report*.
- Incorporate client's comments on the *Vacuum-Enhanced Pumping Test Results at HRW-1 and RW-1* technical memorandum, and provide to DEQ.
- Receive proposals from potential bidders for conversion of data for the Northwest Terminals projects to a GIS database format. Conduct interviews and make selection for GIS consultant.
- Complete preparation of the *Remedial Action Plan* for the east property and provide to client for review.
- Complete field work for the Phase II supplemental sampling and the Phase III preliminary evaluation. Begin evaluation of preliminary data.
- Remove 40 cubic yards of diesel-impacted soil associated with the previously removed underground storage tank at the Bell Terminal. Treat and dispose Prepare a report providing the results and submit to DEQ.
- Complete cleaning and closure activities for the main terminal.

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Landau Associates
Environmental and Geotechnical Services

REC'D NOV 19 2001

November 12, 2001

86-102
ED

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 October 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
11/12/01 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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Seattle (Edmonds) Tacoma Portland (Lake Oswego) Spokane

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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
October 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the September 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 5.02 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.
- Completed preparation of the *Soil Stockpile Removal Action Plan* and provided to client for review.
- Completed client review of the *Second Quarter 2001 Groundwater Report* and *Second Quarter 2001 Groundwater Interim Action Status Report* and submitted to DEQ.
- Validated and evaluated data, and began preparation of *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report.*
- Completed client review of the *Vacuum-Enhanced Pumping Test Results at HRW-1 and RW-1* technical memorandum and provided to DEQ.
- Evaluated other options for a groundwater interim action in the upper zone.
- Completed field work for the Phase II supplemental sampling and the Phase III preliminary evaluation.
- Began preparation of a technical memorandum documenting the results of the Phase II supplemental sampling event.
- Began preparation of the *Phase III Preliminary Evaluation Report.*
- Collected split soil and groundwater samples with representatives of Schnitzer Investment Corporation within the Bell Terminal.
- Received proposals from potential bidders for conversion of data for the Northwest Terminals projects to a GIS database format and conducted interviews with top two selected bidders.
- Continued preparation of the *East Property Remedial Action Plan.*
- Removed 40 cubic yards of diesel-impacted soil associated with the previously removed underground storage tank at the Bell Terminal. Treated and disposed at TPS Technologies (Portland). Prepared a report providing the results (GeoEngineers) and conducted client review.
- Completed cleaning and closure activities for the main terminal.

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RESULTS COLLECTED

- Phase III preliminary evaluation and Phase II supplemental data. Data summary tables, laboratory reports, and data validation reports will be provided to DEQ with the respective reports.

- Preliminary results for the split samples taken with Schnitzer personnel at the Bell Terminal. The results will be provided to DEQ following receipt of final results and validation of the data.

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. Continue full-scale treatment and discharge to POTW.

- Await response from EPA regarding the export of hazardous material from the United States. Await response from Environment Canada and the British Columbia Ministry of Environment regarding the import of the material to Canada.

- Complete client review of the *Soil Stockpile Remedial Action Plan* and submit to DEQ (contingent on receipt of response from EPA and Environment Canada).

- Complete preparation of *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report* and provide to client for review.

- Make selection for GIS consultant and establish schedule for database conversion.

- Complete preparation of the *East Property Remedial Action Plan* and provide to client for review. Begin preparation of a contractor scope of work for the remedial action activities.

- Receive a copy of previous investigations reported to DEQ by the Schnitzer Corporation for the adjacent property from DEQ.

- Submit report documenting the removal of the underground storage tank and associated soil at the Bell Terminal to DEQ.

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Landau Associates
Environmental and Geotechnical Services

RECD FEB 0 6 2001

TRANSMITTAL

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

Date: February 1, 2001

Attn: Mr. Tom Roick

RE: Time Oil Northwest Terminal

Project No.: 231001.131

Copies	Description
1	*Fourth Quarter 2000 Groundwater Report, Time Oil Northwest Terminal, Portland Oregon, February 1, 2001*

Message:

The above-noted report is provided for your files.

LANDAU ASSOCIATES, INC.

By:

For Rebekah Brooks
Project Manager

RB/rgm
2/1/01 S:\WPROC\231\TRANSMIT.FAX\DEQ2Trn.doc
Enclosure

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

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

Fourth Quarter 2000 Groundwater Report
Time Oil Northwest Terminal
Portland, Oregon

January 30, 2001

Prepared for

Time Oil Company
2737 West Commodore Way
Seattle, WA 98100-1233

Prepared by

LANDAU ASSOCIATES, INC.

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

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B Data Validation Report
C Laboratory Data

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10	RW-2 PCP Concentrations and Groundwater Elevations
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1.0 INTRODUCTION

This report provides the results of the fourth quarter 2000 groundwater sampling event, conducted as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal in November 2000. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report.

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. (Time Oil). The facility is located in the industrialized Rivergate area of north Portland, Oregon (Figure 1). Quarterly groundwater sampling has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of the groundwater monitoring points at the terminal are shown on Figure 2.

Modifications to the groundwater quality sampling and analysis requirements (Landau Associates 1998a,b, 1999a, 2000a, 2000b) were approved by the Oregon Department of Environmental Quality (DEQ) in letters dated May 15, 1998, May 18, 2000 (DEQ 1998, 2000a), by verbal authorization to Rebekah Brooks of Landau Associates on February 12, 1999 (Landau Associates 1999a), and by email on August 15, 2000 (DEQ 2000b). Modifications implemented since the second quarter 1998 event include:

- 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 analyses metals 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.

Modifications implemented since the first quarter 1999 event include:

- 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.

Modifications implemented since the second quarter 2000 sampling event included elimination of dioxin/furan analyses. During the third quarter 2000 sampling event modifications included reduction of sampling frequency of wells H, L, and LW-5S from quarterly to annually.

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Groundwater level measurements conducted at the terminal for the fourth quarter 2000 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-1. A record of product recovery activities at well LW-11S is provided on Table A-2. Analyses conducted during this sampling event for each sampling location are summarized in Table A-3. A summary of groundwater quality data for the fourth quarter 2000 event is provided in Tables A-4 and A-5 for the shallow and deep wells, respectively. A summary of groundwater quality data for the product sample collected from LW-11S is provided in Table A-6. The data validation report for this data is provided in Appendix B. Laboratory data packages are provided in Appendix C.

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 be updated for each quarterly event and provided with the quarterly reports.

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2.0 FOURTH QUARTER 2000 GROUNDWATER SAMPLING EVENT

The fourth quarter 2000 groundwater sampling event was conducted from November 7 through November 10, 2000. The quarterly event included measurement of groundwater levels at all 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 where a sheen was observed; and collection of groundwater quality samples from each of the wells. The fourth quarter event included sampling of all monitoring wells in the quarterly sampling program, as agreed upon with DEQ, and the two new monitoring wells (LW-17D, -18D) added in August 2000 as outlined in the *Startup Plan Groundwater Interim Action Report* (Landau Associates 2000c). 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.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the fourth quarter 2000 event on November 9, 2000. The presence of product was also checked in each well. 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-1. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided with the first and second quarter 1998 groundwater reports (Landau Associates 1998a,b) and the Phase II RI Report (Landau Associates 2000b).

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). The groundwater elevations were then contoured using SURFER for Windows. Water level contours interpreted using SURFER kriging techniques are considered approximate, and were modified by hand where the contours did not appear to represent hydrogeologic conditions based on the current conceptual model at the terminal. Groundwater elevation contour maps for the upper and lower water-bearing zones are shown on Figures 3 and 4, respectively.

2.1.1 MEASUREMENT PROCEDURES

Groundwater levels and product thicknesses were measured 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

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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-1.

Water level measurements for the third quarter 2000 event were obtained beginning at about 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. Deep wells closest to the river were measured first, followed by measurements in wells with increasing distance from the 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 1998c), aquifer test report (Landau Associates 1999b), and previous quarterly measurements.

2.1.2 Product Measurements and Product Recovery

During the fourth quarter 2000 event, a trace amount of product was noted in shallow wells Q, P, and N located within the main tank farm area. Also, about 0.4 ft of product was observed in shallow well LW-11S located downgradient of the former PCP mixing area. This is the first occurrence of product in LW-11S and in this area. A sample of the product was collected for laboratory analysis. The types of analyses and results are discussed in Section 2.2.

Following the fourth quarter event, the product in well LW-11S was measured and recovered on three occasions in November 2000 and nine occasions in December, 2000, as shown on Table A-2. Recovery was initially conducted using a disposable or acrylic bailer. On December 8, 2000, a hydrocarbon passive recovery canister with a capacity of 0.5 L was installed in well LW-11S. During this time, product thicknesses were measured up to 0.7 ft and a total of about 8.5 L of product was recovered. By late December, no measurable product was observed, and only about 0.1 L of product was recovered from the passive system. In January 2001, no product was measured using the oil-water interface probe or was recovered in the passive system. The presence of product in LW-11S will continue to be monitored on at least a monthly basis until February 2001.

The recovered product was collected and retained in appropriately labeled containers in an appropriate storage location at the Northwest Terminal.

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2.1.3 Upper Water-Bearing Zone

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper water-bearing zone. Groundwater elevation contours for the upper zone are presented on Figure 3. The contours indicate that groundwater flow in the upper zone across the terminal is generally to the south-southwest toward the Willamette River, with a localized shift to the south in an area south of the former PCP mixing area. A change in the groundwater flow pattern in the upper zone also appears to occur on the east property, such that the groundwater flow direction in this area appears to be radial away from an area at the north property boundary near LW-103S. Groundwater flow patterns and direction in the upper zone appear to vary little between the quarterly events.

2.1.4 Lower Water-Bearing Zone

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower water-bearing zone. Groundwater elevation contours for the lower zone are presented on Figure 4. The contours indicate that groundwater flow in the lower zone generally trends to the west-southwest, with variable flow occurring in the area between well J2 and LW-9D, and a small depression occurring in the area of LW-14D. Groundwater flow patterns and direction in the lower zone vary noticeably between the quarterly events, possibly in response to variability in river stage influence, heterogeneity in lower zone aquifer materials, and the influence from pumping at recovery well RW-2.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the fourth quarter 2000 event on November 7 through November 10, 2000. Eleven shallow wells and eighteen deep wells were sampled. Monitoring well LW-9S and LW-10S were reported as dry and not sampled as part of the fourth quarter 2000 sampling event. As noted previously, product was observed in well LW-11S for the first time during this event. A product sample was collected from the well and analyzed for the following constituents: pentachlorophenol (EPA method 8040/8270AF modified), volatile organic compounds (EPA method 8260), and total petroleum hydrocarbons (method NWTPH-HCID). Because of the presence of product, a groundwater sample was not analyzed from LW-11S for this event. Except as shown in Table A-3, all groundwater samples were analyzed for the following constituents: semivolatile organic compounds (EPA method 8270); chlorinated phenols (EPA method 8040); volatile organic compounds (EPA method 8260); total petroleum hydrocarbons (TPH) for diesel (OTPH-D); six priority pollutant metals (EPA methods 6010/7000 series); chloride (EPA Method 325.2), total dissolved solids (EPA Method 160.1), and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, TPH

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for gasoline and the motor oil range (OTPH-G and OTPH-D extended) were analyzed in samples from wells B1, LW-8S, RW-1 and RW-2; and ethanol (EPA Method 8015) was analyzed in samples from wells B1, LW-8S, and RW-1. Laboratory analyses were conducted by Analytical Resources, Inc. (Seattle, Washington). A summary of analyses conducted for each sampling location is provided in Table A-3.

Analytical results for the fourth quarter 2000 event are provided in Table A-4 for the shallow wells, Table A-5 for the deep wells, and Table A-6 for the product sample from LW-11S, and 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 the same constituent was analyzed by different analytical methods (e.g., methods 8040 and 8270 for PCP).

2.2.1 Groundwater Sampling Procedures

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2) which were purged and sampled with a Grundfos pump. The sample from RW-2 was collected using the in-line sampling port for the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three 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, specific conductance, dissolved oxygen, turbidity, and temperature) were collected at each well during sampling. To prevent degassing during sampling for volatile organic compounds, a pumping rate was maintained below about 100 ml/min. All sampling was conducted in accordance with the Phase I/II RI/FS work plan and appropriate provisions of the quality assurance project plan and project health and safety plan (Landau Associates 1996). A more detailed description of groundwater sampling procedures is provided in the draft Phase II RI report submitted to DEQ on April 6, 2000 (Landau Associates 2000b).

2.2.2 Upper Water-Bearing Zone

The groundwater quality results from the upper water-bearing zone indicate the following:

- Except for low arsenic and lead concentrations, analytical results for wells D and LW-1S were nondetect.

- Pentachlorophenol (PCP) was detected at four upper zone wells (LW-2S, LW-4S, LW-13S, and RW-1) with concentrations ranging from 1.4 µg/L at well LW-13S to 3,400 µg/L at well RW-1 using EPA method 8040. PCP concentrations ranged from 120 µg/L to 4,000 µg/L for

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three of four of these wells using method 8270 (Method 8270 analysis was not conducted at well LW-13S).

- Other chlorinated phenol constituents were detected at wells LW-2S, LW-4S, and RW-1 including: 2,3,4,5-tetrachlorophenol (at concentrations ranging from 1.5 to 16 µg/L); 2,3,5,6- and 2,3,4,6-tetrachlorophenol (at concentrations ranging from 4.1 to 640 µg/L); and 2,4,6-trichlorophenol (detected well RW-1 at 1.1 µg/L).

- Naphthalene, a noncarcinogenic polynuclear aromatic hydrocarbon (PAH), was detected in samples from six wells (B1, LW-2S, LW-4S, LW-7S, LW-8S, and RW-1) at concentrations ranging from 2.0 to 13 µg/L, using method 8270. Naphthalene was detected in the same wells at concentrations ranging from 6.6 to 27 µg/L using method 8260.

- All other semivolatile results were reported as nondetected with the following exceptions: phenol [detected in three wells at concentrations ranging from 2.4 (estimated) to 730 µg/L]; 2-methylphenol (2.2 µg/L at B1); 4-methylphenol (5.6 µg/L at B1 and 120 µg/L at LW-4S); benzoic acid (96 µg/L at LW-4S); 2,4-dichlorophenol (10 µg/L at LW-4S); 2-methylnaphthalene (detected in four wells at concentrations ranging from 1.6 to 5.7 µg/L); di-n-butylphthalate (2.0 µg/L at RW-1); and bis(2-ethylhexyl)phthalate (1.1 µg/L at RW-1).

- Several volatile compounds were detected in the upper zone wells at low concentrations, including:

  - Chloromethane (2.0 µg/L at B1)

  - Acetone (detected in three wells at concentrations ranging from 14 to 49 µg/L)

  - 2-Butanone (detected in four wells at concentrations from 7.4 to 110 µg/L)

  - Benzene (detected in four wells with concentrations from 1.0 to 160 µg/L)

  - Toluene (detected in three wells at concentrations ranging from 8.2 to 1,200 µg/L)

  - Ethylbenzene (detected in six wells at concentrations ranging from 8.5 to 100 µg/L)

  - m-, p-, and o-Xylene (detected in six wells at total xylene concentrations ranging from 2.2 to 480 µg/L)

  - 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected in six wells at individual concentrations ranging from 1.6 to 250 µg/L)

  - Isopropylbenzene and n-propylbenzene (detected in seven wells at individual concentrations ranging from 2.5 to 100 µg/L)

  - tert-Butylbenzene (4.9 µg/L at LW-8S)

  - sec-Butylbenzene (detected in five wells at concentrations ranging from 2.6 to 11 µg/L)

  - 4-Isopropyltoluene (detected in four wells at concentrations ranging from 1.2 µg/L to 8.5 µg/L)

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- n-Butylbenzene (detected in four wells at concentrations ranging from 3.2 to 9.5 µg/L)

- TPH-diesel range concentrations were detected in six upper zone wells, ranging from 0.32 mg/L to 19 mg/L.

- TPH-motor oil range was analyzed at wells B1, J1, LW-4S, LW-8S, and RW-1, and reported at nondetected concentrations for these locations.

- TPH-gasoline range was analyzed at wells B1, LW-8S, and RW-1 at reported concentrations ranging from 3.9 to 9.9 mg/L.

- At least one priority pollutant metal was detected in each upper zone well as follows:

  - Arsenic (detected in all wells where analyzed, except well K), at concentrations ranging from 0.006 to 0.022 mg/L)

  - Chromium (detected only in RW-1 at 0.015 mg/L)

  - Copper [detected in five wells at concentrations ranging from 0.004 (estimated) to 0.081 mg/L]

  - Lead (detected in seven wells with concentrations ranging from 0.001 to 0.006 mg/L)

  - Nickel (detected in two wells, K and RW-1, at 0.03 and 0.01 mg/L respectively)

  - Zinc (detected in six wells at concentrations ranging from 0.009 to 0.054 mg/L).

- Ethanol was reported as nondetect at the three upper zone wells sampled for this analysis (B1, LW-8S, RW-3).

The analytical results from the upper zone wells indicate that the highest concentrations of PCP in the upper zone during the fourth quarter 2000 event were observed in well RW-1 (4,000 µg/L by method 8270). As shown on Figure 5, PCP concentrations increased significantly in well LW-4S between February and August 2000; however during this sampling event, PCP concentrations decreased to below the concentrations seen during the second and third quarter 2000 sampling events. PCP concentrations have also decreased in RW-1 since the high concentration observed during the second quarter 2000 sampling event (May 2000), as shown on Figure 6. The PCP concentration at well LW-2S (1500 µg/L by method 8270), the upper zone well located within the former PCP mixing area, increased slightly since the previous quarter, but remains relatively low in comparison to concentrations observed at this location in 1998-99 (Figure 7). The most elevated concentrations of other semivolatile compounds (naphthalene and 2-methylnaphthalene) were detected in well LW-4S. The most elevated concentrations of volatile compounds were generally observed at wells B1, LW-4S and LW-8S. The most elevated concentrations of metal constituents were generally detected in wells B1, K, LW-2S, LW-8S, and RW-1. The most elevated concentrations of TPH compounds were observed at wells LW-4S and RW-1.

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In addition to the groundwater samples collected in the upper water-bearing zone, a sample of the product in well LW-11S was analyzed. The results indicated a concentration of 3,200 mg/kg PCP. Detected volatile organic compounds included: toluene (120 mg/kg), ethylbenzene (1,400 mg/kg); total xylenes (5,500 mg/kg); 1,3,5-trimethylbenzene (4,300 mg/kg); 1,2,4-trimethylbenzene (13,000 mg/kg); isopropylbenzene (1,000 mg/kg); n-propylbenzene (2,200 mg/kg); sec-butylbenzene (1,000 mg/kg); 4-isopropyhtoluene (1,200 mg/kg); n-butylbenzene (1,700 mg/kg); and naphthalene (640 mg/kg). In addition, the product sample was analyzed for TPH using method NWTPH-HCID. In addition, the product sample was analyzed for TPH using method NWTPH-HCID. According to the laboratory, the sample's chromatographic pattern appears to be that of a middle distillate mixture (e.g., mineral spirits), rather than discrete gas, diesel, or motor oil range hydrocarbons. Because of knowledge about prior use at the terminal, the laboratory ran the sample against a mineral spirits standard using a single point calibration. A concentration for the mineral spirit range was estimated at 55 percent. This value is an estimate because the original product is not available for comparison as a standard, and use of the single point calibration is less accurate than the multipoint calibration required by the method.

2.2.3 Lower Water-Bearing Zone

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for some low metal concentrations, diesel range hydrocarbons and a low level detection of bis(2-ethylhexyl)phthalate at well LW-10D, analytical results for wells B2, J2, LW-1D, LW-9D and LW-10D were nondetect.

- PCP was only detected at RW-2 in the lower zone at a concentration of 45 µg/L using EPA method 8040 or 95 µg/L using EPA method 8270. Groundwater from wells LW-17D and LW-18D was also analyzed for PCP and was reported as nondetect at both locations.

- Other chlorinated phenols were detected in well RW-2 as follows: 2,3,5,6- and 2,3,4,6-tetrachlorophenol (3.6 µg/L); 2,3,4,5-tetrachlorophenol (1.3 µg/L); and 2,4,5-trichlorophenol (1.1 µg/L).

- Naphthalene was detected in two lower zone wells (LW-4D and RW-2) at concentrations of 5.4 and 14 µg/L, respectively using method 8270 and at concentrations of 12 and 25 µg/L, respectively, using method 8260.

- Other semivolatile results were reported as nondetect for lower zone wells with the following exceptions:

  - Phenol (detected in wells R and RW-2 at concentrations of 6.4 and 97 µg/L, respectively)

  - 4-Methylphenol (detected in well RW-2 at 18 µg/L)

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- Benzoic acid (detected at well RW-2 at 22 µg/L)
- 2-Methylnaphthalene (detected in three wells at concentrations ranging from 4.1 to 32 µg/L)
- Dimethylphthalate (detected in well LW-6D at 2.1 µg/L)
- Acenaphthene (detected at well O at 1.8 µg/L)
- Diethylphthalate (detected in well LW-6D at 2.0 µg/L)
- Fluorene (detected in well O at a concentration of 3.5 µg/L)
- Di-n-butylphthalate (detected in well LW-4D at a concentrations of 2.2 µg/L)
- Bis(2-ethylhexyl)phthalate (detected in well O at 2.2 µg/L and well LW-10D at 2.7 µg/L)

• Several volatile compounds were detected at low concentrations, including:

- Acetone (detected in five wells at concentrations ranging from 11 to 20 µg/L)
- 2-Butanone (detected in four wells at concentrations ranging from 8.4 to 30 µg/L)
- Benzene (detected in three wells with concentrations ranging from 2.7 to 77 µg/L)
- Toluene (detected in three wells at concentrations ranging from 1.5 µg/L to 3.6 µg/L)
- Ethylbenzene (detected in wells LW-4D and RW-2 at concentrations of 1.3 and 29 µg/L, respectively)
- m-, p-, and o-Xylene (detected in five wells, at total xylene concentrations ranging from 1.0 to 96 µg/L)
- 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (at least one of the compounds detected in five wells at individual concentrations ranging from 1.4 to 240 µg/L)
- Isopropylbenzene and n-propylbenzene (at least one of the compounds detected in eight wells at individual concentrations ranging from 1.3 to 140 µg/L)
- tert-Butylbenzene (detected in four wells at concentrations ranging from 2.1 to 3.7 µg/L)
- sec-Butylbenzene (detected in eight wells at concentrations ranging from 1.6 to 19 µg/L)
- 4-Isopropyltoluene (detected in wells LW-12D1 and RW-2 at concentrations of 1.6 and 7.6 µg/L, respectively)
- n-Butylbenzene (detected in five wells at concentrations ranging from 1.5 to 12 µg/L).

• TPH-diesel range concentrations were detected in seven lower zone wells at concentrations ranging from 0.40 to 5.4 mg/L.

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- TPH-gasoline was analyzed only at RW-2 and detected at a concentration of 5.0 mg/L.
- At least one priority pollutant metal was detected in each lower zone well tested, as follows:
  - Arsenic (detected in all lower zone wells tested, ranging at concentrations from 0.005 to 0.033 mg/L)
  - Chromium (detected in four wells, at concentrations ranging from 0.010 to 0.016 mg/L)
  - Copper (detected in all lower zone wells, except B2 and J2, at concentrations ranging from 0.002 to 0.018 (estimated) mg/L)
  - Lead (detected in eight wells at concentrations ranging from 0.001 to 0.008 mg/L)
  - Nickel (detected in well LW-11D at a concentration of 0.01 mg/L)
  - Zinc (detected in all lower zone wells, except B2 and J2, ranging at concentrations from 0.007 to 0.122 mg/L).

The analytical results from the lower zone wells indicate that PCP was only detected in well RW-2 (45 µg/L by method 8040 and 95 µg/L by method 8270) during the fourth quarter 2000 event. PCP concentrations at wells LW-4D, LW-11D, LW-12D1, and G1A continue to remain at near or below detection limits after decreasing from elevated levels in mid to late-1999 (late 1997 for G1A). The most elevated concentrations of semivolatile (naphthalene and 2-methylnaphthalene) compounds were observed in well RW-2. The most elevated concentrations of most volatile compounds were observed in wells R, G1A, LW-4D and RW-2. The most elevated concentrations of metals were detected in wells G1A, LW-11D, and RW-2.

2.2.4 Deep Sand Unit

Well LW-12D2 is the only well currently installed in the deep sand unit underlying the lower water-bearing zone. Only two detections were noted in well LW-12D2: arsenic at 0.020 mg/L and copper at 0.004 mg/L.

2.2.5 Water Level and Contaminant Trends

Water levels and concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the Phase II RI quarterly events. Plots of water levels and PCP concentrations (EPA method 8270) versus time for nested wells LW-4S and LW-4D, lower zone wells G1A and RW-2, and upper zone wells RW-1, LW-2S, and LW-11S are provided on Figures 5 through 10.

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The upper zone well plots indicate that water levels show typical seasonal fluctuations with seasonal lows during the fall months (October-November) and seasonal highs during the winter and early spring months (January-March). Figure 7 shows PCP concentrations in the upper water-bearing zone moderately following the water levels in that zone over time in well LW-2S. Figures 5 and 6 indicate that no correlation is apparent between the two in LW-4S and RW-1. In the lower water-bearing zone, water levels trend similarly with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at G1A with river stage on Figure 8; however, there appears to be no correlation between PCP concentrations and groundwater elevations (Figures 5, 10, and 12).

As discussed previously, product was observed in well LW-11S for the first time during this sampling event. As shown on Figure 9, the occurrence of product in this well corresponds to the lowest groundwater elevation measured at this location since its installation in 1997. PCP concentrations within the previously defined PCP plume area in the upper zone at LW-2S continue to remain at lower concentrations than observed in 1998-99. PCP concentrations in the downgradient part of the plume area at wells RW-1 and LW-4S decreased since the last quarterly event, although there was a general increase in PCP concentrations during the prior two events at these locations. The PCP concentration at the downgradient edge of the plume at LW-13S increased slightly from 0.89 to 1.4 µg/L. These concentration trends indicate that plume movement in the upper zone appears to have stabilized since the last sampling event. Upper zone wells LW-10S (located at the south property boundary) and well LW-9S (located between the PCP plume extent and the Willamette River) continue to be dry.

In the lower zone, PCP was only detected at RW-2 during this event. PCP concentrations at this well are lower than the previous sampling event, but have fluctuated between about 50 to 700 µg/L over the last year (Figure 10).

Concentrations of other constituents (2,3,4,6 and 2,3,5,6-tetrachlorophenol, total xylenes, and naphthalene) over the quarterly sampling periods were plotted over time with PCP at wells LW-2S and LW-4D (Figures 11 and 12). The fourth quarter 2000 data continue similar trends as discussed in previous quarterly reports for these wells, with one exception: total xylenes concentrations at well LW-4D decreased more significantly this quarter than the other constituents, even though decreases were also observed for the other constituents (Figure 12). Contaminant trends will continue to be evaluated for future quarterly events; a more detailed evaluation was presented in the Phase II RI report (Landau Associates 2000b).

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3.0 FUTURE GROUNDWATER TASKS

The first quarter 2001 event is currently scheduled for February 12-16, 2001. The groundwater analytical program for the first quarter 2001 will be the annual event that includes the sampling of the east property wells, plus additional sampling of groundwater interim action wells LW-14D, LW-17D, and LW-18D. The results of the first quarter 2001 event will be provided in the *First Quarter 2001 Groundwater Report.*

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4.0 USE OF THIS REPORT

This quarterly 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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By:

Rebekah Brooks
Project Manager

And

For Christy L. Johnson
Senior Staff Engineer

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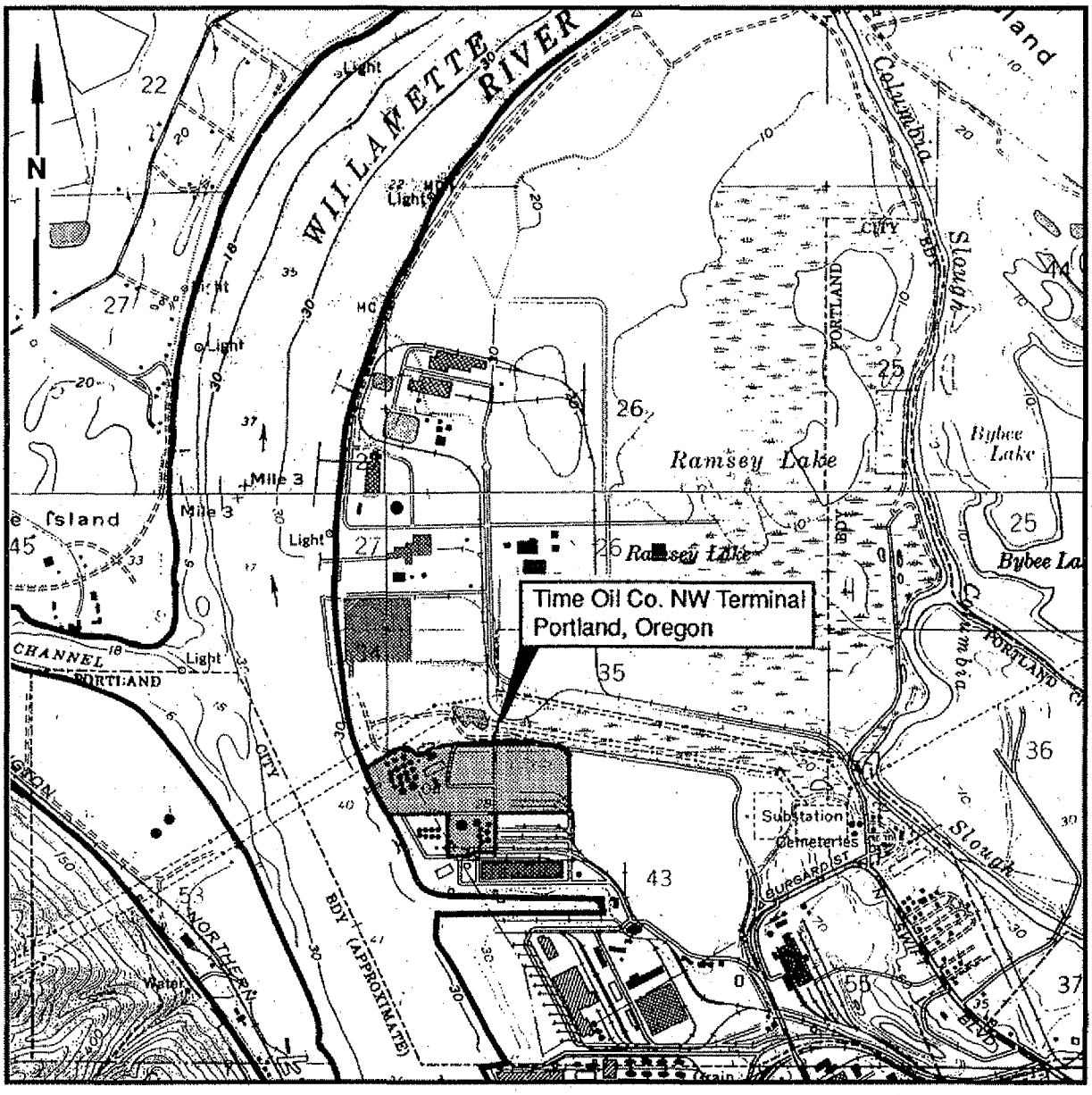
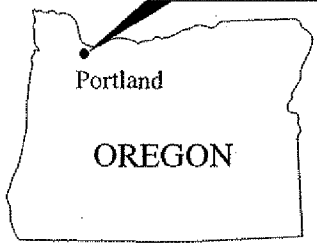


SITE LOCATION
(see enlarged map area above)



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Landau Associates	Time Oil NW Terminal Portland, Oregon	**Vicinity Map**

Figure
1

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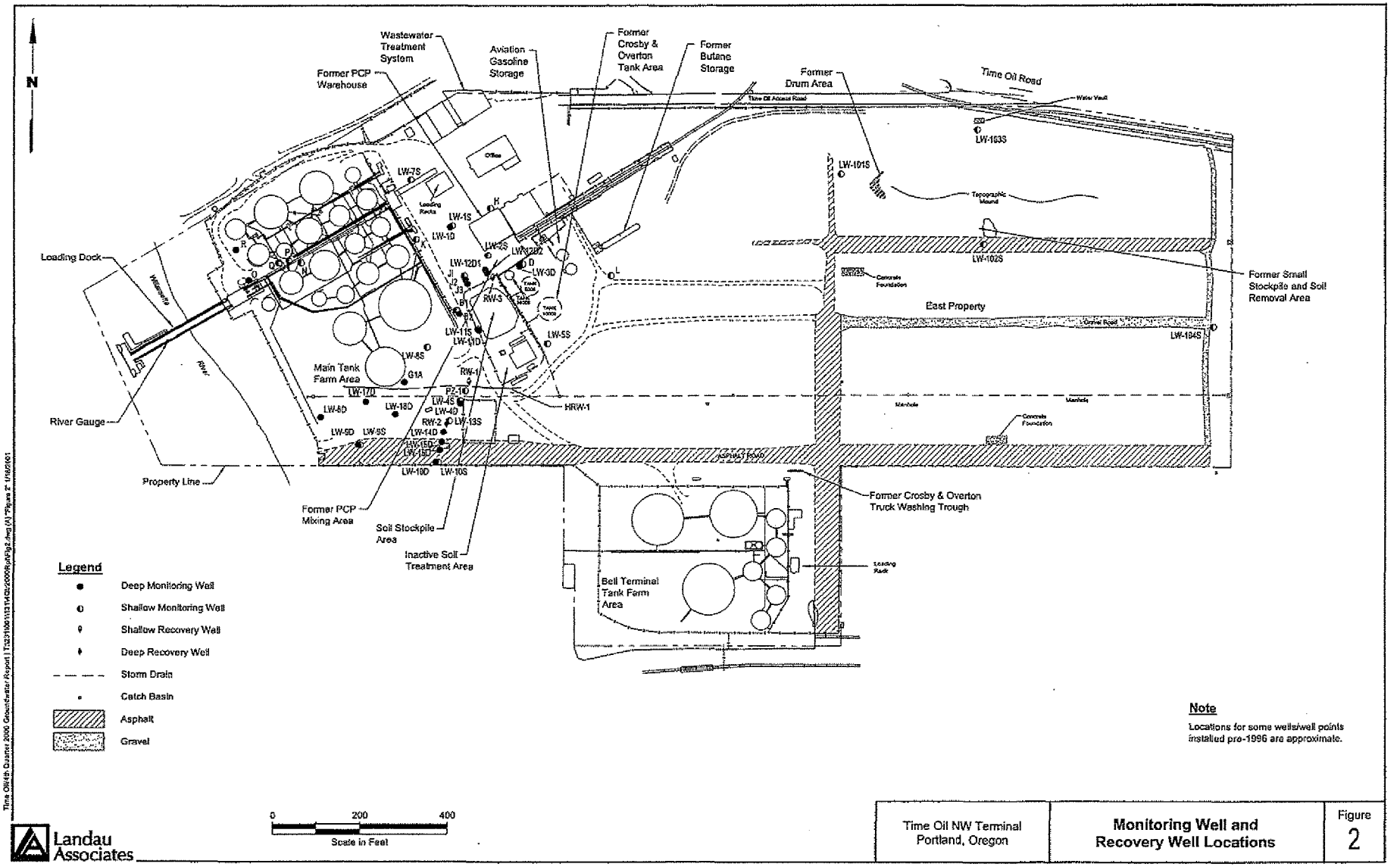

Note

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

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Time Oil NW Terminal Portland, Oregon	**Monitoring Well and Recovery Well Locations**	Figure 2

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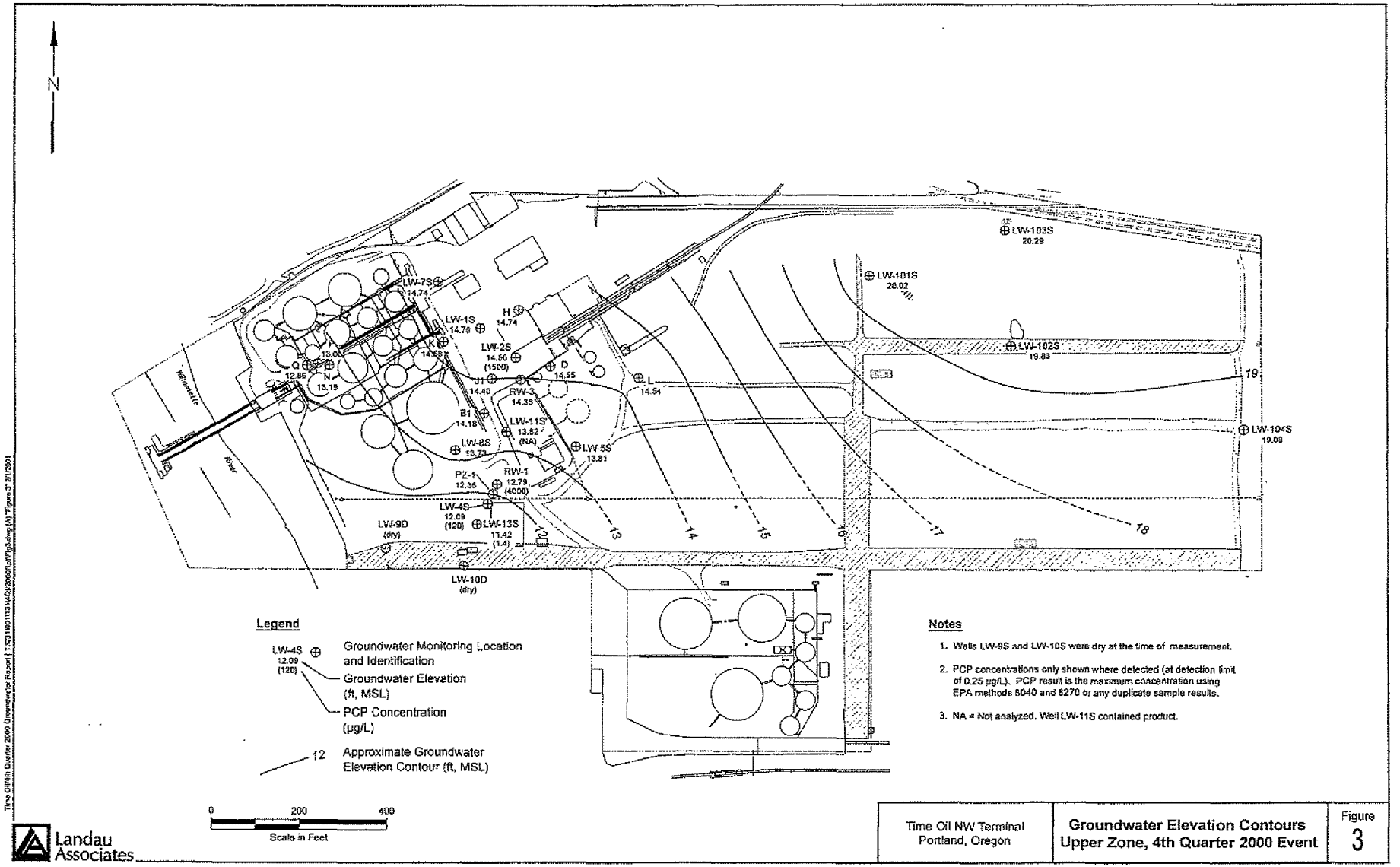

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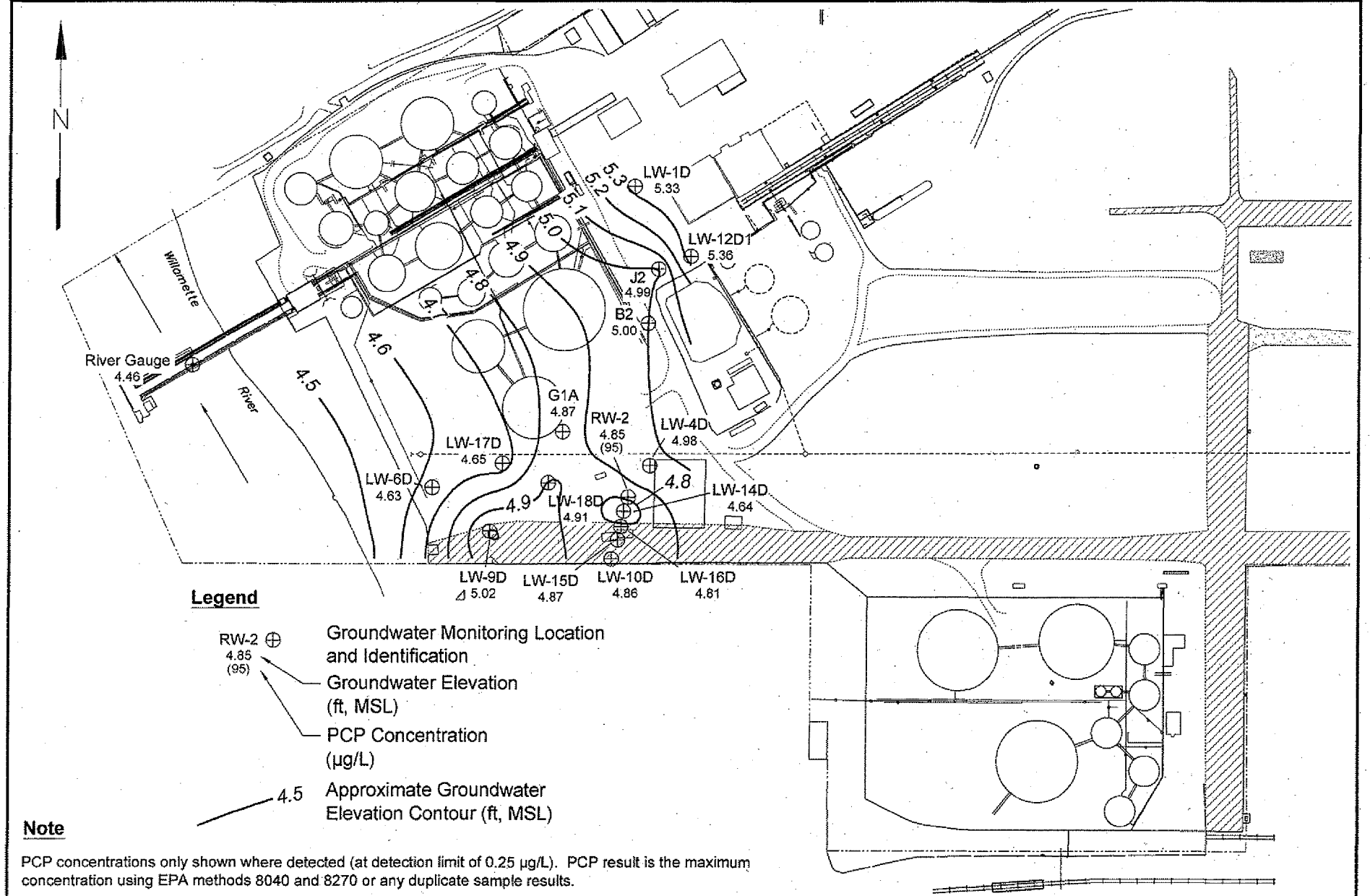
APPENDICES

APPENDIX A

Groundwater Level Measurements and Quality Data



Note

PCP concentrations only shown where detected (at detection limit of 0.25 µg/L). PCP result is the maximum concentration using EPA methods 8040 and 8270 or any duplicate sample results.

0 200 400
Scale in Feet

Landau Associates

Time Oil NW Terminal
Portland, Oregon

Groundwater Elevation Contours
Lower Zone, 4th Quarter 2000 Event

Figure
4

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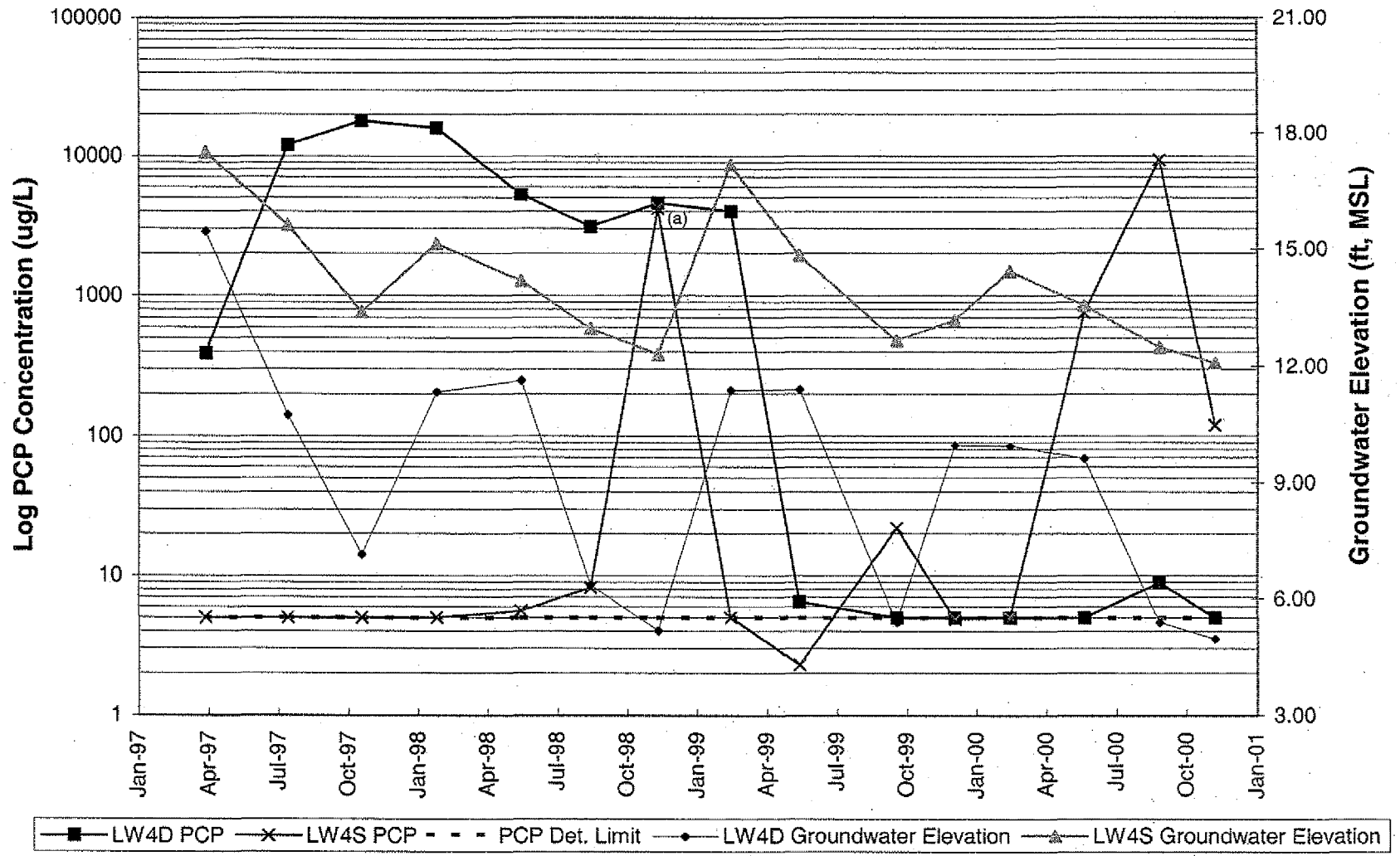
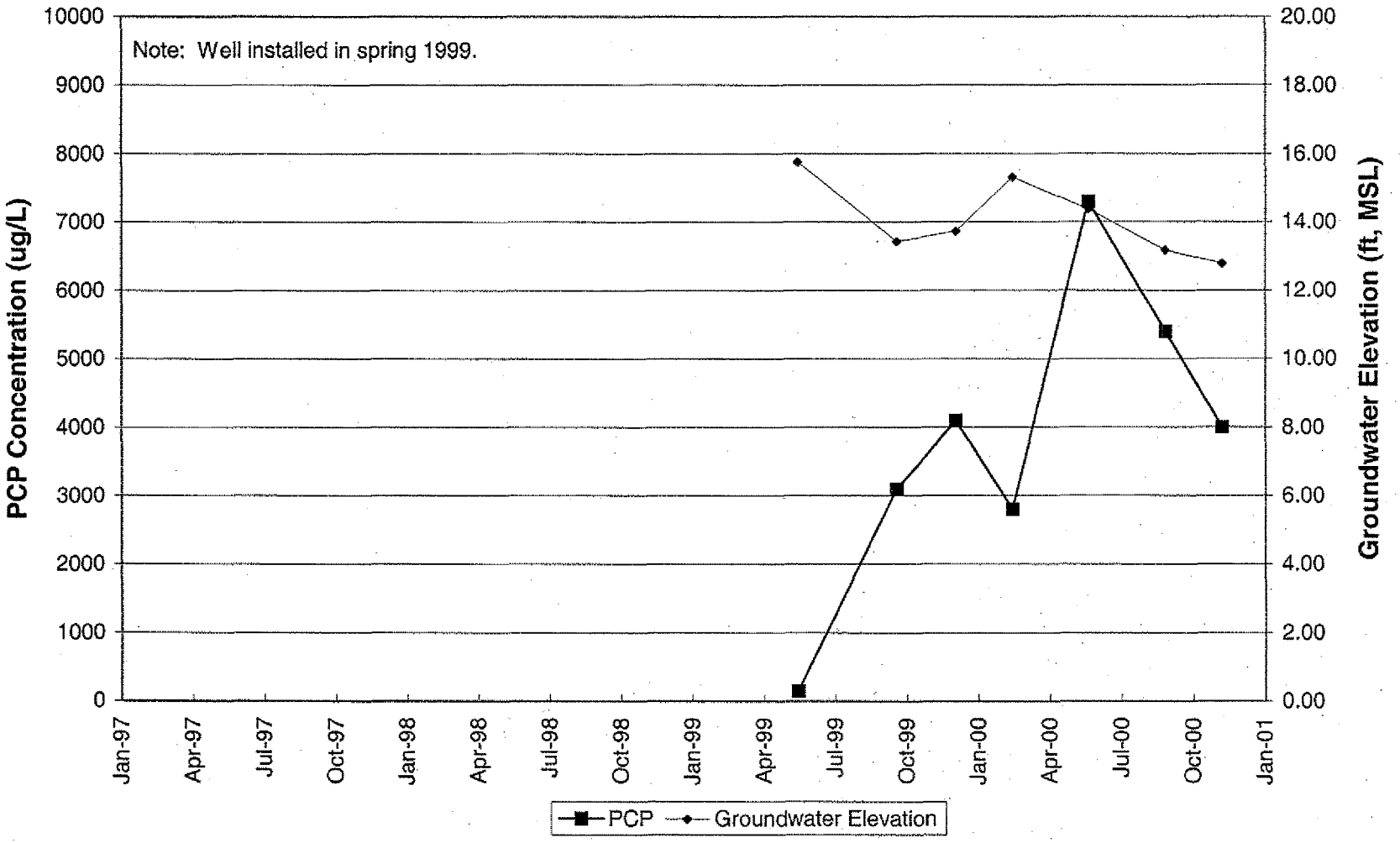


Note: (a) Concentration of PCP at well LW4S during the November 1998 event appears anomalous.

Landau Associates	Time Oil NW Terminal Portland, Oregon	**LW-4D and LW-4S PCP Concentrations and Groundwater Elevations**

Figure
5

1/17/01 S:\SHAREDOC\231\001\131\4q00_Fig 6.doc



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Time Oil NW Terminal Portland, Oregon	**RW-1** **PCP Concentrations and Groundwater Elevations**	Figure 6

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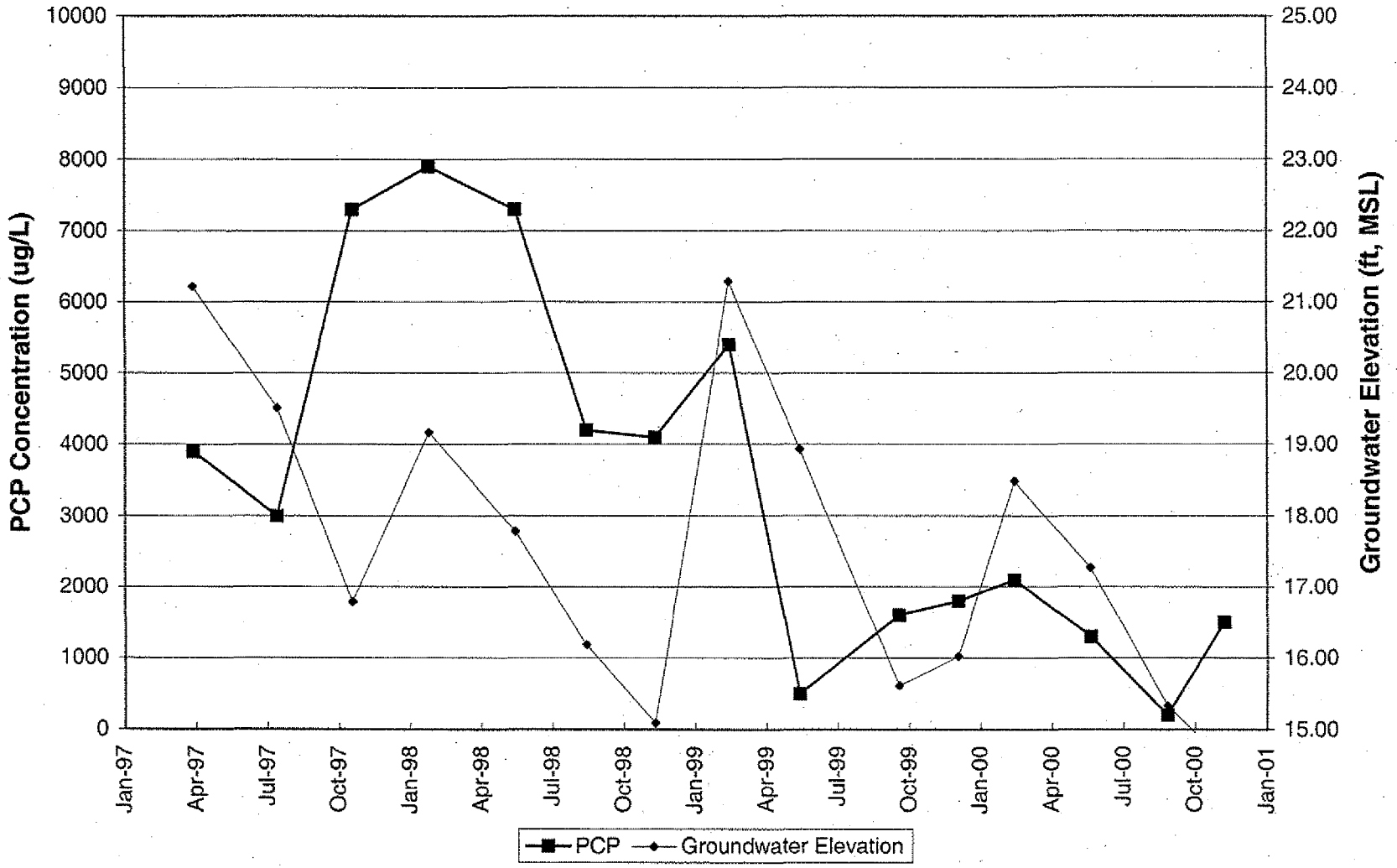

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Time Oil NW Terminal Portland, Oregon	**LW-2S** **PCP Concentrations and Groundwater Elevations**	Figure 7

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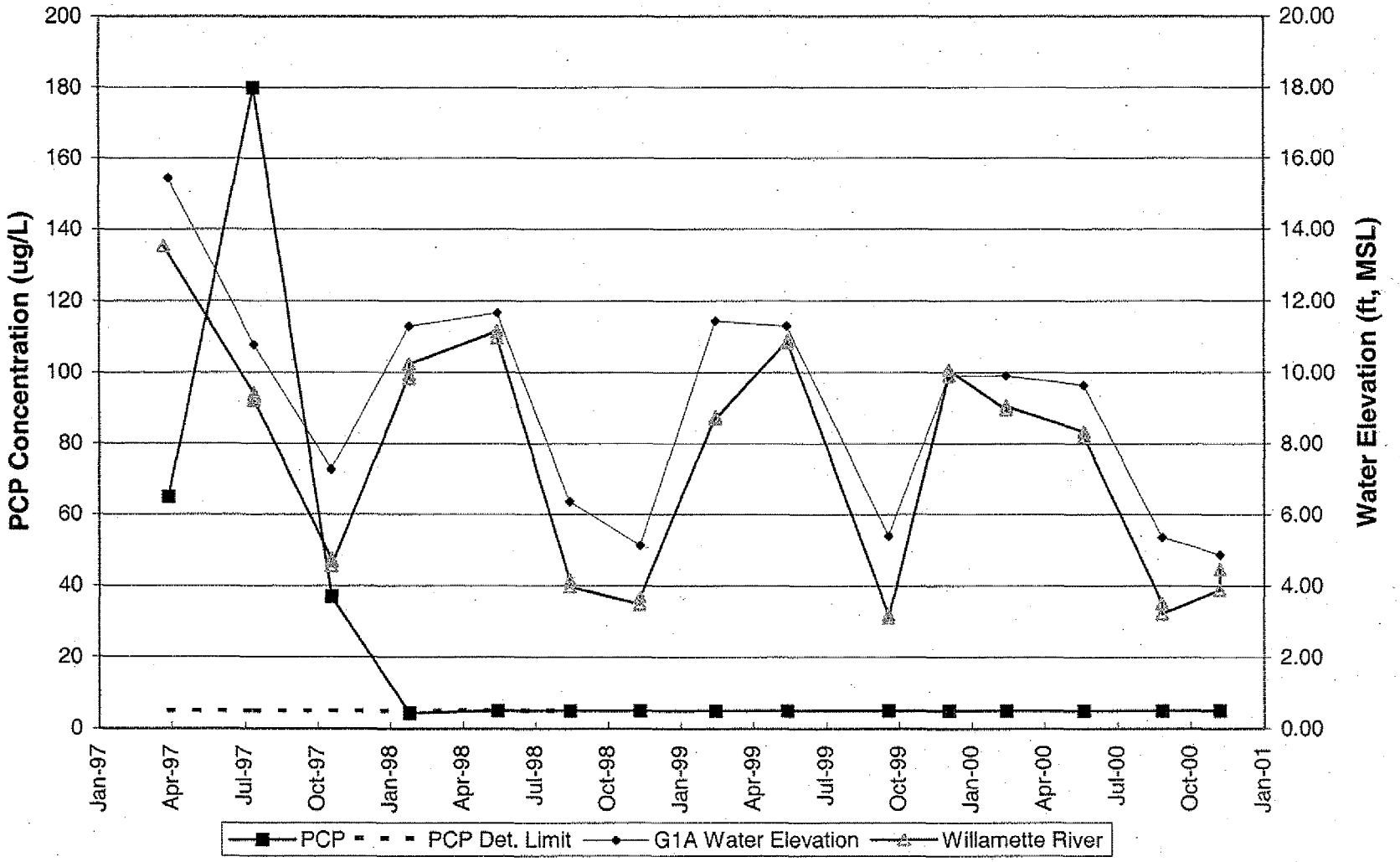

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Time Oil NW Terminal Portland, Oregon	**G1A** **PCP Concentrations and Water Elevations**	Figure 8

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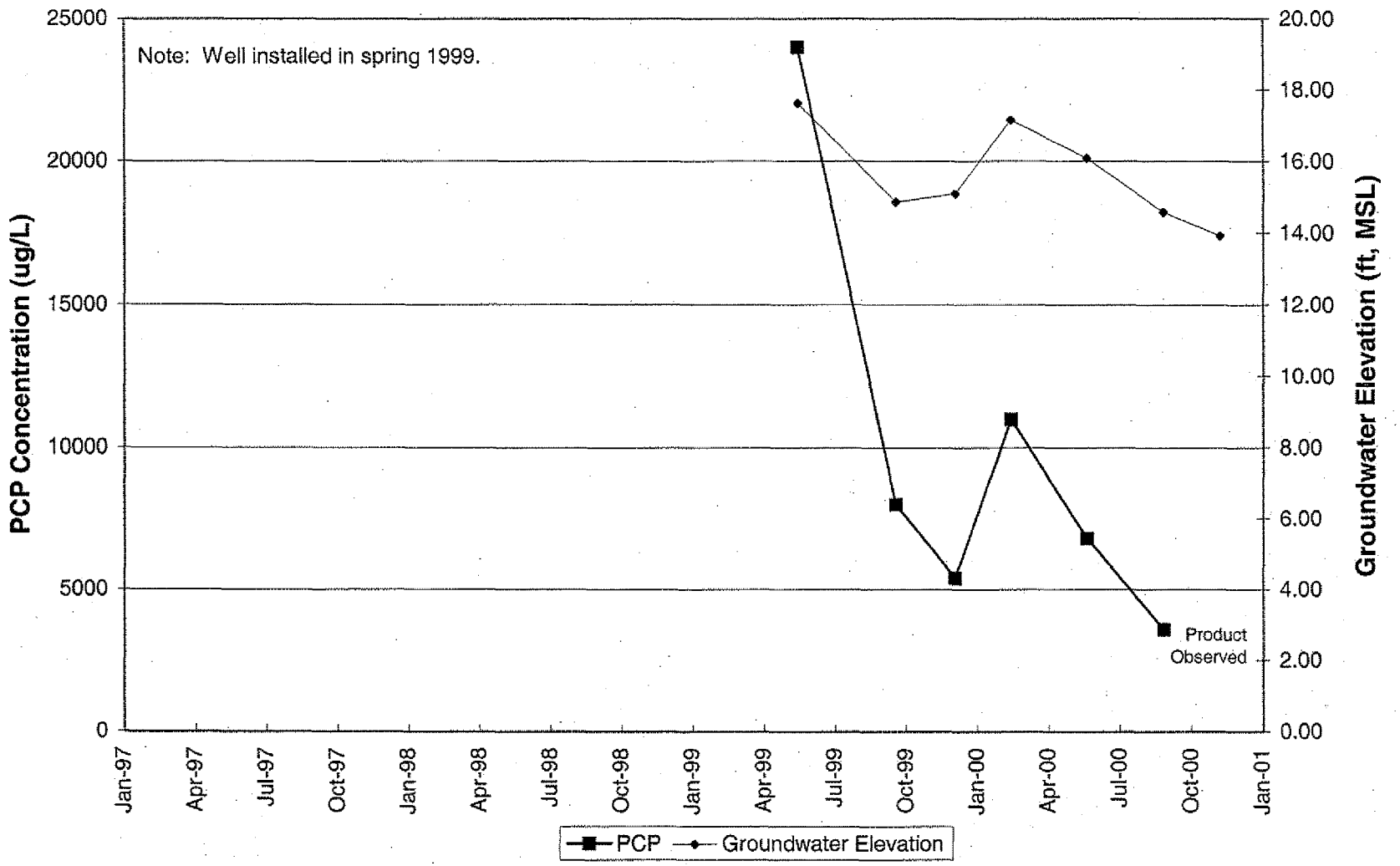

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Time Oil NW Terminal Portland, Oregon	**LW-11S** **PCP Concentrations and Groundwater Elevations**	Figure 9

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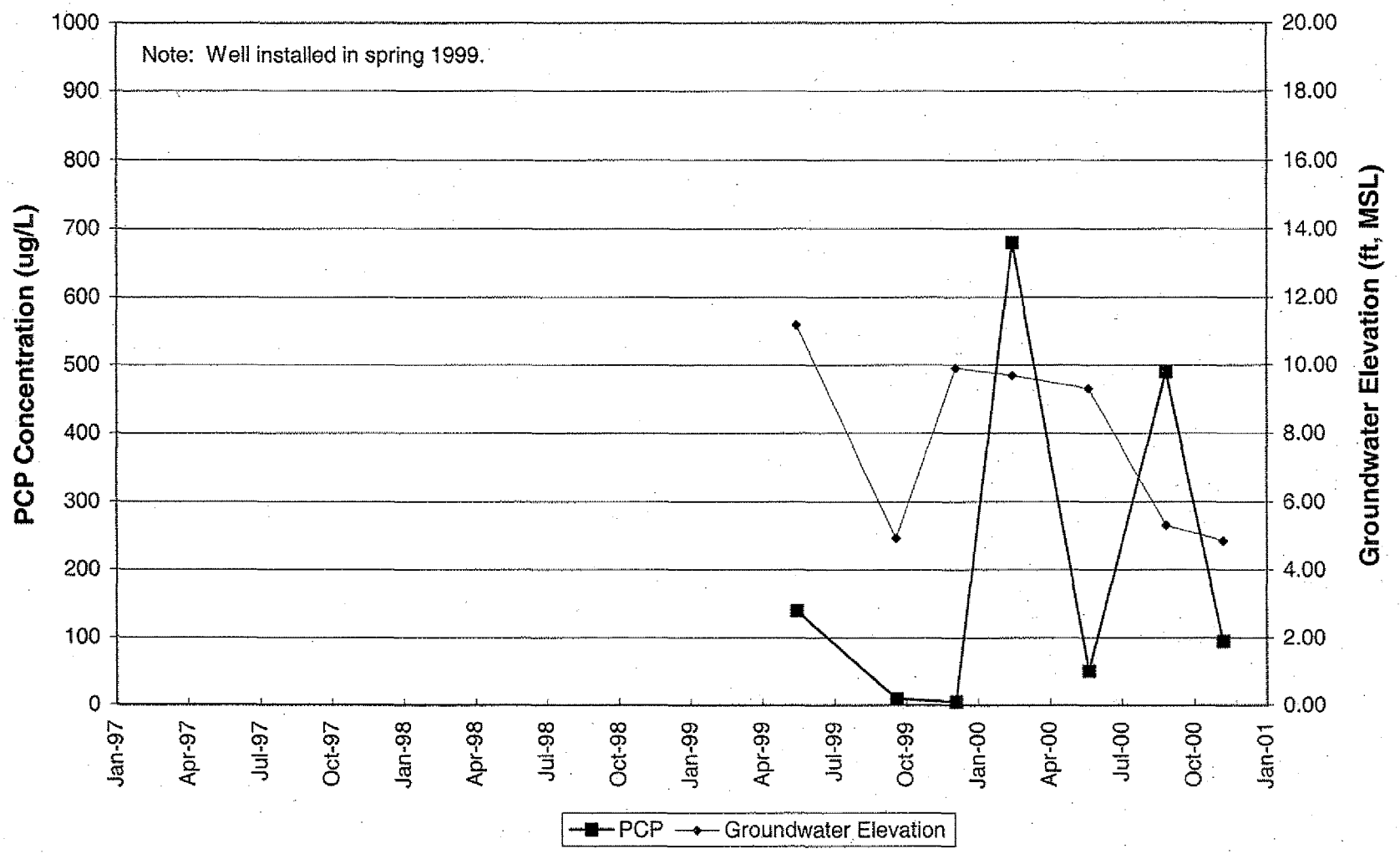

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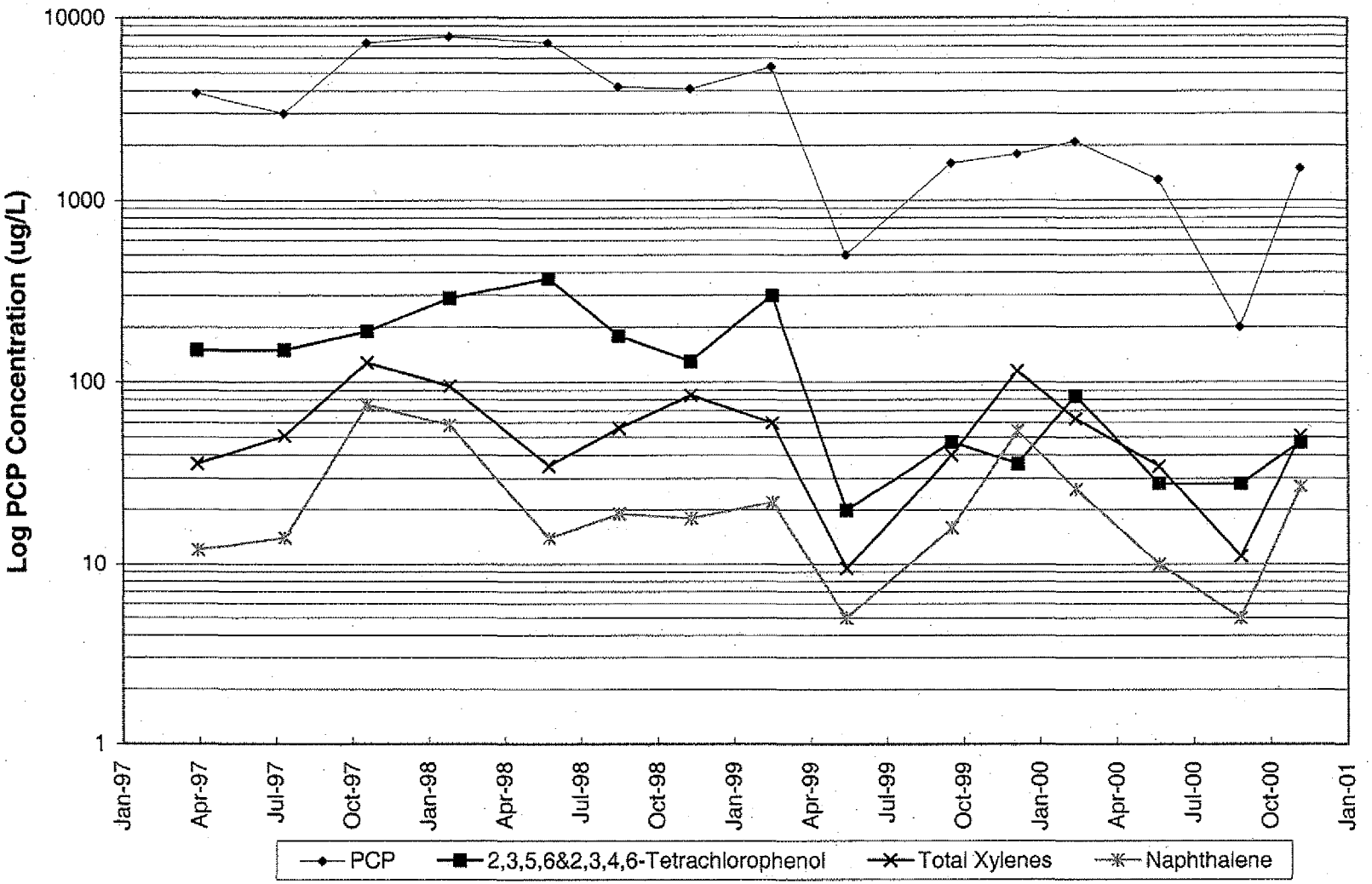
Time Oil NW Terminal Portland, Oregon	**RW-2** **PCP Concentrations and Groundwater Elevations**	Figure 10

BZTO104(e)016040

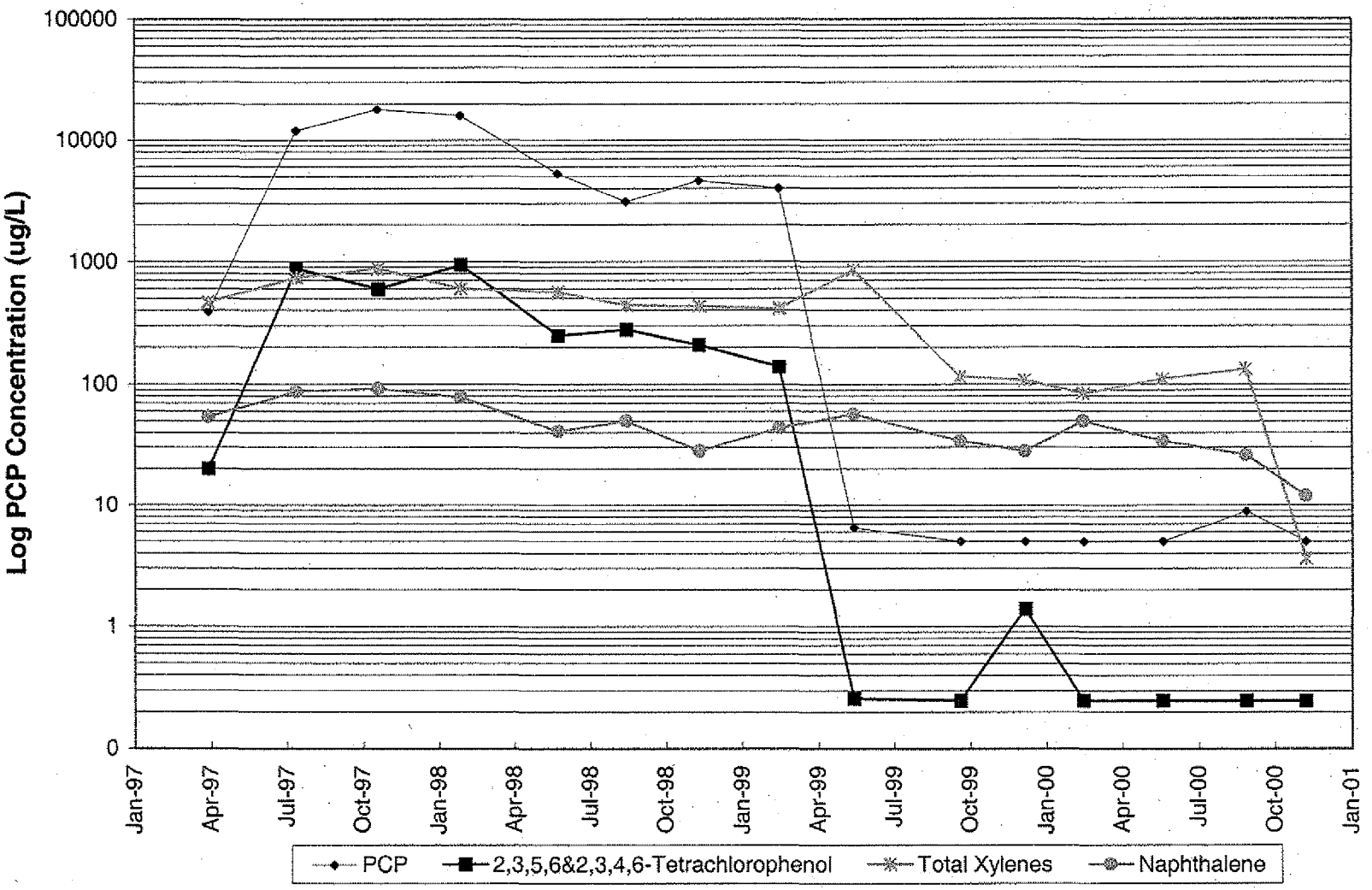
1/30/01 S:\SHAREDOC\231\001\131\4q00_Fig 11.doc



Landau Associates

Time Oil NW Terminal Portland, OR	**LW-2S** **Selected Constituents**	Figure 11

BZTO104(e)016041



Landau Associates

Time Oil NW Terminal Portland, Oregon	**LW-4D** **Selected Constituents**	Figure 12

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
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	----	
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	----	
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	----	
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?
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	----	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
F*	08/18/98	08:10	NA	14.77	NA		
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	—	—	
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	—	
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	—	
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	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
K	11/09/00	13:16	29.42	14.84	14.58	---	
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	---	
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	---	No product measured
N	11/09/00	12:26	31.40	18.23	13.19	0.03	
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	
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 A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
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	—	Small film of product
LW1S	03/31/97	11:12	27.96	6.65	21.31	—	
LW1S	07/16/97	08:15	27.96	8.34	19.62	—	
LW1S	10/21/97	16:53	27.96	11.02	16.94	—	
LW1S	01/27/98	13:00	27.96	8.75	19.21	—	
LW1S	05/18/98	17:40	27.96	9.15	18.81	—	
LW1S	08/17/98	10:54	27.96	11.67	16.29	—	
LW1S	11/13/98	10:02	27.96	12.76	15.20	—	
LW1S	02/16/99	13:24	27.96	6.60	21.36	—	
LW1S	05/18/99	15:38	27.96	8.92	19.04	—	
LW1S	09/21/99	12:10	27.96	12.20	15.76	—	
LW1S	12/06/99	14:33	27.96	11.86	16.10	—	
LW1S	02/16/00	10:50	27.96	9.42	18.54	—	
LW1S	05/23/00	17:18	27.96	10.52	17.44	—	
LW1S	08/29/00	13:58	27.96	12.51	15.45	—	
LW1S	11/09/00	13:17	27.96	13.26	14.70	—	
LW2S	03/25/97	12:22	29.56	8.06	21.50	—	
LW2S	03/31/97	11:27	29.56	8.34	21.22	—	
LW2S	07/16/97	08:33	29.56	10.05	19.51	—	
LW2S	10/21/97	17:04	29.56	12.77	16.79	—	
LW2S	01/27/98	13:25	29.56	10.39	19.17	—	
LW2S	05/18/98	18:02	29.56	11.78	17.78	—	
LW2S	08/17/98	10:56	29.56	13.38	16.18	—	
LW2S	11/13/98	10:32	29.56	14.47	15.09	—	
LW2S	02/16/99	13:42	29.56	8.27	21.29	—	
LW2S	05/18/99	15:45	29.56	10.63	18.93	—	
LW2S	09/21/99	12:34	29.56	13.95	15.61	—	
LW2S	12/06/99	15:11	29.56	13.54	16.02	—	
LW2S	02/16/00	10:38	29.56	11.08	18.48	—	
LW2S	05/23/00	17:24	29.56	12.29	17.27	—	
LW2S	08/29/00	14:12	29.56	14.23	15.33	—	
LW2S	11/09/00	13:04	29.56	15.00	14.56	—	
LW4S	03/31/97	09:20	30.26	12.77	17.49	—	
LW4S	07/16/97	07:40	30.26	14.66	15.60	—	
LW4S	10/21/97	16:25	30.26	16.88	13.38	—	
LW4S	01/27/98	12:00	30.26	15.13	15.13	—	
LW4S	05/18/98	17:32	30.26	16.08	14.18	—	
LW4S	08/17/98	11:07	30.26	17.30	12.96	—	
LW4S	11/13/98	09:56	30.26	17.96	12.30	—	
LW4S	02/16/99	13:16	30.26	13.10	17.16	—	
LW4S	05/18/99	15:03	30.26	15.43	14.83	—	
LW4S	09/21/99	11:44	30.26	17.61	12.65	—	
LW4S	12/06/99	14:19	30.26	17.08	13.18	—	
LW4S	02/16/00	10:31	30.26	15.84	14.42	—	
LW4S	05/23/00	16:55	30.26	16.71	13.55	—	
LW4S	08/29/00	13:39	30.26	17.78	12.48	—	
LW4S	11/09/00	12:53	30.26	18.17	12.09	—	
LW5S	03/25/97	12:29	30.79	10.57	20.22	—	
LW5S	03/31/97	11:35	30.79	10.84	19.95	—	
LW5S	07/16/97	08:53	30.79	12.29	18.50	—	
LW5S	10/21/97	15:16	30.79	15.00	15.79	—	
LW5S	01/27/98	13:36	30.79	12.90	17.89	—	
LW5S	05/18/98	18:05	30.79	14.19	16.60	—	
LW5S	08/17/98	11:09	30.79	15.54	15.25	—	
LW5S	11/13/98	10:38	30.79	16.55	14.24	—	
LW5S	02/16/99	13:16	30.79	10.59	20.20	—	
LW5S	05/18/99	16:01	30.79	13.12	17.67	—	
LW5S	09/21/99	12:40	30.79	16.00	14.79	—	
LW5S	12/06/99	14:47	30.79	15.64	15.15	—	
LW5S	02/16/00	09:56	30.79	13.54	17.25	—	
LW5S	05/23/00	17:51	30.79	14.80	15.99	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW5S	08/29/00	14:37	30.79	16.35	14.44	---	
LW5S	11/09/00	13:45	30.79	16.98	13.81	---	
LW7S	03/31/97	11:05	28.10	6.75	21.35	---	
LW7S	07/16/97	08:05	28.10	8.62	19.48	---	
LW7S	10/21/97	16:45	28.10	11.26	16.84	---	
LW7S	01/27/98	12:47	28.10	8.85	19.25	---	
LW7S	05/18/98	17:48	28.10	10.34	17.76	---	
LW7S	08/17/98	10:48	28.10	11.85	16.25	---	
LW7S	11/13/98	10:12	28.10	12.90	15.20	---	Strong gasoline odor
LW7S	02/16/99	13:53	28.10	6.81	21.29	---	
LW7S	05/18/99	15:23	28.10	9.14	18.96	---	
LW7S	09/21/99	12:03	28.10	12.37	15.73	---	
LW7S	12/06/99	14:27	28.10	12.00	16.10	---	
LW7S	02/16/00	10:46	28.10	9.60	18.50	---	
LW7S	05/23/00	17:09	28.10	10.70	17.40	---	
LW7S	08/29/00	13:53	28.10	12.64	15.46	---	
LW7S	11/09/00	13:14	28.10	13.36	14.74	---	
LW8S	05/18/99	14:55	31.28	14.84	16.44	---	
LW8S	09/21/99	12:24	31.28	16.94	14.34	---	
LW8S	12/06/99	14:40	31.28	16.63	14.65	---	
LW8S	02/16/00	10:16	31.28	15.18	16.10	---	
LW8S	05/23/00	17:42	31.28	15.88	15.40	---	
LW8S	08/29/00	14:26	31.28	17.06	14.22	---	
LW8S	11/09/00	13:32	31.28	17.55	13.73	---	
LW9S	05/18/99	14:57	31.04	19.58	11.46	---	Water level appears to be more representative of lower zo
LW9S	09/21/99	11:36	31.04	dry	---	---	
LW9S	12/06/99	14:13	31.04	19.64	---	---	Water in endcap
LW9S	02/16/00	10:24	31.04	19.59	---	---	Water in endcap
LW9S	05/23/00	16:39	31.04	dry	---	---	
LW9S	08/29/00	13:28	31.04	dry	---	---	
LW9S	11/09/00	12:42	31.04	dry	---	---	
LW10S	05/18/99	14:59	30.75	17.24	13.51	---	
LW10S	09/21/99	11:38	30.75	19.13	11.62	---	
LW10S	12/06/99	14:14	30.75	18.54	12.21	---	
LW10S	02/16/00	10:26	30.75	17.62	13.13	---	
LW10S	05/23/00	16:41	30.75	18.25	12.50	---	
LW10S	08/29/00	13:30	30.75	dry	---	---	
LW10S	11/09/00	12:45	30.75	dry	---	---	
LW11S	05/18/99	15:10	29.10	11.47	17.63	---	
LW11S	09/21/99	11:51	29.10	14.23	14.87	---	
LW11S	12/06/99	15:05	29.10	14.00	15.10	---	
LW11S	02/16/00	11:01	29.10	11.94	17.16	---	
LW11S	05/23/00	11:01	29.10	13.01	16.09	---	
LW11S	08/29/00	14:55	29.10	14.51	14.59	---	
LW11S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well.
LW13S	05/23/00	16:51	30.17	17.23	12.94	---	
LW13S	08/29/00	13:37	30.17	18.27	11.90	---	
LW13S	11/09/00	12:51	30.17	18.75	11.42	---	
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	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW101S	08/29/00	14:47	29.41	8.67	20.74	—	
LW101S	11/09/00	13:56	29.41	9.39	20.02	—	
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	—	
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	—	
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	—	
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	—	
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	—	
PZ-1	05/23/00	17:47	28.04	14.21	13.83	—	
PZ-1	08/29/00	14:30	28.04	15.33	12.71	—	
PZ-1	11/09/00	12:55	28.04	15.68	12.36	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
Deep Wells:							
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	---	
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	---	
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	---	
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	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
J3	11/09/00	13:27	29.58	24.24	5.34	—	
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	—	
O	08/29/00	12:56	32.03	26.49	5.54	—	
O	11/09/00	12:18	32.03	27.01	5.02	—	
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	—	
LW1D	03/31/97	11:11	28.31	12.71	15.60	—	
LW1D	07/16/97	08:12	28.31	17.65	10.66	—	
LW1D	10/21/97	16:55	28.31	21.29	7.02	—	
LW1D	01/27/98	13:07	28.31	17.06	11.25	—	
LW1D	05/18/98	17:39	28.31	16.53	11.78	—	
LW1D	08/17/98	10:30	28.31	21.82	6.49	—	
LW1D	11/13/98	10:01	28.31	22.77	5.54	—	
LW1D	02/16/99	13:21	28.31	17.30	11.01	—	
LW1D	05/18/99	15:36	28.31	16.76	11.55	—	
LW1D	09/21/99	12:12	28.31	22.91	5.40	—	
LW1D	12/06/99	14:34	28.31	18.00	10.31	—	
LW1D	02/16/00	10:49	28.31	18.16	10.15	—	
LW1D	05/23/00	17:19	28.31	18.62	9.69	—	
LW1D	08/29/00	13:59	28.31	22.81	5.50	—	
LW1D	11/09/00	13:20	28.31	22.98	5.33	—	
LW3D	03/31/97	11:45	30.80	19.38	11.42	—	Time estimated
LW3D	07/16/97	08:38	30.80	28.09	2.71	—	
LW3D	10/21/97	17:07	30.80	23.36	7.44	—	
LW3D	01/27/98	13:30	30.80	21.66	9.14	—	
LW3D	05/18/98	17:35	30.80	19.21	11.59	—	
LW3D	08/17/98	10:24	30.80	24.62	6.18	—	
LW3D	11/13/98	09:03	30.80	25.56	5.24	—	
LW3D	02/16/99	13:44	30.80	20.00	10.80	—	
LW3D	05/18/99	15:58	30.80	19.42	11.38	—	Purged dry at 11:00
LW3D	09/21/99	10:40	30.80	25.76	5.04	—	
LW3D	12/06/99	14:45	30.80	20.69	10.11	—	
LW3D	02/16/00	09:54	30.80	20.98	9.82	—	
LW3D	05/23/00	14:40	30.80	21.16	9.64	—	Purged dry at 13:10
LW3D	08/29/00	14:36	30.80	—	—	—	Well purged dry 8/28; sampled a.m. on 8/29
LW3D	11/09/00		30.80	—	—	—	Well sampled 11/8/00 - water level not representative

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW4D	03/31/97	09:18	30.17	14.73	15.44	---	
LW4D	07/16/97	07:42	30.17	19.43	10.74	---	
LW4D	10/21/97	16:27	30.17	23.02	7.15	---	
LW4D	01/27/98	11:56	30.17	18.84	11.33	---	
LW4D	05/18/98	17:33	30.17	18.54	11.63	---	
LW4D	08/17/98	10:18	30.17	23.81	6.36	---	
LW4D	11/13/98	09:57	30.17	24.99	5.18	---	
LW4D	02/16/99	13:17	30.17	18.79	11.38	---	
LW4D	05/18/99	15:04	30.17	18.77	11.40	---	Completed sampling at 13:40
LW4D	09/21/99	11:41	30.17	24.78	5.39	---	
LW4D	12/06/99	14:18	30.17	20.21	9.96	---	
LW4D	02/16/00	10:30	30.17	20.23	9.94	---	
LW4D	05/23/00	16:54	30.17	20.55	9.62	---	
LW4D	08/29/00	13:38	30.17	24.78	5.39	---	
LW4D	11/09/00	12:52	30.17	25.19	4.98	---	
LW6D	03/25/97	11:52	30.84	16.51	14.33	---	
LW6D	03/31/97	09:05	30.84	15.53	15.31	---	Faint odor
LW6D	07/16/97	07:30	30.84	20.74	10.10	---	
LW6D	10/21/97	16:16	30.84	24.05	6.79	---	
LW6D	01/27/98	11:38	30.84	19.94	10.90	---	
LW6D	05/18/98	17:28	30.84	19.36	11.48	---	
LW6D	08/17/98	10:05	30.84	24.92	5.92	---	
LW6D	11/13/98	09:50	30.84	25.94	4.90	---	
LW6D	02/16/99	13:11	30.84	20.40	10.44	---	
LW6D	05/18/99	14:53	30.84	19.81	11.03	---	
LW6D	09/21/99	11:32	30.84	25.92	4.92	---	
LW6D	12/06/99	14:09	30.84	20.86	9.98	---	
LW6D	02/16/00	10:20	30.84	21.27	9.57	---	
LW6D	05/23/00	16:35	30.84	21.64	9.20	---	
LW6D	08/29/00	13:20	30.84	25.93	4.91	---	
LW6D	11/09/00	12:35	30.84	26.21	4.63	---	
LW9D	05/18/99	14:56	30.98	20.02	10.96	---	
LW9D	09/21/99	11:34	30.98	25.23	5.75	---	
LW9D	12/06/99	14:11	30.98	21.04	9.94	---	
LW9D	02/16/00	10:23	30.98	21.17	9.81	---	
LW9D	05/23/00	16:39	30.98	21.15	9.83	---	
LW9D	08/29/00	13:27	30.98	25.36	5.62	---	
LW9D	11/09/00	12:43	30.98	25.96	5.02	---	
LW10D	05/18/99	15:00	31.12	19.82	11.30	---	
LW10D	09/21/99	11:37	31.12	25.81	5.31	---	
LW10D	12/06/99	14:15	31.12	21.18	9.94	---	
LW10D	02/16/00	10:27	31.12	21.20	9.92	---	
LW10D	05/23/00	16:42	31.12	21.51	9.61	---	
LW10D	08/29/00	13:29	31.12	25.86	5.26	---	
LW10D	11/09/00	12:46	31.12	26.26	4.86	---	
LW11D	05/18/99	15:09	29.04	18.59	10.45	---	
LW11D	09/21/99	11:50	29.04	20.76	8.28	---	
LW11D	12/06/99	15:06	29.04	21.81	7.23	---	
LW11D	02/16/00	11:02	29.04	20.35	8.69	---	
LW11D	05/23/00	17:37	29.04	19.50	9.54	---	
LW11D	08/29/00	14:54	29.04	---	---	---	Well purged dry 8/28; sampled a.m. on 8/29
LW11D	11/09/00		29.04	---	---	---	Well sampled 11/8/00 - water level not representative
LW12D1	05/18/99	15:13	30.02	18.45	11.57	---	
LW12D1	09/21/99	11:54	30.02	24.44	5.58	---	
LW12D1	12/06/99	14:21	30.02	19.72	10.30	---	
LW12D1	02/16/00	10:35	30.02	19.89	10.13	---	
LW12D1	05/23/00	17:00	30.02	20.23	9.79	---	
LW12D1	08/29/00	13:45	30.02	24.38	5.64	---	
LW12D1	11/09/00	13:00	30.02	24.66	5.36	---	
LW12D2	05/18/99	15:14	29.24	18.23	11.01	---	
LW12D2	09/21/99	11:53	29.24	24.69	4.55	---	
LW12D2	12/06/99	14:22	29.24	19.40	9.84	---	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW12D2	02/16/00	10:36	29.24	19.90	9.34	—	
LW12D2	05/23/00	16:59	29.24	20.38	8.86	—	
LW12D2	08/29/00	13:44	29.24	24.68	4.56	—	
LW12D2	11/09/00	13:01	29.24	24.56	4.68	—	
LW14D	05/23/00	16:50	30.54	21.26	9.28	—	
LW14D	08/29/00	13:35	30.54	25.68	4.86	—	
LW14D	11/09/00	12:49	30.54	25.90	4.64	—	
LW15D	05/23/00	16:49	30.85	21.26	9.59	—	
LW15D	08/29/00	13:34	30.85	25.54	5.31	—	
LW15D	11/09/00	12:48	30.85	25.98	4.87	—	
LW16D	05/23/00	16:48	28.4	18.79	9.61	—	
LW16D	08/29/00	13:32	28.4	23.07	5.33	—	
LW16D	11/09/00	12:47	28.4	23.59	4.81	—	
LW17D	08/29/00	13:21	27.82	22.96	4.86	—	
LW17D	11/09/00	12:36	27.82	23.17	4.65	—	
LW18D	08/29/00	13:25	27.82	22.79	5.03	—	
LW18D	11/09/00	12:40	27.82	22.91	4.91	—	
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.
Other:							
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	—	

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2000
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 c 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].

TABLE A-2
PRODUCT RECOVERY RECORD
WELL LW-11S
TIME OIL NORTHWEST TERMINAL

Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Reference Elevation (ft, MSL)	Groundwater Elevation (a) (ft, MSL)	Product Volume Removed (L)	Comments
11/8/2000	15.1	15.48	0.38	29.10	13.92	0.5	4th quarter sampling event; product sample sent to ARI
11/22/2000	15.12	15.81	0.69	29.10	13.84	1	
11/30/2000	15.12	15.78	0.66	29.10	13.85	1	Conducted by Time Oil
12/5/2000	15.11	15.79	0.68	29.10	13.85	1	
12/8/2000	15.16	15.77	0.61	29.10	13.82	0.95	Passive recovery system installed
12/12/2000						0.33	Conducted by Time Oil
12/13/2000						0.66	Conducted by Time Oil
12/15/2000	15.05	15.70	0.65	29.10	13.92	1.5	0.75 L from passive recovery system, 0.75 L from bailing
12/19/2000	15.19	15.54	0.35	29.10	13.84	0.3	Total from passive recovery system
12/22/2000	15.05	15.47	0.42	29.10	13.97	0.5	Total from passive recovery system
12/27/2000	14.86	14.91	0.05	29.10	14.23	0.6	Total from passive recovery system
12/29/2000		14.83	0	29.10	14.27	0.1	Total from passive recovery system
1/3/2001		14.78	0	29.10	14.32	0.015	Total from passive recovery system
1/5/2001		14.78	0	29.10	14.32	0	
1/9/2001		14.72	0	29.10	14.38	0	Adjusted passive bailer to account for rising water level
1/17/2001		14.71	0	29.10	14.39	0	
TOTAL PRODUCT VOLUME RECOVERED (L)						8.5	
			(gal)			2.2	

(a) Where measurable product was observed, groundwater elevation adjusted to account for the presence of product 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].

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TABLE A-3
LABORATORY ANALYSES REQUESTED
FOURTH QUARTER SAMPLING EVENT, NOVEMER 2000

Well	Semivolatiles (8270)	Volatiles (8260)	Chlorinated Phenols (8040)	TPH-D	TPH-D (extended)	TPH-G	PP Metals (6010/7000)	TDS	Chloride	Ethanol
B1	X	X	X	X	X	X	X	X	X	X
B2	X	X	X	X			X	X	X	
D	X	X	X	X			X	X	X	
G1A	X	X	X	X			X	X	X	
J1	X	X	X	X			X	X	X	
J2	X	X	X	X			X	X	X	
K							X			
O	X	X								
R	X	X								
LW1S	X	X	X	X			X	X	X	
LW1D	X	X	X	X			X	X	X	
LW2S	X	X	X	X			X	X	X	
LW3D	X	X	X	X			X	X	X	
LW4S	X	X	X	X			X	X	X	
LW4D	X	X	X	X			X	X	X	
LW6D	X	X	X	X			X	X	X	
LW7S	X	X	X	X			X	X	X	
LW8S	X	X	X	X	X	X	X	X	X	X
LW9S	X	X	X	X			X	X	X	
LW9D	X	X	X	X			X	X	X	
LW10S	X	X	X	X			X	X	X	
LW10D	X	X	X	X			X	X	X	
LW11D	X	X	X	X			X	X	X	
LW12D1	X	X	X	X			X	X	X	
LW12D2	X	X	X	X			X	X	X	
LW13S			X							
LW15D			X							
LW17D			X							
LW18D			X							
RW1	X	X	X	X	X	X	X	X	X	X
RW2	X	X	X	X	X	X	X	X	X	

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								SHALLOW WELLS	
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S	LW11S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C	CL03A	CK77K
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00	11/9/00	11/8/00
CHLORINATED PHENOLS (µg/L)										
EPA Method SW8040/SW8270AF MOD.										
Pentachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	1100	48	0.25 U	0.25 U	NA
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	NA
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	NA
2,4,5-Trichlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	0.33 U	3.8 U	0.25 U	0.25 U	NA
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	NA
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	47	4.1	0.25 U	0.25 U	NA
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	0.25 U	NA	0.25 U	1.6	5.9	0.25 U	0.25 U	NA
SEMIVOLATILES (µg/L)										
EPA Method SW8270										
Phenol	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.4 J2	730	2.0 U	2.0 U	NA
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
2-Chlorophenol	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U	5.0 U	NA
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
2-Methylphenol	2.2	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
4-Methylphenol	5.6	1.0 U	1.0 U	NA	1.0 U	1.0 U	120	1.0 U	1.0 U	NA
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
Hexachloroethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
Nitrobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
Isophorone	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
2-Nitrophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U	5.0 U	NA
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	9.0 U	3.0 U	3.0 U	NA
Benzoic Acid	10 U	10 U	10 U	NA	10 U	10 U	96	10 U	10 U	NA
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	10	3.0 U	3.0 U	NA
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U	1.0 U	NA
Naphthalene	2.0	1.0 U	1.0 U	NA	1.0 U	9.2	13	5.2	4.3	NA
4-Chloroaniline	3.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	9.0 U	3.0 U	3.0 U	NA
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	6.0 U	2.0 U	2.0 U	NA
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	5.7	1.6	4.7	NA
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U	5.0 U	NA
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U	5.0 U	NA
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U	5.0 U	NA

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CK77K	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/8/00	11/9/00	11/7/00	11/7/00
CHLORINATED PHENOLS (µg/L)					
EPA Method SW8040/SW8270AF MOD.					
Pentachlorophenol	0.25 U	NA	1.4	3400	3400
2,4,6-Trichlorophenol	0.25 U	NA	0.25 U	1.1	1.1
2,3,6-Trichlorophenol	0.25 U	NA	0.25 U	0.44 U	0.48 U
2,4,5-Trichlorophenol	0.25 U	NA	0.25 U	30 U	32 U
2,3,4-Trichlorophenol	0.25 U	NA	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	NA	0.25 U	630	640
2,3,4,5-Tetrachlorophenol	0.25 U	NA	0.25 U	16	16
SEMIVOLATILES (µg/L)					
EPA Method SW8270					
Phenol	2.0 U	NA	NA	8.2 J2	14 J2
Bis-(2-Chloroethyl) Ether	2.0 U	NA	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	NA	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
2-Methylphenol	2.0 U	NA	NA	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	NA	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	NA	NA	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	2.0 U	NA	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	NA	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Isophorone	1.0 U	NA	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	NA	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	NA	NA	3.0 U	3.0 U
Benzoic Acid	10 U	NA	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	NA	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	NA	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Naphthalene	4.3	NA	NA	7.1	5.8
4-Chloroaniline	3.0 U	NA	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	NA	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	NA	NA	2.0 U	2.0 U
2-Methylnaphthalene	4.7	NA	NA	2.2	1.7
Hexachlorocyclopentadiene	5.0 U	NA	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	NA	NA	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	NA	6.0 U	6.0 U	18 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	NA	10 U	10 U	30 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	NA	10 U	10 U	30 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	1500	120	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	15 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CK77K	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/8/00	11/9/00	11/7/00	11/7/00
2,4,5-Trichlorophenol	5.0 U	NA	NA	40	31
2-Chloronaphthalene	1.0 U	NA	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	NA	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	NA	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	NA	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	NA	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	NA	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	NA	NA	10 U	10 U
4-Nitrophenol	5.0 U	NA	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	NA	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	NA	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	NA	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	NA	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	NA	NA	1.0 U	1.0 U
Fluorene	1.0 U	NA	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	NA	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	NA	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	NA	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	NA	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	NA	NA	4000	3900
Phenanthrene	1.0 U	NA	NA	1.0 U	1.0 U
Carbazole	1.0 U	NA	NA	1.0 U	1.0 U
Anthracene	1.0 U	NA	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	NA	NA	1.5	2.0
Fluoranthene	1.0 U	NA	NA	1.0 U	1.0 U
Pyrene	1.0 U	NA	NA	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	NA	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	NA	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	NA	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	NA	NA	1.1	1.0 U
Chrysene	1.0 U	NA	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	NA	NA	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	NA	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	NA	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	NA	NA	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	2.0	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
Acetone	5.0 U	5.0 U	5.0 U	NA	5.0 U	27	49	110 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2-Butanone	28	5.0 U	5.0 U	NA	5.0 U	15 U	110	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Benzene	160	1.0 U	1.0 U	NA	1.0 U	3.0 U	7.4	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Toluene	1200	1.0 U	1.0 U	NA	1.0 U	3.0 U	19	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Ethylbenzene	100	1.0 U	1.0 U	NA	1.0 U	11	61	23
Styrene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CK77K	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/8/00	11/9/00	11/7/00	11/7/00
VOLATILES (µg/L)					
EPA Method SW8260					
Chloromethane	1.0 U	NA	NA	1.0 U	1.0 U
Bromomethane	1.0 U	NA	NA	1.0 U	1.0 U
Vinyl Chloride	1.0 U	NA	NA	1.0 U	1.0 U
Chloroethane	1.0 U	NA	NA	1.0 U	1.0 U
Methylene Chloride	2.0 U	NA	NA	2.0 U	2.0 U
Acetone	5.0 U	NA	NA	16	14
Carbon Disulfide	1.0 U	NA	NA	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	NA	NA	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	NA	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	NA	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	NA	NA	1.0 U	1.0 U
Chloroform	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	NA	NA	1.0 U	1.0 U
2-Butanone	12	NA	NA	7.4 J2	41 J2
1,1,1-Trichloroethane	1.0 U	NA	NA	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	NA	NA	1.0 U	1.0 U
Vinyl Acetate	5.0 U	NA	NA	5.0 U	5.0 U
Bromodichloromethane	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	NA	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	NA	NA	1.0 U	1.0 U
Trichloroethene	1.0 U	NA	NA	1.0 U	1.0 U
Dibromochloromethane	1.0 U	NA	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	NA	NA	1.0 U	1.0 U
Benzene	5.0	NA	NA	1.0	1.0 U
trans-1,3-Dichloropropene	1.0 U	NA	NA	1.0 U	1.0 U
Bromoform	1.0 U	NA	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	NA	NA	5.0 U	5.0 U
2-Hexanone	5.0 U	NA	NA	5.0 U	5.0 U
Tetrachloroethene	1.0 U	NA	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	NA	NA	1.0 U	1.0 U
Toluene	1.0 U	NA	NA	9.1	8.2
Chlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Ethylbenzene	8.5	NA	NA	96	86
Styrene	1.0 U	NA	NA	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	NA	NA	1.0 U	1.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
m,p-Xylene	320	1.0 U	1.0 U	NA	1.0 U	15	170	19
o-Xylene	160	1.0 U	1.0 U	NA	1.0 U	36	88	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	NA	50 U	150 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	NA	2.0 U	6.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	NA	3.0 U	9.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	15	1.0 U	1.0 U	NA	1.0 U	47	46	2.8
1,2,4-Trimethylbenzene	61	1.0 U	1.0 U	NA	1.0 U	250	160	1.6
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
Isopropylbenzene	9.0	1.0 U	2.5	NA	1.0 U	9.1	19	22
n-Propylbenzene	15	1.0 U	3.8	NA	1.0 U	20	27	33
Bromobenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	3.0 U	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	1.0 U	NA	1.0 U	9.3	7.7	2.6
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	NA	1.0 U	8.5	4.8	1.2
n-Butylbenzene	1.8 U	1.0 U	1.0 U	NA	1.0 U	9.5	6.8 U	3.2
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U
Naphthalene	25	5.0 U	5.0 U	NA	5.0 U	27	19	13
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	NA	5.0 U	15 U	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CK77K	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/8/00	11/9/00	11/7/00	11/7/00
1,1,2-Trichlorotrifluoroethane	2.0 U	NA	NA	2.0 U	2.0 U
m,p-Xylene	2.2	NA	NA	92	82
o-Xylene	1.0 U	NA	NA	160	150
1,2-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U
Acrolein	50 U	NA	NA	50 U	50 U
Methyl Iodide	1.0 U	NA	NA	1.0 U	1.0 U
Bromoethane	2.0 U	NA	NA	2.0 U	2.0 U
Acrylonitrile	5.0 U	NA	NA	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	NA	NA	1.0 U	1.0 U
Dibromomethane	1.0 U	NA	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	NA	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	NA	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	NA	NA	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	NA	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	NA	NA	29	25
1,2,4-Trimethylbenzene	2.6	NA	NA	240	250
Hexachlorobutadiene	5.0 U	NA	NA	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	NA	NA	1.0 U	1.0 U
Bromochloromethane	1.0 U	NA	NA	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	NA	NA	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	NA	NA	1.0 U	1.0 U
Isopropylbenzene	100	NA	NA	26	21
n-Propylbenzene	56	NA	NA	36	31
Bromobenzene	1.0 U	NA	NA	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	NA	NA	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	NA	NA	1.0 U	1.0 U
tert-Butylbenzene	4.9	NA	NA	1.0 U	1.0 U
sec-Butylbenzene	11	NA	NA	11	10
4-Isopropyltoluene	1.0 U	NA	NA	5.2	4.6
n-Butylbenzene	4.1	NA	NA	6.0	6.0
1,2,4-Trichlorobenzene	5.0 U	NA	NA	5.0 U	5.0 U
Naphthalene	6.6	NA	NA	11	12
1,2,3-Trichlorobenzene	5.0 U	NA	NA	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	CL03B	CK77F	CL03H	CK77L	CK77D	CK77I	CL03F	CK77C
Date Collected:	11/10/00	11/7/00	11/10/00	11/7/00	11/7/00	11/8/00	11/9/00	11/7/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0.37	0.25 U	0.25 U	NA	0.25 U	4.0 (b)	19	0.32 (b)
TPH-Motor Oil Range	0.50 U	NA	0.50 U	NA	NA	NA	5.0 U	NA
TPH-Gasoline Range	8.8	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.007	0.014	0.012	0.001 U	0.011	0.017	0.006	0.015
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
Copper (6010)	0.081	0.002 U	0.002 U	0.004 J2	0.002 U	0.005 J2	0.008	0.002 U
Lead (7421)	0.001 U	0.001 U	0.001 U	0.001	0.001	0.003	0.001	0.002
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.03	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.009	0.006 U	0.013	0.009	0.024
CONVENTIONALS								
Total Dissolved Solids (mg/L) (EPA 160.1)	140	220	160	NA	170	220	990	210
Chloride (mg/L) (EPA 325.2)	2.5	5.4	2.3	NA	3.6	26	7.7	4.1
FIELD PARAMETERS								
pH (avg)	4.89	5.41	5.27	5.05	5.21	5.58	5.74	5.18
Temperature (° C) (avg)	13.4	14.3	14.4	15.3	15.2	15.3	14.3	14.9
Conductivity (mS/cm) (avg)	222	300	212	323	207	302	884	302
Dissolved oxygen (mg/L) (avg)	0.84	2.04	1.09	2.36	1.86	0.98	0.62	2.02
Turbidity (NTU)	7	0	0	2	0	74	38	16
ETHANOL (mg/L)	5.0 U	NA	NA	NA	NA	NA	NA	NA

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	CL03A	CK77K	CL03U	CK77B	CK77A
Date Collected:	11/9/00	11/8/00	11/9/00	11/7/00	11/7/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)					
Method OR-DEQ					
TPH-Diesel Range	2.3	NA	NA	6.4 (b)	5.7 (b)
TPH-Motor Oil Range	0.50 U	NA	NA	0.50 U (b)	0.50 U (b)
TPH-Gasoline Range	3.9	NA	NA	9.7 (a)	9.9 (a)
PRIORITY POLLUTANT					
METALS (mg/L)					
Arsenic (7060)	0.022	NA	NA	0.006	0.006
Chromium (6010)	0.005 U	NA	NA	0.015	0.010
Copper (6010)	0.002 U	NA	NA	0.020 J2	0.016 J2
Lead (7421)	0.005	NA	NA	0.006	0.004
Nickel (6010)	0.01 U	NA	NA	0.01	0.01
Zinc (6010)	0.041	NA	NA	0.054	0.048
CONVENTIONALS					
Total Dissolved Solids (mg/L) (EPA 160.1)	190	NA	NA	220	230
Chloride (mg/L) (EPA 325.2)	4.2	NA	NA	7.3	6.2
FIELD PARAMETERS					
pH (avg)	5.74	NM	5.62	5.28	5.27
Temperature (° C) (avg)	14.7	NM	10.7	14.2	14.1
Conductivity (mS/cm) (avg)	352	NM	272	305	303
Dissolved oxygen (mg/L) (avg)	0.53	NM	1.47	0.69	0.72
Turbidity (NTU)	30	NM	1	408	421
ETHANOL (mg/L)	5.0 U	NA	NA	5.0 U	5.0 U

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
CHLORINATED PHENOLS (µg/L)										
EPA Method SW8040										
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,6-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,4,5-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,4-Trichlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,5,6- and 2,3,4,6-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
2,3,4,5-Tetrachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
SEMIVOLATILES (µg/L)										
EPA Method SW8270										
Phenol	2.0 U	2.0 U	2.0 U	6.4	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	2.0 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	1.0 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	1.0 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	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	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	1.0 U
2-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	2.0 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	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	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	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	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	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	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	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	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	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	5.4	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	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	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	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	4.1	1.0 U	1.0 U	11	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	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	5.0 U

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8040									
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	45	38
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
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
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	1.2 U	1.1
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
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	3.6	3.5
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	1.3	1.2
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	85	97
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	14	18
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	NA	NA	NA	21	22
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	13	14
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	31	32
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U

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TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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
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	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	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	2.1	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	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	6.0 U
Acenaphthene	1.0 U	1.0 U	1.8	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	5.0 U
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	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	2.0	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	1.0 U
Fluorene	1.0 U	1.0 U	3.5	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	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	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	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	1.0 U
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
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	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	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	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	2.2	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	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	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	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	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	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	2.2	1.0 U	1.0 U	1.0 U	1.0 U	2.8 U	1.0 U	1.0 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	1.0 U
Di-n-Octyl 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
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	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	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	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	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	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	1.0 U

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	NA	NA	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	77	95
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	2.7	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	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	NA	NA	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	1.0 U	1.0 U

BZTO104(e)016069

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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	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	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	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	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	2.0 U
Acetone	5.0 U	5.0 U	11	12	5.0 U	5.0 U	15	17 U	5.0 U	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	1.0 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	1.0 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	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	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	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	1.0 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	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.0 U	21	5.0 U	5.0 U	14	5.0 U	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	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	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	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	1.0 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	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	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	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	1.0 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	1.0 U
Benzene	1.0 U	1.0 U	7.7	77	1.0 U	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	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	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	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	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	1.0 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	1.0 U
Toluene	1.0 U	1.0 U	3.0	3.6	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	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	1.3	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	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	1.0 U

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
Acetone	5.0 U	12	5.0 U	5.0 U	NA	NA	NA	20	17
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	8.4	5.0 U	NA	NA	NA	30	24
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.8	2.7
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.5
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	27	29
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U

BZTO104(e)016071

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
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	2.0 U
m,p-Xylene	1.0 U	1.0 U	2.6	2.4	1.0	1.0 U	1.0 U	3.6	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	1.0 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	1.0 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	1.0 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	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-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	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-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	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	5.0 U	5.0 U	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	3.0 U	3.0 U	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	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	1.4	1.0 U	1.0 U	1.0 U	1.0 U	12	1.0 U	1.0 U
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	2.4 M	1.0 U	1.0 U	240	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	5.0 U	5.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	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	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	33	24	140	1.0 U	1.0 U	56	24	1.0 U
n-Propylbenzene	1.0 U	1.0 U	18	14	130	1.0 U	1.0 U	60	2.8	1.0 U
Bromobenzene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	3.7	1.0 U	1.0 U	2.9	2.8	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	6.7	4.4	19	1.0 U	1.0 U	9.1	6.4	1.0 U
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
n-Butylbenzene	1.0 U	1.0 U	2.5	1.3 U	12	1.0 U	1.0 U	7.0	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	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	12	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	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	78	81
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	15	15
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U	NA	NA	NA	100 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	NA	NA	NA	4.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	NA	NA	NA	6.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	3.1	4.8	1.0 U	NA	NA	NA	58	66
1,2,4-Trimethylbenzene	1.0 U	5.6	22	1.0 U	NA	NA	NA	200	220
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	1.3	1.0 U	NA	NA	NA	57	68
n-Propylbenzene	1.0 U	1.6	2.2	1.0 U	NA	NA	NA	75	90
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	2.1	2.8
sec-Butylbenzene	1.0 U	1.7	1.6	1.0 U	NA	NA	NA	11	14
4-Isopropyltoluene	1.0 U	1.0 U	1.6	1.0 U	NA	NA	NA	5.7	7.6
n-Butylbenzene	1.0 U	1.5	1.4 U	1.0 U	NA	NA	NA	11	14 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	22	25
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA	10 U	5.0 U

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TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS									
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D	LW9D
Laboratory Identification:	CL03J	CL03I	CL03P	CL03Q	CL03E	CK77E	CK77G	CL03G	CL03C	CL03D
Date Collected:	11/10/00	11/10/00	11/8/00	11/8/00	11/8/00	11/7/00	11/8/00	11/9/00	11/8/00	11/8/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)										
Method OR-DEQ										
TPH-Diesel Range	0.25 U	0.40	NA	NA	2.2	0.25 U	0.25 U	5.4	1.2	0.25 U
TPH-Motor Oil Range	0.50 U	0.50 U	NA	NA	NA	NA	NA	0.50 U	NA	NA
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT										
METALS (mg/L)										
Arsenic (7060)	0.006	0.008	NA	NA	0.033	0.005	0.016	0.028	0.015	0.030
Chromium (6010)	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.010
Copper (6010)	0.002 U	0.002 U	NA	NA	0.004	0.002 J2	0.004 J2	0.004	0.006	0.015
Lead (7421)	0.001 U	0.001 U	NA	NA	0.003	0.001	0.001	0.001 U	0.002	0.003
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	0.01 U
Zinc (6010)	0.006 U	0.006 U	NA	NA	0.009	0.007	0.017	0.013	0.008	0.028
CONVENTIONALS										
Total Dissolved Solids (mg/L) (EPA 160.1)	240	340	NA	NA	380	360	350	370	220	170
Chloride (mg/L) (EPA 325.2)	3.2	5.1	NA	NA	8.2	3.2	6.9	16	2.2	2.1
FIELD PARAMETERS										
pH (avg)	5.53	5.46	5.70	5.91	5.84	5.47	5.58	5.96	5.73	5.91
Temperature (° C) (avg)	13.3	12.8	13.4	13.5	13.7	14.0	12.7	13.3	13.8	13.4
Conductivity (mS/cm) (avg)	319	578	437	571	679	481	624	656	360	242
Dissolved oxygen (mg/L) (avg)	2.17	1.02	0.39	0.69	0.64	2.23	1.28	0.31	1.20	1.06
Turbidity (NTU)	0	0	509	1	7	7	26	143	0	64
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-5
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	LW10D	LW11D	LW12D1	LW12D2	LW15D	LW17D	LW18D	RW2	Dup of RW2 X
Laboratory Identification:	CL03O	CK77H	CL03K	CL03L	CL03T	CL03R	CL03S	CL03N	CL03M
Date Collected:	11/9/00	11/8/00	11/10/00	11/10/00	11/9/00	11/8/00	11/9/00	11/9/00	11/9/00
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	0.25 U	0.70 (b)	0.78	0.25 U	NA	NA	NA	5.2	5.0
TPH-Motor Oil Range	0.50 U	NA	0.50 U	0.50 U	NA	NA	NA	0.50 U	0.50 U
TPH-Gasoline Range	NA	NA	NA	NA	NA	NA	NA	4.6	5.0
PRIORITY POLLUTANT									
METALS (mg/L)									
Arsenic (7060)	0.022	0.007	0.019	0.020	NA	NA	NA	0.021	0.021
Chromium (6010)	0.013	0.016	0.010	0.005 U	NA	NA	NA	0.005 U	0.005 U
Copper (6010)	0.021	0.018 J2	0.016	0.004	NA	NA	NA	0.002 U	0.004
Lead (7421)	0.006	0.008	0.006	0.001 U	NA	NA	NA	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01	0.01 U	0.01 U	NA	NA	NA	0.01 U	0.01 U
Zinc (6010)	0.030	0.058	0.037	0.006 U	NA	NA	NA	0.116	0.122
CONVENTIONALS									
Total Dissolved Solids (mg/L) (EPA 160.1)	160	380	330	280	NA	NA	NA	320	310
Chloride (mg/L) (EPA 325.2)	2.0	14	3.3	3.3	NA	NA	NA	4.7	5.0
FIELD PARAMETERS									
pH (avg)	6.10	5.75	5.68	5.48	6.12	5.95	6.12	5.55	5.54
Temperature (° C) (avg)	13.0	12.8	12.2	13.3	12.8	13.5	12.8	12.7	12.7
Conductivity (mS/cm) (avg)	203	544	444	442	265	79	265	513	513
Dissolved oxygen (mg/L) (avg)	1.09	1.23	0.93	0.29	1.25	1.21	1.25	0.53	0.55
Turbidity (NTU)	264	5	218	0	238	72	238	12	12
ETHANOL (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

TABLE A-6
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product
Laboratory Identification:	LW11S
Date Collected:	CK77K
	11/8/00
CHLORINATED PHENOLS (µg/kg)	
EPA Method SW8040/SW8270AF MOD.	
Pentachlorophenol	3200000
VOLATILES (µg/kg)	
EPA Method SW8260	
Chloromethane	98000 U
Bromomethane	98000 U
Vinyl Chloride	98000 U
Chloroethane	98000 U
Methylene Chloride	200000 U
Acetone	490000 U
Carbon Disulfide	98000 U
1,1-Dichloroethene	98000 U
1,1-Dichloroethane	98000 U
trans-1,2-Dichloroethene	98000 U
cis-1,2-Dichloroethene	98000 U
Chloroform	98000 U
1,2-Dichloroethane	98000 U
2-Butanone	490000 U
1,1,1-Trichloroethane	98000 U
Carbon Tetrachloride	98000 U
Vinyl Acetate	490000 U
Bromodichloromethane	98000 U
1,2-Dichloropropane	98000 U
cis-1,3-Dichloropropene	98000 U
Trichloroethene	98000 U
Dibromochloromethane	98000 U
1,1,2-Trichloroethane	98000 U
Benzene	98000 U
trans-1,3-Dichloropropene	98000 U
Bromoform	98000 U
4-Methyl-2-Pentanone (MIBK)	49000 U
2-Hexanone	49000 U
Tetrachloroethene	98000 U
1,1,2,2-Tetrachloroethane	98000 U
Toluene	120000
Chlorobenzene	98000 U

TABLE A-6
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product LW11S
Laboratory Identification:	CK77K
Date Collected:	11/8/00
Ethylbenzene	1400000
Styrene	98000 U
Trichlorofluoromethane	98000 U
1,1,2-Trichlorotrifluoroethane	200000 U
m,p-Xylene	3200000
o-Xylene	2300000
1,2-Dichlorobenzene	98000 U
1,3-Dichlorobenzene	98000 U
1,4-Dichlorobenzene	98000 U
Acrolein	4900000 U
Methyl Iodide	98000 U
Bromoethane	200000 U
Acrylonitrile	490000 U
1,1-Dichloropropene	98000 U
Dibromomethane	98000 U
1,1,1,2-Tetrachloroethane	98000 U
1,2-Dibromo-3-chloropropane	490000 U
1,2,3-Trichloropropane	290000 U
trans-1,4-Dichloro-2-butene	490000 U
1,3,5-Trimethylbenzene	4300000
1,2,4-Trimethylbenzene	13000000
Hexachlorobutadiene	490000 U
Ethylene Dibromide	98000 U
Bromochloromethane	98000 U
2,2-Dichloropropane	98000 U
1,3-Dichloropropane	98000 U
Isopropylbenzene	1000000
n-Propylbenzene	2200000
Bromobenzene	98000 U
2-Chlorotoluene	98000 U
4-Chlorotoluene	98000 U
tert-Butylbenzene	98000 U
sec-Butylbenzene	1000000
4-Isopropyltoluene	1200000
n-Butylbenzene	1700000
1,2,4-Trichlorobenzene	490000 U
Naphthalene	640000
1,2,3-Trichlorobenzene	490000 U

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TABLE A-6
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FOURTH QUARTERLY SAMPLING EVENT, NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Sample Identification:	Product LW11S
Laboratory Identification:	CK77K
Date Collected:	11/8/00
TOTAL PETROLEUM HYDROCARBONS (mg/kg)	
Method NWTPH HCID	
Gas Range	1300000 (c)
Diesel Range	81000
Oil Range	50000 U

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TABLE 7
KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS FOR TABLES A-4, A-5, AND A-6

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.

J1 = Laboratory flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J2 = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

[ ] = 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 hydrocarbon patterns that eluted in the range between mineral spirits and diesel #2 were detected; however the elution patterns do not match available standards.

(c) An explanation for this concentration is provided in the data validation report (Appendix B).

APPENDIX B

Data Validation Report

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Rebekah Brooks, Project Manager, Landau Associates

CC: Mr. Thomas Roick, Oregon Department of Environmental Quality (DEQ)
Mr. Kevin Murphy, Time Oil Co.
Ms. Patty Dost, Schwabe, Williamson & Wyatt

FROM: Mary Hubbard, Landau Associates

DATE: December 20, 2000

RE: TIME OIL NORTHWEST TERMINAL
FOURTH QUARTER 2000 GROUNDWATER MONITORING
LABORATORY DATA QUALITY EVALUATION

This technical memorandum provides the results of a data quality evaluation for 33 groundwater samples and one product sample collected at the Time Oil Northwest Terminal between November 7 and 10, 2000 for the Phase II remedial investigation (RI) fourth quarter 2000 groundwater monitoring event. A data quality evaluation was performed for analyses of total petroleum hydrocarbons (TPH) (Oregon Department of Environmental Quality TPH-D, TPH-D extended, and TPH-G); volatile organic compounds (VOC) (EPA method 8260); chlorophenols (EPA method 8040); semivolatile compounds (SVOC) (EPA method 8270); selected priority pollutant metals (EPA method 6010/7000 series); chloride (EPA method 325.2); total dissolved solids (TDS) (EPA method 160.1); and ethanol (EPA method 8015). All of the above analyses were performed by Analytical Resources, Inc. (ARI), Seattle. This data quality evaluation covers ARI data packages CK77 and CL03. The data quality evaluation was performed in accordance with the quality assurance project plan (QAPP) contained in Appendix B of the *Phases I and II Remedial Investigation/Feasibility Study* work plan (Landau Associates 1996), and with applicable portions of the U.S. Environmental Protection Agency (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
- Blank results (laboratory, method, and field)
- Surrogate recoveries

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- Laboratory matrix spikes and matrix spike duplicates (MS/MSD) (including laboratory control samples)
- Duplicate analyses (field and laboratory)
- Quantitation limits
- Conclusions 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.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package. One minor discrepancy was noted in the case narrative for data package CL03. Two of the samples were misidentified on the chain-of-custody. Landau confirmed the correct sample IDs, and ARI reported the data correctly. The laboratory received all samples in good condition and all analyses requested were performed. For the TPH analyses, the laboratory performed the TPH-D extended analysis for seven samples which were indicated for only TPH-D analysis on the chain-of-custody form.

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 time, with the following exception. The product sample from LW-11S was extracted for both pentachlorophenol and TPH analyses 12 days after sample collection. According to EPA methodology, the holding time from sample collection to sample extraction for these two analyses is 7 days for water and 14 days for solid material. Because the product sample is neither water nor a solid material, and the sample was extracted within a holding time intermediate to the two matrices, the data were not qualified with respect to holding time.

SURROGATE SPIKE RECOVERIES

All of the surrogate recoveries were within the project-specified control limits with the following exceptions:

- Recovery for one of the surrogates associated with the SVOC analysis of sample X exceeded the current laboratory and project-specified upper 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.
- All surrogates were diluted out during reanalysis of diluted samples W, RW-1, and LW-2S for SVOCs. Because recoveries during the initial (nondiluted) analysis of these samples were within the laboratory and/or project-specified control limits, no qualifiers were assigned.

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- The 2,4,6-tribromophenol surrogate was diluted out during the second dilution analysis of samples W, RW-1, and LW-2S for chlorophenols. Because recoveries during the initial (nondiluted) analyses and first dilution analyses of these samples were within the laboratory and/or project-specified control limits, no qualifiers were assigned.

- The product sample from LW-11S was analyzed for pentachlorophenol only by EPA method 8040. Due to the large dilution required for quantitation of the target analyte, the surrogate was diluted out of the sample. No qualifiers were assigned.

- During TPH analysis of the product sample from LW-11S, the surrogate was diluted out on the dilution run. The sample was diluted due to a large pattern on the gas and mineral spirit range exceeding the linear range of the curve. Because the recovery during the initial (nondiluted) analysis of the sample was within the laboratory and/or project-specified control limits, no qualifiers were assigned.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

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 chloride analyses with the following exceptions.

- The product sample from LW-11S collected on 11/08/00 and reported in data package CK77 was analyzed for pentachlorophenol in a separate analysis, and no MS/MSD pair was analyzed. Although no MS/MSD sample was analyzed for pentachlorophenol during analysis of the product sample, a MS/MSD sample was analyzed for chlorinated phenols with the water samples in this same batch, which met the frequency requirement of at least one MS/MSD sample per laboratory batch of samples. Therefore, no corrective action was taken.

- Although not stated in the case narrative, the water samples in data package CL03 were batched together with the water samples in data package CK77 for the ethanol analysis for quality control (QC) purposes. Therefore, the MS/MSD results for ethanol in data package CK77 also apply to the samples in data package CL03. The frequency requirement of one MS/MSD pair per 20 samples was also met in this instance; therefore, no corrective action was taken.

For all analyses, each MS/MSD was performed using a project sample. Recoveries and relative percent difference (RPDs) for the MS/MSDs were within the project-specified control limits with the following exception. For the VOC analyses associated with data package CL03, the RPD between the MS/MSD results for the compound trans-1,4-dichloro-2-butene slightly exceeded the RPD control criteria. The compound was not detected in the associated project samples; therefore, no qualification of the data was necessary.

LABORATORY DUPLICATE

At least one laboratory duplicate sample was analyzed for total metals, total dissolved solids, and chloride. All RPDs were within the laboratory and project-specified control limits. No qualification of the data was necessary.

LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample/blank spike was analyzed with each batch of samples (except for the total dissolved solids and chloride analyses). Laboratory control sample duplicates were performed with the OTPH-G analysis associated with data package CK77. Laboratory-specified control limits were met for each laboratory control sample recovery with the following exceptions:

- During the SVOC analyses of the laboratory control samples in data packages CK77 and CL03, the recovery of the spiking compound pentachlorophenol was slightly below the current laboratory lower control limit, indicating a potential low bias. Because the MS/MSD recoveries associated with both batches of samples were acceptable, no qualifiers were assigned.

- During the TPH-D extended analysis for data package CL03, the recovery of the diesel range hydrocarbon spiking compound was slightly above the current laboratory upper control limit, indicating a potential high bias. Because the MS/MSD recoveries associated with the batch of samples were acceptable, no qualifiers were assigned.

The RPDs between the laboratory control sample duplicate results for the OTPH-G analyses were within the laboratory-specified control limits. No qualification of the data was necessary.

METHOD BLANKS

Method blanks were analyzed with each batch of samples. No contamination was detected in any of the method blanks, with the following exception.

- Bis(2-ethylhexyl)phthalate was detected in the method blank associated with the SVOC analyses included in data package CL03. Bis(2-ethylhexyl)phthalate was also detected in one associated project sample at a concentration less than 10 times the method blank concentration; therefore, the bis(2-ethylhexyl)phthalate result for this sample was qualified as nondetected (U), as indicated in Table 1.

FIELD BLANKS

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 with each shipment of samples. No VOCs were detected in the trip blanks that were submitted for analysis. No qualification of the data was necessary.

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FIELD DUPLICATE RESULTS

Two blind field duplicate water samples (RW-1/W and RW-2/X) were collected during this sampling event. The project-specified criterion of at least one blind field duplicate sample per 20 samples was met. Alternate control limits (± the detection limit) were used to assess precision between duplicate results for samples RW-1 and W for the VOC compound 2-butanone and the SVOC compound phenol. The results for these two compounds were within five times the detection limit in sample RW-1, triggering the alternate control limits. These alternate control limits were exceeded; therefore the detected 2-butanone and phenol concentrations in the associated samples (W, RW-1, and LW-2S) were qualified as estimated (see Table 1). Copper results in data package CK77 were also qualified as estimated (J) based on low precision demonstrated by exceedance of the RPD control limit (20%).

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples except for the following:

- The reporting limits for pentachlorophenol (analyzed using EPA method 8270) for all samples were higher than the project-specified quantitation limit (5.0 vs. 1.0 ppb); however, the reporting limits for pentachlorophenol (analyzed using modified EPA method 8040) met the project-specified quantitation limit of 0.25 ppb. Two samples in data package CL03 (O and R) were analyzed for pentachlorophenol by EPA method 8270 only; therefore, the reporting limits for pentachlorophenol for these two samples exceed the project-specified quantitation limits.

- The reporting limits for SVOCs for sample LW-4S and for VOCs for sample LW-2S were about three times higher than project-specified quantitation limits due to dilution requirements.

- The reporting limits for 2,4,5-trichlorophenol for samples LW-4S and RW-2 were higher than project-specified quantitation limits due to peak interferences. In addition, two samples (RW-1 and W) had no values reported in the initial analysis for 2,4,5-trichlorophenol due to saturation of the detector. While in the diluted analysis, the concentrations were reported as undetected with a raised detection limit above the project-specified quantitation limit due to peak interferences.

- The reporting limits for acrolein (50 ppb) in all samples were above the project-specified quantitation limits of 1-10 ppb. This is the current laboratory quantitation limit for acrolein; therefore, no corrective action was taken.

- The reporting limits for VOCs for sample RW-2 were about two times higher than project-specified quantitation limits due to dilution requirements.

- The reporting limits for acetone in samples LW-4D and LW-7S and n-butylbenzene in sample X were raised due to matrix interference.

- The reporting limits for the motor oil range (500 ppb) in the TPH-D extended analysis were twice the project-specified quantitation limits of 250 ppb. This is the current laboratory quantitation limit for the motor oil range; therefore, no corrective action was taken.

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- The reporting limits for VOCs and TPH analyses for the product sample from LW-11S were elevated due to the large dilution required for quantitation of the target analytes.

Overall Data Quality and Completeness

Data precision was evaluated through laboratory, field, and matrix spike 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.

Other factors that may affect the use of the data include the following:

- As reported by the laboratory, samples W and RW-1 showed detectable hydrocarbons in the gas range. However, the elution patterns generated did not match the laboratory's gasoline standard. A footnote to this effect has been added to the Landau Associates summary data tables.

- As reported by the laboratory, samples LW-7S, LW-11D, LW-2S, W, and RW-1 showed detectable hydrocarbon patterns that eluted in the range between mineral spirits and diesel #2; however, the elution patterns do not closely match either product. A footnote to this effect has been added to the Landau Associates summary data tables.

- The product sample from LW-11S was not water miscible; therefore the sample was extracted in methanol and then analyzed. Results for this sample are reported on an as-received basis.

- For the TPH analysis, the product sample from LW-11S had a result for the gasoline range of 1,300,000 mg/kg. The laboratory confirmed that even though there was an area response in each of the carbon ranges when compared to the gasoline, diesel, and motor oil standards, the sample's chromatographic pattern appears to be that of a middle distillate (e.g., mineral spirits). Because of knowledge about prior use at the terminal, the laboratory ran the sample against a mineral spirits standard using a single point calibration. A concentration for the mineral spirit range was estimated at 55 percent. This value is an estimate because the original product is not available for comparison as a standard, and use of the single point calibration is less accurate than the multipoint calibration required by the method.

- The extraction laboratory described sample LW-4D (data package CL03) as a light fuel mixed with water. The laboratory noted that several other samples in this data package also had a fuel odor.

The completeness for this set of data is 100 percent, which exceeds the project-specified goal of 90 percent.

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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. 1996. *Phases I and II Remedial Investigation/Feasibility Study Work Plan.*

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APPENDIX C

Laboratory Data

LAB DATA IS NOT INCLUDED IN THIS REPORT

Landau Associates
Environmental and Geotechnical Services

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ED

TRANSMITTAL

RECD FEB 20 2001

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

Date: February 13, 2001

Attn: Mr. Kevin Murphy

Project No.: 231001.117

RE: Time Oil

Copies	Description
1	Memorandum RE: Groundwater Interim Action Status Report, 4th Quarter 2000, Time Oil Northwest Terminal, dated February 13, 2001

Message:

Please find enclosed 1 copy of the above-referenced document. Please call me if you have any questions.

LANDAU ASSOCIATES, INC.

By: Rhonda Morr
For Charles P. Halbert
Senior Staff Engineer

CPH/rgm
Enclosures

cc: Don Butler, Time Oil Co.
Patty Dost, Schwabe Williamson & Wyatt
Tom Roick, DEQ
Mike Tischuk, Beazer East, Inc.

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Landau Associates
Environmental and Geotechnical Services

MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Jerry Ninteman, Landau Associates

DATE February 13, 2001

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – 4TH QUARTER 2000
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 in Portland, Oregon for the fourth quarter of 2000. Figure 1 shows a site plan for the Northwest 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

Operation of the groundwater interim action system commenced on October 5, 2000 and continued throughout the fourth quarter of 2000 with one inoperative period from November 6 to November 11, 2000. Groundwater extraction and treatment has been restricted to the lower water-bearing zone at well RW-2 due to the low groundwater level in horizontal well HRW-1. The low water level alarm in HRW-1 will continue to be monitored daily (on days the terminal is operating) during the first quarter of 2001 to identify when the water level is sufficiently high to allow for groundwater extraction from HRW-1.

System operation data were evaluated in accordance with the startup monitoring plan (Landau Associates 2000) to confirm fourth quarter 2000 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.

Initial lower zone startup monitoring activities were performed October 2-16, 2000, in accordance with the groundwater interim action startup plan (Landau Associates 2000). The results of the initial investigation are summarized in a technical memorandum for lower zone startup monitoring (Landau Associates 2001a). Conclusions of the initial evaluation indicated that operation of recovery well RW-2 at a groundwater extraction rate of 10 gpm resulted in a hydraulic capture zone that contains the entire lower zone PCP plume, as defined by the third quarter 2000 groundwater data. Furthermore, a groundwater extraction rate of 10 gpm in the lower water-bearing zone does not appear to increase the

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vertical hydraulic gradient between the upper and lower zones. The ultimate recommendation was that recovery well RW-2 be operated at a groundwater extraction rate of 10 gpm with continued monitoring as described in the startup plan.

Following the initial lower zone startup monitoring, RW-2 continued pumping at an extraction rate of 10 gpm until November 6, 2000. To test the high tank level alarm, groundwater extracted during operation of the interim action system was contained in storage tank number 16804 until the water level reached the high tank alarm height. After the high tank level alarm was activated, pumping from well RW-2 was temporarily suspended while maintenance work was performed on the water treatment system. The water treatment system began processing groundwater from the storage tank on November 7, 2000. Groundwater extraction from RW-2 was resumed on November 11, 2000 and continued for the remainder of the fourth quarter.

Recovery well RW-2 operated for 1,905 hours (approximately 79 days) and extracted approximately 1,180,000 gallons of groundwater during the fourth quarter of 2000. Approximately 990,000 gallons of groundwater were treated and discharged in the fourth quarter of 2000. The remaining volume of extracted groundwater was contained in storage tank number 16804 at the terminal pending treatment at the end of the fourth quarter.

DATA COLLECTION AND RESULTS

As discussed above, upper zone and lower zone groundwater levels were monitored during the initial lower zone startup phase for use in evaluation of the appropriate groundwater extraction rate for long-term operation. These data were evaluated and presented in a technical memorandum dated January 26, 2001 (Landau Associates 2001a). Subsequent groundwater level measurements were collected monthly on November 22, 2000 and December 19, 2000 to confirm that hydraulic capture of the known extent of the lower zone PCP plume was maintained by the 10 gpm extraction rate from RW-2. Groundwater level data from November and December 2000, which are included in Tables 1 and 2, respectively, suggest that hydraulic capture is achieved beyond well LW-10D to the south and well LW-18D to the west. Groundwater level measurements to monitor interim action performance in the lower zone will continue on a quarterly basis beginning in the first quarter of 2001.

One water sample was collected from the point of discharge downstream of the water treatment system on December 6, 2000. This sample showed that the treated groundwater contained PCP at a concentration of 5.89 µg/L. Subsequent sampling performed on December 20, 2000 demonstrated that the water treatment system reduced PCP concentrations from an influent concentration of 39 µg/L to a level of 9.73 µg/L at the point of discharge. The PCP concentrations in the discharge samples from the

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fourth quarter of 2000 were less than the discharge limitation of 40 µg/L, as defined in the Metro permit (Permit No. 400-121) for discharge to the sanitary sewer.

Groundwater samples were collected from five interim action wells (LW-13S, LW-15D, LW-17D, LW-18D, and RW-2) on November 8-9, 2000, during the fourth quarter 2000 sampling event. PCP was detected at concentrations of 1.4 µg/L in well LW-13S and 77 µg/L in recovery well RW-2. PCP was not detected at a detection limit of 0.25 µg/L in samples collected from wells LW-15D, LW-17D, and LW-18D. Analytical reports and data validation results for these samples are included with the data presented in the *Fourth Quarter 2000 Groundwater Report* (Landau Associates 2001b).

REFERENCES

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

Landau Associates. 2001a. Technical memorandum to Kevin Murphy, Time Oil Co., and Don Butler, Time Oil Co. from Chip Halbert and Jerry Ninteman *Re: Groundwater Interim Action Startup Monitoring – RW-2, Time Oil Northwest Terminal, Portland, Oregon.* January 26.

Landau Associates. 2001b. *Fourth Quarter 2000 Groundwater Report, Time Oil Northwest Terminal, Portland, Oregon.* January 30.

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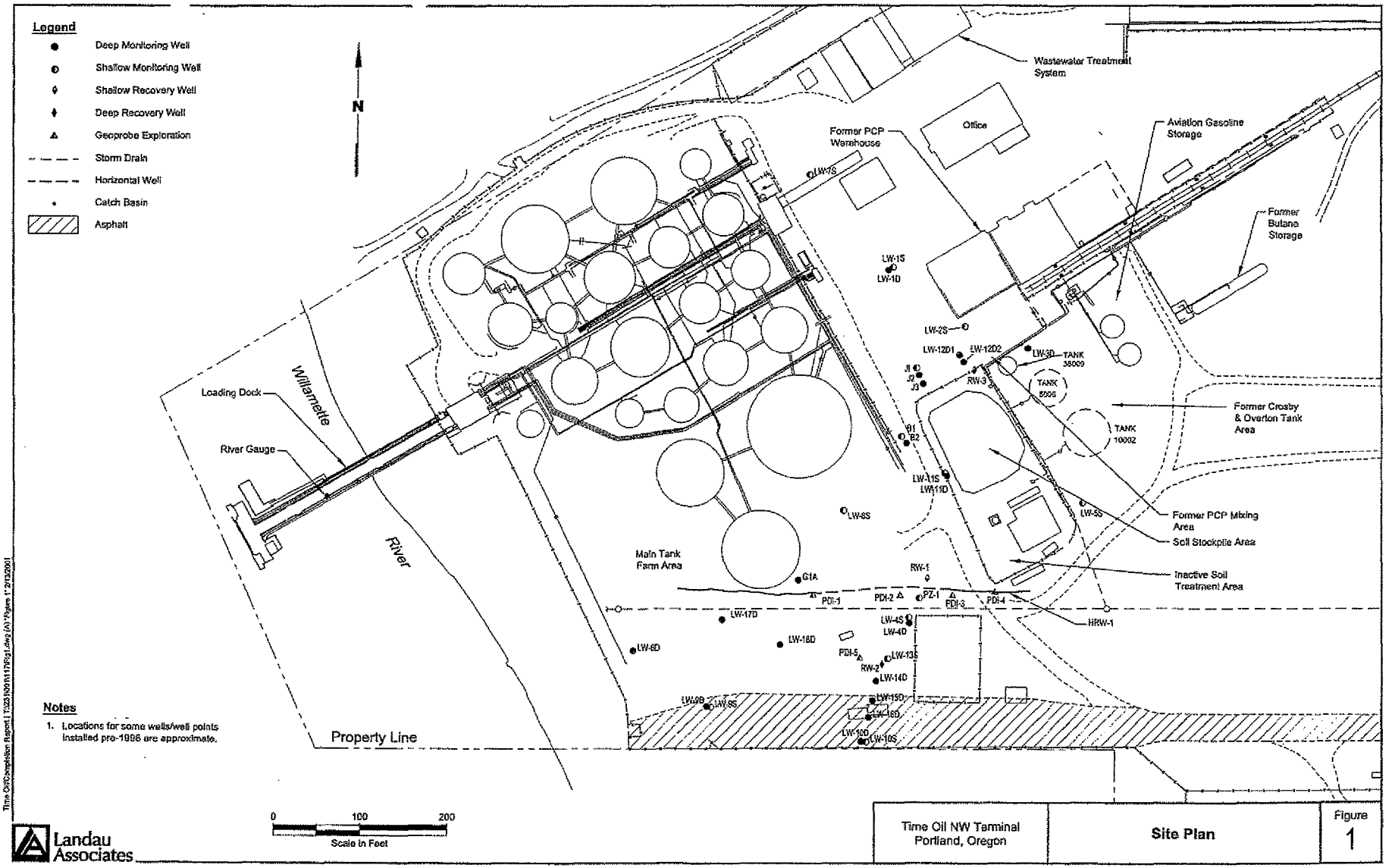

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TABLE 1
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - NOVEMBER 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft)(1)	DTW(2) (ft)	GW Elevation (ft) (3)(4)	LNAPL Thickness (ft)	NOTES
Shallow Wells:							
LW11S	11/22/00	10:19	29.10	15.81	13.58	0.36	
RW1	11/22/00	10:17	31.46	18.74	12.72	—	
HRW1	11/22/00	11:13	—	—	—	—	Low level alarm on
Deep Wells:							
B2	11/22/00	11:25	30.31	27.22	3.09	—	
G1A	11/22/00	10:56	29.72	25.04	4.68	—	
J2	11/22/00	11:22	29.65	24.81	4.84	—	
J3	11/22/00	11:23	29.58	24.53	5.05	—	
LW1D	11/22/00	11:35	28.31	23.13	5.18	—	
LW3D	11/22/00	11:19	30.80	26.34	4.46	—	
LW4D	11/22/00	11:16	30.17	25.59	4.58	—	
LW6D	11/22/00	11:00	30.84	26.39	4.45	—	
LW9D	11/22/00	11:07	30.98	25.87	5.11	—	
LW10D	11/22/00	11:07	31.12	26.53	4.59	—	
LW11D	11/22/00	10:42	29.04	24.01	5.03	—	
LW12D1	11/22/00	11:28	30.02	24.78	5.24	—	
LW12D2	11/22/00	11:30	29.24	27.67	1.57	—	
LW14D	11/22/00	11:11	30.54	26.33	4.21	—	
LW15D	11/22/00	11:09	30.85	26.36	4.49	—	
LW16D	11/22/00	11:08	28.40	23.86	4.54	—	
LW17D	11/22/00	11:04	27.82	23.41	4.41	—	
LW18D	11/22/00	11:05	27.82	23.42	4.40	—	
RW2	11/22/00	11:14	30.68	27.30	3.38	—	
Other:							
River Gauge	11/22/00	10:54	28.13	24.82	3.31	—	

Notes:
NM Not measured.
NA Not available.
– No measurable product or odor observed.
* Well Point
(1) Reference Elevation (Ref. Elev) is the north side of the top of the 1.25, 2 or 4-in well casing, Ref. Elev. surveys were conducted by Zarosinski-Talone 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.
(2) Depth to water (DTW) measured from surveyed reference elevation [see note (1)].
(3) 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].

TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - DECEMBER 2000
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft)(1)	DTW(2) (ft)	GW Elevation (ft) (3)(4)	LNAPL Thickness (ft)	NOTES
Shallow Wells:							
RW1	12/19/00		31.46		31.46	---	
HRW1	12/19/00		---		---	---	Low level alarm still on
Deep Wells:							
B2	12/19/00	09:03	30.31	24.82	5.49	---	
G1A	12/19/00	08:26	29.72	24.20	5.52	---	
J2	12/19/00	09:06	29.65	24.13	5.52	---	
J3	12/19/00	09:04	29.58	23.63	5.95	---	
LW1D	12/19/00	09:15	28.31	22.34	5.97	---	
LW3D	12/19/00	09:00	30.80	25.13	5.67	---	
LW4D	12/19/00	08:56	30.17	24.80	5.37	---	
LW6D	12/19/00	08:28	30.84	25.49	5.35	---	
LW9D	12/19/00	08:43	30.98	25.14	5.84	---	
LW10D	12/19/00	08:45	31.12	25.72	5.40	---	
LW11D	12/19/00	09:20	29.04	23.33	5.71	---	
LW12D1	12/19/00	09:07	30.02	24.00	6.02	---	
LW12D2	12/19/00	09:09	29.24	23.95	5.29	---	
LW14D	12/19/00	08:48	30.54	25.47	5.07	---	
LW15D	12/19/00	08:47	30.85	25.53	5.32	---	
LW16D	12/19/00	08:46	28.40	23.10	5.30	---	
LW17D	12/19/00	08:35	27.82	22.57	5.25	---	
LW18D	12/19/00	08:42	27.82	22.58	5.24	---	
RW2	12/19/00	08:53	30.68	26.48	4.20	---	Rate = 10 gpm, Totalizer = 991,900, p = 21psi, elapsed time = 1617.4
Other:							
River Gauge	12/19/00	08:24	28.13	23.74	4.39	---	
River Gauge	12/19/00	09:18	28.13	23.56	4.57	---	

Notes:
NM Not measured.
NA Not available.
-- No measurable product or odor observed.
* Well Point
(1) Reference Elevation (Ref. Elev) is the north side of the top of the 1.25, 2 or 4-in well casing, Ref. Elev. 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.
(2) Depth to water (DTW) measured from surveyed reference elevation [see note (1)].
(3) 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].

Landau Associates
Environmental and Geotechnical Services

REC'D FEB 1 2 2001

86-107
(EJD)

February 8, 2001

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By: Rhonda Moore
For Rebekah Brooks
Project Manager

2/8/01 S:\WPROC\231\001\038\DEQ-Dec00.ltr.doc
Enclosure

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

130 2nd AVENUE SOUTH • EDMONDS, WA 98020
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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
January 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the December 2000 monthly report to DEQ.
- Submitted the *Third Quarter 2000 Groundwater Report* to DEQ.
- Conducted internal reviews of the *Fourth Quarter 2000 Groundwater Report* and submitted to DEQ.
- Checked for the occurrence of product in well LW-11S and in the passive recovery bailer installed at that location on four occasions in January (twice during the first week of January and weekly after that). Recovered only about 0.5 oz. product from the well (the passive recovery bailer did not contain any product) during the first visit. No product was observed in the passive recovery bailer or well during the following visits. The presence of product will be checked during the 1st quarter 2001 groundwater sampling event during the second week of February 2001. If no product is observed at that time, the passive recovery bailer will be removed.
- Continued internal reviews of response to DEQ's comments on the *Phase II RI Report* and began incorporation of the responses into the final report for submittal to DEQ.
- Provided recommendation to DEQ to reduce types of analyses used during future sampling events.
- Continued development of a strategy for a sensitivity analyses to calculate a range of potential risk-based cleanup levels for key constituents prior to conducting the risk assessment for the terminal to possibly expedite remediation of the soil stockpile.
- Submitted the *Third Quarter 2000 Groundwater Interim Action Status Report* to DEQ.
- Conducted internal reviews of the *Fourth Quarter 2000 Groundwater Interim Action Status Report.*
- Submitted a technical memorandum summarizing groundwater interim action startup monitoring in the lower zone at RW-2 to DEQ.
- Evaluated groundwater levels and PCP concentration distribution in wells in the lower zone to determine performance of groundwater interim action at RW-2.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 1.5 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.
- Continued implementation of groundwater interim action startup monitoring in the lower zone, including collection of quarterly groundwater elevation measurements in the lower zone.
- Coordinated with subcontractor for preparation of as-built construction drawings to facilitate completion of groundwater interim action completion report. Prepared groundwater interim action completion report for internal review.

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- Continued preparation of a pilot study work plan for treatment of contaminated soil.

- Continued internal reviews of a report to provide the results of the EPPI on the east property, including the results of human health and ecological risk evaluations, statistical evaluations for compliance, and plans for further action.

- Continued preparation of the Phase III RI work plan, including update of the Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

- Provided DEQ with an updated schedule for Phase I/II RI/FS activities. Updated schedules for the east property and Phase III activities will be provided with the *EPPI Results Report* and *Phase III RI work plan*, respectively.

RESULTS COLLECTED

- Daily system operation data collected during interim action startup monitoring in the lower zone will be provided in the next quarterly status report.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Submit the *Fourth Quarter 2000 Interim Action Status Report* to DEQ.

- Provide DEQ with the final *Phase II RI report* and response letter to DEQ comments.

- Conduct internal reviews on the *Groundwater Interim Action Completion Report.*

- Continue implementation of the interim action startup plan, including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping (if appropriate based on upper zone groundwater levels). Continue full-scale treatment and discharge to POTW.

- Evaluate system operation data for groundwater interim action.

- Continue preparation and internal review of the pilot study work plan.

- Complete internal reviews of *EPPI Results Report* and submit to DEQ.

- Complete preparation and conduct internal reviews of the Phase III RI work plan.

- Provide DEQ with updated schedules for the east property and Phase III activities (with respective documents listed above).

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Landau Associates
Environmental and Geotechnical Services

MAR 15 2001

March 8, 2001

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:
Rhonda Morr
For Rebekah Brooks
Project Manager

3/8/01 S:\WPROC\231\001\038\DEQ-Dec00.ltr.doc
Enclosure

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

130 2nd AVENUE SOUTH • EDMONDS, WA 98020
(425) 778-0907 • Fax: (425) 778-6409 • Toll Free: (800) 552-5957 • E-mail: info@landauinc.com
Seattle (Edmonds) Tacoma Portland (Lake Oswego) Spokane

BZTO104(e)016100

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
February 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the January 2000 monthly report to DEQ.
- Conducted the first quarter 2001 groundwater sampling event on February 12-15, 2001, including collection of groundwater samples from the east property wells. No product was observed in well LW-11S or the passive recovery bailer; therefore, the bailer was removed.
- Incorporated DEQ's comments into a final *Phase II RI Report* and submitted to DEQ with a letter providing responses to DEQ's comments on the report.
- Received comments from DEQ on groundwater monitoring and groundwater interim action documents and the Phases I/II RI/FS project schedule. Responses to DEQ's comments will be incorporated into future documents or addressed in a response letter.
- Continued development of a strategy for a sensitivity analysis to calculate a range of potential risk-based cleanup levels for key constituents prior to conducting the risk assessment for the terminal to possibly expedite remediation of the soil stockpile.
- Submitted the *Fourth Quarter 2000 Groundwater Interim Action Status Report* to DEQ.
- Conducted internal reviews of the *Draft Groundwater Interim Action Completion Report.*
- Evaluated groundwater levels and PCP concentration distribution in wells in the lower zone to determine performance of groundwater interim action at RW-2.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 1.9 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.
- Continued implementation of groundwater interim action startup monitoring in the lower zone, including collection of quarterly groundwater elevation measurements in the lower zone.
- Continued preparation of a pilot study work plan for treatment of contaminated soil.
- Continued internal reviews of a report to provide the results of the EPPI on the east property, including the results of human health and ecological risk evaluations, statistical evaluations for compliance, and plans for further action.
- Began internal reviews of the Phase III RI work plan, including the updated Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

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RESULTS COLLECTED

- Daily system operation data collected during interim action startup monitoring in the lower zone will be provided with the next quarterly status report.

- Quarterly groundwater levels collected as part of the first quarter 2001 quarterly groundwater monitoring event, including those collected for lower zone interim action monitoring; these data will be provided to DEQ with the March 2001 monthly report, and discussed in the *First Quarter 2001 Groundwater Report* and the *First Quarter 2001 Groundwater Interim Action Status Report.*

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Receive and begin evaluation and validation of the first quarter 2001 groundwater analytical data; these data will be provided to DEQ with the monthly report following validation.

- Prepare a recommendation letter to DEQ for future analyses of TPH for quarterly groundwater sampling events.

- Complete internal reviews and submit the *Groundwater Interim Action Completion 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.

- Implement the interim action startup plan within the upper zone, including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping, if appropriate, based on upper zone groundwater levels.

- Evaluate system operation data for groundwater interim action.

- Continue preparation and internal review of the pilot study work plan.

- Complete internal reviews of *EPPI Results Report* and submit to DEQ.

- Continue internal reviews of the *Phase III RI Work Plan.*

- Provide DEQ with updated schedules for the east property and Phase III activities (with respective documents listed above).

BZTO104(e)016102

Landau Associates
Environmental and Geotechnical Services

APR 27 2001

TRANSMITTAL

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

Date: April 24, 2001

Attn: Mr. Kevin Murphy

Project No.: 231001.151/132

RE: Time Oil Northwest Terminal

Copies	Description
1	DRAFT Technical Memorandum RE: Work Plan for 2001 Stockpile Soil Characterization Sampling Time Oil Northwest Terminal
1	DRAFT Technical Memorandum RE: Supplemental Sampling and Analysis Plan, Phase II Remedial Investigation, Time Oil Northwest Terminal

Message:

Please find enclosed 1 copy of the above-referenced documents. Please call me if you have any questions.

LANDAU ASSOCIATES, INC.

By:

For Rebekah Brooks
Senior Hydrogeologist

RB/rgm
Enclosures

cc: Patty Dost, Schwabe Williamson & Wyatt
Bob Fisher, Beazer East, Inc. (Work Plan for 2001 Stockpile memo only)
Mike Tischuk, Beazer East, Inc.

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Landau Associates
Environmental and Geotechnical Services

Confidential Privileged Communication and Attorney Work Product—Restricted Distribution

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

DRAFT

FROM: Martin Powers and Rebekah Brooks

DATE April 24, 2001

RE: WORK PLAN FOR 2001 STOCKPILE SOIL CHARACTERIZATION SAMPLING TIME OIL NORTHWEST TERMINAL

INTRODUCTION

This technical memorandum presents a work plan for the collection and analysis of additional soil characterization samples from the soil stockpile located at the Time Oil Northwest Terminal in Portland, Oregon (Figure 1). The objective of the sampling will be to collect data for determination of soil concentrations under current conditions for use in the evaluation of future remedial action alternatives for the stockpile. Specifically, the data collected from the soil stockpile will be used to evaluate the following:

- whether the material in the soil stockpile is suitable for direct land disposal or incineration at an offsite facility, and
- whether the material in the soil stockpile is amenable to solid-phase biodegradation as a potential remedial option. This determination will include collection of data to attempt to determine what factors, if any, would limit the biodegradation of the soil stockpile materials.

The soil stockpile characterization sampling will consist of the collection of representative soil samples from the stockpile and analysis of the samples for a group of constituents, including those previously identified as constituents of potential concern (COPC) or constituents of potential ecological concern (CPEC) (Landau Associates 1999), in accordance with DEQ's guidance for risk assessments (DEQ 1999, 2000). The soil samples will also be evaluated for physical and biological parameters to evaluate the biodegradation potential of the stockpile material. A description of the procedures for management of the stockpile cover, soil sample collection, analytical methods, and subsequent evaluations are provided in the following sections. Field sampling procedures are provided as Attachment A.

MANAGEMENT OF THE SOIL STOCKPILE COVER

The soil stockpile is currently covered with a high density polyethylene (HDPE) cover measuring approximately 130 ft by 170 ft. The HDPE cover (Griffolyn T-85) is a 15-mil, 5-ply flexible membrane with nylon scrim reinforcing. The cover is secured to the stockpile by water-filled hydrotubes along its

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base and a tire web placed on the stockpile top and side slopes. The current cover was installed in 1999 to replace an earlier cover which exhibited weather-induced damage. The current cover was placed on top of the earlier cover to provide additional cover protection.

Prior to collection of the soil samples, the uppermost cover will be peeled back to allow direct access for the soil sample augers. Holes will be cut into the older cover, as necessary, to access the stockpile for sampling. It is anticipated that a remediation contractor will be used for manipulation of the cover. Following sample collection, the cover and hydrotubes will be replaced, in accordance with the Stockpile Management Plan (SMP) implementation protocols (Landau Associates 1997).

SAMPLE COLLECTION METHODS

The procedures for collection of representative soil samples from the soil stockpile are provided in Attachment A to this memorandum. In summary, soil samples will be collected from 18 grid-based random sample locations distributed over the entire surface area of the stockpile (Figure 2). Sampling will be conducted using a hand auger or limited access hollow-stem auger rig with care being taken so that the auger does not penetrate the liner located under the stockpile. The samples will be composited over the entire thickness of the stockpile at each location. In addition, composite soil samples will be collected from every group of three consecutive grid locations (e.g., grids 1, 2, and 3; grids 4, 5, and 6; etc.). A total of 6 composite samples will be collected from the 18 sample locations.

Quality assurance/quality control (QA/QC) procedures and health and safety protocols to be used during sampling will be conducted in accordance with the revised Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HSP) (Landau Associates 2001a,b). The QAPP and HSP will be reviewed by field personnel prior to mobilization to the site for sampling activities. Questions regarding the policies and procedures contained in these documents, if any, will be resolved by the Landau Associates and Time Oil project managers before initiation of field activities.

ANALYTICAL METHODS

Following collection, the stockpile soil samples will be submitted to analytical laboratories for the analysis of the parameters listed on Table 1. The samples will be submitted to analytical laboratories as follows:

- Each of the 18 soil samples collected at the grid locations, and the associated QA/QC samples, will be submitted to Analytical Resources, Inc. (ARI) in Seattle, Washington for analysis of semivolatile organic compounds (SVOCs), including pentachlorophenol (PCP) by the selected ion monitoring method, and metals.

- The six composite soil samples will also be submitted to ARI for potassium, and pH analyses.

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- The six composite soil samples will be submitted to Pace Analytical Services, Inc. in St. Paul, Minnesota for analysis of dioxins/furans.

- The six composite soil samples will be submitted to Microbe Inetek Labs in St. Louis, Missouri for analysis of biochemical parameters (except potassium and pH) and the biofeasibility parameters.

- The six composite samples will be homogenized into one sample and will be submitted to Rosa Environmental and Geotechnical Laboratory in West Seattle, Washington for analysis of physical parameters.

The sampling and analyses will be conducted in accordance with the QA/QC procedures provided in the QAPP (Landau Associates 2001), and as described in Attachment A.

RESULTS EVALUATION/REPORTING

Following receipt of the analytical results, Landau Associates will process the laboratory-provided data and validate the quality of the data using the procedures provided in the QAPP. Following validation, the analytical results will be evaluated to determine the most feasible method for treatment and/or disposal of the material in the soil stockpile in accordance with state and federal regulations. The results of this evaluation and the tabulated analytical results will be presented in a technical memorandum to DEQ. The evaluation results will provide the recommended remedial alternative for treatment and/or disposal of the stockpile material. If disposal is determined to be the recommended alternative, a focused feasibility study will be prepared and submitted to DEQ for approval. If treatment is determined to be the recommended alternative, a plan for conducting solid-phase biodegradation on the stockpile material will be provided to DEQ for approval prior to implementation.

REFERENCES

DEQ. 2000. *Guidance for Conduct of Deterministic Human Health Risk Assessments.* Oregon Department of Environmental Quality, Portland, Oregon. May.

DEQ. 1999. *Guidance for Ecological Risk Assessment, Level II – Screening.* Oregon Department of Environmental Quality, Portland, Oregon. October.

Landau Associates. 2000a. *Draft Quality Assurance Project Plan, Time Oil Northwest Terminal.* March 22.

Landau Associates. 2000b. *Draft Project Health and Safety Plan, Time Oil Northwest Terminal.* March 22.

Landau Associates. 1999. *Phase I and II Contaminants of Potential Concern (COPC) Screening Report, Time Oil Northwest Terminal.* September 10.

Landau Associates. 1997. Technical Memorandum RE: Stockpile Management Plan. March 24.

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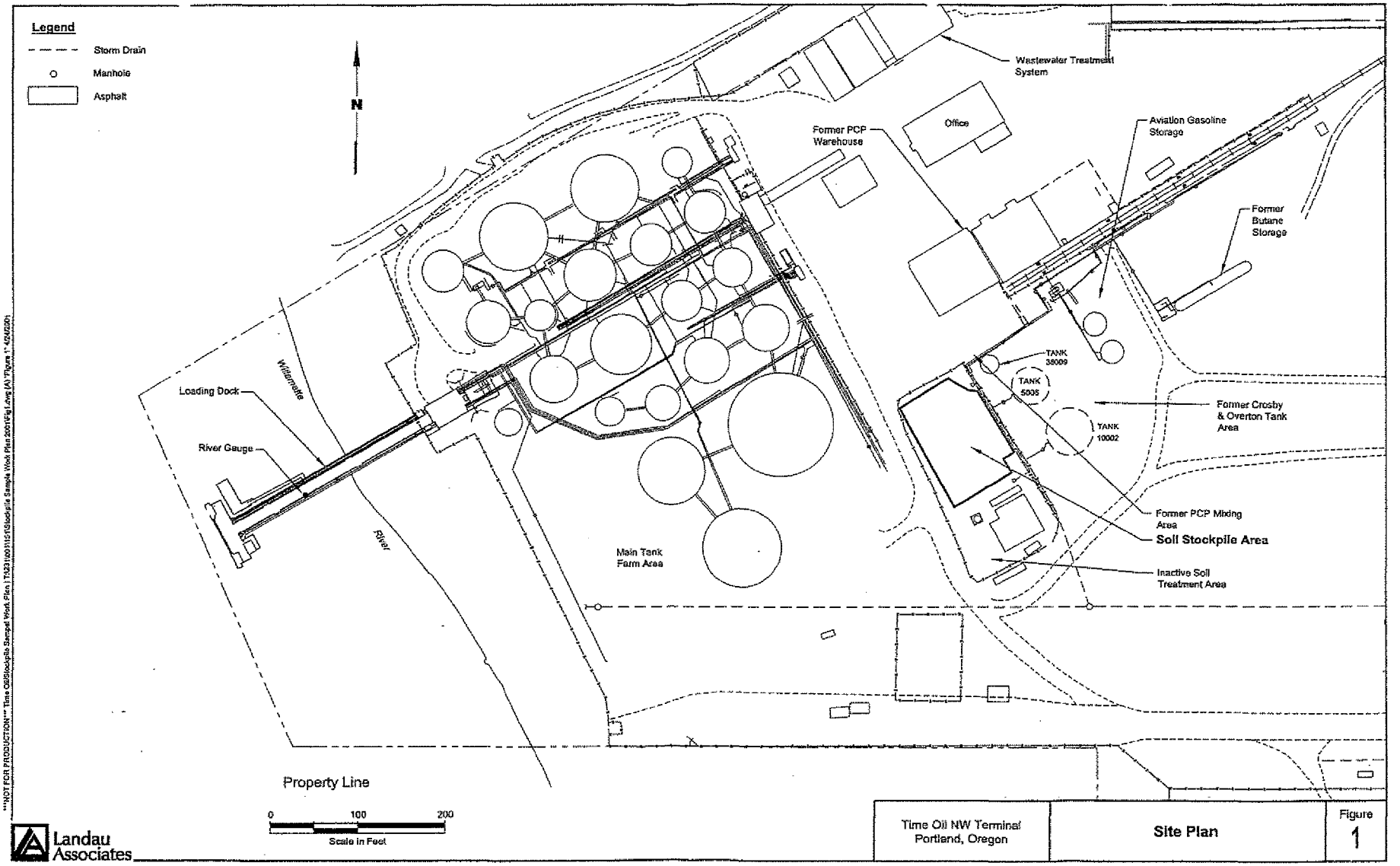

Time Oil NW Terminal
Portland, Oregon

Site Plan

Figure 1

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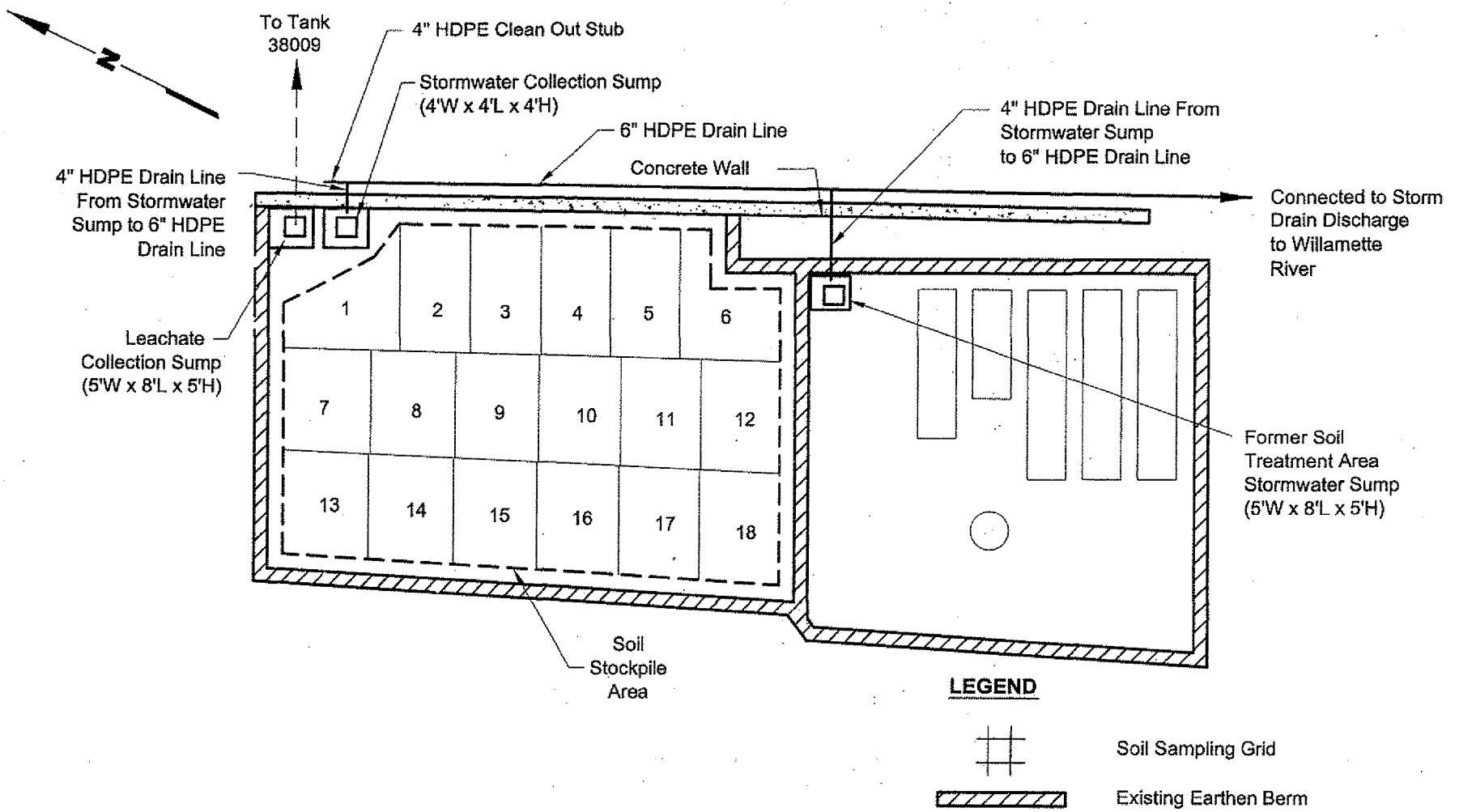
NOT FOR PRODUCTION Time Oil/Phase III Work Plan | T:\231\001\151\Stockpile Sample Work Plan 2001\Fig2.dwg (A) "Figure 2" 4/24/2001



Landau Associates

Time Oil NW Terminal Portland, Oregon	**Grid Sampling Plan for Soil Stockpile**	Figure 2

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ATTACHMENT A
FIELD SAMPLING PLAN

This field sampling plan describes the procedures for collecting soil characterization samples of the soil stockpile at the Time Oil Northwest Terminal in Portland, Oregon. The procedures described herein are consistent with Oregon Department of Environmental Quality (DEQ) and Environmental Protection Agency (EPA) sampling protocols. Sampling and analysis for this activity will take place in accordance with the project Health and Safety Plan and Quality Assurance Project Plan (Landau Associates 2001a,b).

IDENTIFICATION OF SOIL SAMPLE LOCATIONS

The locations for the soil characterization samples will initially be identified using a grid-based random sampling approach. In summary, the method for sample identification will consist of dividing the surface area of the soil pile into 18 sample grids of approximately equal surface area. One sample will be collected at a randomly-generated location from each of the 18 grids. Coordinates for the random sample locations within each grid will be generated using the method described in the EPA guidance, entitled *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media* (February 1989), as follows:

1. Assign the origin of an XY-axis at the lower left hand corner of each sample grid. The minimum X and Y coordinates will be defined as X_{min} and Y_{min} and both will be set equal to zero.

2. Measure the total length (X_{max}) and total width (Y_{max}) of each sample grid. X_{max} will be set equal to the distance, measured in feet, between the lower left hand corner of the sample grid and the lower right hand corner of the sample grid. Y_{max} will be set equal to the distance, measured in feet, between the lower left hand corner of the sample grid and the upper left hand corner of the sample grid.

3. For each of the 10 sampling grids, two random numbers (A and B) between 0 and 1 will be generated (using a HP calculator, or equivalent) and the following equation will be utilized to determine the X and Y coordinates of the sample location within the sample grid:
   $X = X_{min} + (X_{max} - X_{min}) * \text{Random Number A}$
   $Y = Y_{min} + (Y_{max} - Y_{min}) * \text{Random Number B}$
   Each X and Y coordinate will be rounded to the nearest half-foot.

4. Once the soil sample locations have been identified, each of the sample locations will be identified with a wooden stake, with the appropriate sample location identified.

5. Sample location identifications will be identified as follows:
   SSP-2001-(Grid Number).

SAMPLE COLLECTION PROCEDURES

At each of the designated sample locations, a sample will be collected using a hand auger or a limited access hollow-stem auger drilling rig. The sample collected will be a composite sample representative of the entire thickness of the soil pile at the sample location. As such, each time the auger is brought to the surface, the material present in the hand auger bucket or split spoon sampler will be placed on clean plastic sheeting. To the extent possible, the volume of soil collected at each depth sampled at a single location will be approximately equal. If a hand auger is utilized to collect the soil samples, a 3-inch diameter clean PVC pipe will be inserted in the borehole as the hand auger is advanced, to reduce the potential for the borehole to collapse or slough. If a limited access auger drilling rig (e.g., Minuteman or an Acker Soil Mechanic) is utilized, the method of soil sample collection will be through split spoon samples driven through the center of hollow-stem augers. The borehole will be advanced to the top of the layer of gravel located near the bottom of the soil pile. Measurements will be made prior to drilling to determine the anticipated depth to the gravel layer. After reaching the maximum depth of the borehole, the sample material will be placed into a decontaminated stainless steel bowl, and thoroughly homogenized by field personnel using a decontaminated, stainless steel mixing spoon. Following homogenization of the sample material, the soil will be placed into appropriate sample containers provided by the laboratory.

During the collection of the soil samples, the Log of Exploration, Soil/Sediment Sample Collection Form, and the Chain of Custody Form will be completed by Landau Associates personnel, in accordance with the methods described in the QAPP. Copies of these forms are provided in Appendix E of the draft *Phase III Remedial Investigation Work Plan* (Landau Associates 2001c). In addition to the forms listed above, Landau Associates field personnel will follow protocols specified in the QAPP for project documentation, including taking field notes, labeling sample containers, photographing the soil sampling activity, and making notations on a site map showing sample locations.

QA/QC samples to be collected during the field activities will include one blind field duplicate from one of the grid locations and one field equipment blank. Collection procedures will be conducted in accordance with the QAPP.

SAMPLE SHIPMENT AND ANALYSIS

Following collection of the soil samples, the sample containers will be placed in a cooler for shipment to the laboratory. All samples will be shipped by overnight courier or hand delivered to the appropriate analytical laboratory. Sample shipment will be completed as soon as possible following completion of the requisite field forms to minimize the holding time for the samples. At a minimum,

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samples will be shipped from the field at the conclusion of each work day. Specific procedures for sample packing, shipment, and custody will be followed as specified in the QAPP.

The samples will be analyzed for the chemical, physical, and biological parameters listed in Table 1 of the main text. The samples will be submitted to analytical laboratories as follows:

- Each of the 18 soil samples collected at the grid locations, and the associated QA/QC samples, will be submitted to Analytical Resources, Inc. (ARI) in Seattle, Washington for analysis of semivolatile organic compounds (SVOCs), including pentachlorophenol (PCP) by the selected ion monitoring method, and metals.

- The six composite soil samples will also be submitted to ARI for potassium, and pH analyses.

- The six composite soil samples will be submitted to Pace Analytical Services, Inc. in St. Paul, Minnesota for analysis of dioxins/furans.

- The six composite soil samples will be submitted to Microbe Inetek Labs in St. Louis, Missouri for analysis of biochemical parameters (except potassium and pH) and the biofeasibility parameters.

The six composite samples will be homogenized into one sample will be submitted to Rosa Environmental and Geotechnical Laboratory in West Seattle, Washington for analysis of physical parameters.

The analytical laboratories will complete the analyses of the samples within the appropriate holding times permitted by the respective sampling methods.

EQUIPMENT DECONTAMINATION

Decontamination procedures are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

All manual sampling equipment used (i.e., hand auger, split spoon samplers, stainless steel bowls, stainless steel spoons, etc.) will be decontaminated using a three step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution

2. Rinse and scrub equipment with clean tap water

3. Rinse equipment a final time with deionized water to remove tap water impurities.

Decontamination of sampling equipment that is suspected to come into contact with free phase liquid, or contains a visible sheen will include a hexane rinse (or other appropriate solvent) prior to the final rinse.

All downhole sampling equipment (i.e., hollow-stem augers) will be decontaminated using the following two-step process:

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1. After removing augers from the drill rig, remove excess soil from the auger and deposit the soil back into the borehole.

2. Following the removal of the excess soil, use a hot water pressure washer to clean the remaining visible soil from the augers. The supply source of water will be potable water available at the site.

The decontamination station for the downhole sampling equipment will be located at the base of the soil stockpile at an area designated by Time Oil personnel. Water generated during the decontamination process shall be contained and stored in 55-gallon drums to be left at the site after being properly labeled and sealed. Decontamination of the reusable sampling devices will occur between collection of each sample and at completion of the project.

RESIDUAL WASTE HANDLING

Following collection of the soil samples and preparation for shipment to the laboratory, any remaining soil sample will be placed back into the original boreholes. Any remaining boreholes will be filled in with additional soil from the stockpile to reduce the hazard that could be created by the borehole.

Decontamination water derived from the collection of soil samples will be temporarily contained in 55-gallon drums provided by Time Oil and transferred to tank 38009 for subsequent treatment by the terminal wastewater treatment system. Soil residuals from the drums will be placed on the soil stockpile.

Other contaminated waste material derived from sample collection (e.g., PPE, plastic sheeting, etc.) will be containerized in 55-gallon drums for future disposal in accordance with applicable state and federal regulations.

REFERENCES

Landau Associates. 2001a. *Draft Project Health and Safety Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

Landau Associates. 2001b. *Draft Quality Assurance Project Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

Landau Associates. 2001c. *Draft Phase III Remedial Investigation Work Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

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TABLE 1
LABORATORY ANALYSES

Analyte	Method (a)	Number of Samples(b)	Holding Times
Chemical Parameters:			
PCP (c)	8270 (SIM)	18	14 days
Other semivolatile organic compounds (c)	8270	18	14 days
Metals (d)	6010/7000 series	18	6 months
Dioxins/furans (e)	8290 (modified)	6	14 days
Biochemical Parameters:			
Ammonia nitrogen (f)	SM 4500-NH3FR	6	7 days
Nitrate nitrogen (f)	SM 4500-NO2B	6	28 days
Sulfate (f)	SM 9038	6	28 days
Potassium (d)	6010	6	6 months
Total phosphorous (f)	SM 4500-BPE	6	2 days
Soil pH (d)	150.1	6	2 hours
Total organic carbon (f)	SM 9060	6	28 days
Biological oxygen demand (BOD) (g)	SM 5210	6	2 days
Chemical oxygen demand (COD) (g)	SM 5220	6	7 days
Physical Parameters:			
Grain-size (sieve) (h)	ASTM D-421/422	1	NA
Soil moisture content (h)	ASTM D-2216	1	NA
Soil moisture retention (h)	SSSA Chap. 26-6	1	NA
Biofeasibility Parameters:			
Total Heterotrophs (i)	SM 9215c	6	48 hours
Identify PCP degrading microorganisms (i)	GC Method	6	NA
Endpoint kinetic assay for PCP-degrading microorganisms (i)	NA	6	NA

Notes:

NA = Not Applicable

(a) Analysis methods are from EPA SW-846, unless otherwise noted. SM methods are referenced in *Standard Methods for Water and Wastewater, 18th Edition.* The SSA method is referenced in Soil Scientist Society of America *Methods of Soil Analysis, Part I. Physical and Mineraological Methods.* ASTM methods are referenced in the American Society for Testing and Materials Annual Standards—Soil and Rock.
(b) The number of samples indicated does not include QA/QC sampling.
(c) One 8-oz., unpreserved WMG container will be used for these analyses.
(d) One 4-oz., unpreserved WMG container will be used for metals and potassium analysis.
(e) One 8 oz., unpreserved WMG container will be used for dioxins/furans analyses.
(f) One 8-oz., unpreserved wide mouth glass (WMG) container will be used for these analyses.
(g) One 8-oz., unpreserved WMG container will be used for BOD and COD analyses. The sample must be submitted to the laboratory within 24 hours of collection.
(h) One 16-oz., unpreserved WMG container will be used for analyses of the physical parameters listed.
(i) One 16-oz., unpreserved WMG container will be used for analysis of biological parameters.

DRAFT

Landau Associates
Environmental and Geotechnical Services

RECD APR 16 2001

April 9, 2001

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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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By: Rhonda Moon
For Rebekah Brooks
Senior Hydrogeologist

RB/rgm

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
March 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the February 2000 monthly report to DEQ.
- Received comments from DEQ on the revised Phase II RI report. As stated, approval contingencies will be addressed during the Phase III RI or future risk assessment and feasibility study evaluations.
- Received, validated, and evaluated the first quarter 2001 groundwater analytical data; these data are attached. Began preparation of the *First Quarter 2001 Groundwater Report.*
- Prepared the *First Quarter 2001 Interim Action Status Report,* including evaluation of quarterly groundwater elevations and PCP distribution for performance of groundwater interim action.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 2.2 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.
- Continued development of a strategy for a sensitivity analysis to calculate a range of potential risk-based cleanup levels for key constituents prior to conducting the risk assessment for the terminal to possibly expedite remediation of the soil stockpile.
- Continued preparation of a pilot study work plan for treatment of contaminated soil.
- Continued client reviews of a report to provide the results of the EPPI on the east property, including the results of human health and ecological risk evaluations, statistical evaluations for compliance, and plans for further action.
- Began client reviews of the Phase III RI work plan, including the updated Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

RESULTS COLLECTED

- Validated analytical results for the first quarter 2001 quarterly groundwater monitoring event, including those collected for lower zone interim action monitoring locations, are attached to this report. The data validation reports and laboratory data will be provided with the *First Quarter 2001 Groundwater Report.*

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

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- Prepare a letter providing documentation for stockpile management activities since 1998.
- Prepare a recommendation letter to DEQ for future analyses of TPH for quarterly groundwater sampling events.
- Complete and conduct internal reviews for the *First Quarter 2001 Groundwater Report,* and the *First Quarter 2001 Interim Action Status Report*.
- Complete client reviews and submit the *Groundwater Interim Action Completion 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.
- Implement the interim action startup plan within the upper zone, including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping, contingent on upper zone groundwater levels.
- Evaluate system operation data for the groundwater interim action.
- Provide DEQ with a work plan for resampling of the soil stockpile for assessment of current conditions.
- Continue preparation and internal review of the pilot study work plan.
- Complete client reviews of *EPPI Results Report* and submit to DEQ.
- Continue client reviews of the *Phase III RI Work Plan.*
- Provide DEQ with updated schedules for the east property and Phase III activities (with respective documents listed above).

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	H	J1	K	L	LW1S	LW2S
Laboratory Identification:	CT67H	CT37F	CT37N	CT55F	CT37O	CT37D	CT37B	CT55G
Date Collected:	2/15/01	2/12/01	2/12/01	2/14/01	2/12/01	2/12/01	2/12/01	2/14/01
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040								
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.50	NA	0.25 U	0.25 U	650
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	2.6	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 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-Chlorophenol	1.0 U	1.0 U	NA	1.0 U	NA	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
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
2-Methylphenol	8.6	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 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
4-Methylphenol	8.4	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 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
Hexachloroethane	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	NA	3.0 U	NA	3.0 U	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	NA	10 U	NA	10 U	10 U	10 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
2,4-Dichlorophenol	3.0 U	3.0 U	NA	3.0 U	NA	3.0 U	3.0 U	3.0 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
Naphthalene	5.1	1.0 U	NA	2.9	NA	1.0 U	1.0 U	12
4-Chloroaniline	3.0 U	3.0 U	NA	3.0 U	NA	3.0 U	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	2.0 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-Methylnaphthalene	1.0 U	1.0 U	NA	3.0	NA	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 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
2,4,5-Trichlorophenol	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	NA	6.0 U	NA	6.0 U	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	NA	10 U	NA	10 U	10 U	10 U

BZTO104(e)016117

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW4S	LW5S	LW7S	LW8S	Dup of LW8S W	LW11S	LW13S	LW101S
Laboratory Identification:	CT67C	CT37E	CT37A	CT67J	CT67I	CT55H	CT67O	CT37J
Date Collected:	2/15/01	2/12/01	2/12/01	2/15/01	2/15/01	2/14/01	2/15/01	2/13/01
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040								
Pentachlorophenol	0.25 U	0.25 U	0.25 UJ	0.25 U	0.25 U	320	9.3	0.25 U
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	100	2.0 U	2.0 U	2.0 U	2.0 U	10	NA	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-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
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
2-Methylphenol	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U
4-Methylphenol	210	1.0 U	1.0 U	1.0 U	1.0 U	3.7	NA	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
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	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
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
2,4-Dimethylphenol	4.4	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	NA	3.0 U
Benzoic Acid	200	10 U	10 U	10 U	10 U	10 U	NA	10 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
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
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
Naphthalene	8.5	1.0 U	3.7	6.7	6.4	5.7	NA	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
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	NA	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-Methylnaphthalene	3.6	1.0 U	1.4	7.0	6.8	3.9	NA	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
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
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
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	NA	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
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW102S	LW103S	LW104S	RW1
Laboratory Identification:	CT37H	CT37K	CT37G	CT67K
Date Collected:	2/13/01	2/13/01	2/13/01	2/15/01
CHLORINATED PHENOLS (µg/L)				
EPA Method SW8040				
Pentachlorophenol	0.25 U	0.25 U	0.25 U	11000
SEMIVOLATILES (µg/L)				
EPA Method SW8270				
Phenol	2.0 U	2.0 U	2.0 U	60
Bis-(2-Chloroethyl) Ether	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
1,3-Dichlorobenzene	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
Benzyl Alcohol	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
2-Methylphenol	2.0 U	2.0 U	2.0 U	2.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	1.0 U	1.0 U
4-Methylphenol	3.5	1.0 U	1.0 U	16
N-Nitroso-Di-N-Propylamine	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
Nitrobenzene	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
2-Nitrophenol	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
Benzoic Acid	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy) Methane	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
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	13
4-Chloroaniline	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
4-Chloro-3-methylphenol	2.0 U	2.0 U	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	5.2
Hexachlorocyclopentadiene	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
2,4,5-Trichlorophenol	5.0 U	5.0 U	5.0 U	17
2-Chloronaphthalene	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
Dimethylphthalate	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
3-Nitroaniline	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
2,4-Dinitrophenol	10 U	10 U	10 U	10 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	H	J1	K	L	LW1S	LW2S
Laboratory Identification:	CT67H	CT37F	CT37N	CT55F	CT37O	CT37D	CT37B	CT55G
Date Collected:	2/15/01	2/12/01	2/12/01	2/14/01	2/12/01	2/12/01	2/12/01	2/14/01
4-Nitrophenol	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	NA	10 U	NA	10 U	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	1200
Phenanthrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.3
Fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.4
Chrysene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 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
Dibenz(a,h)anthracene	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	1.0 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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW4S	LW5S	LW7S	LW8S	Dup of LW8S W	LW11S	LW13S	LW101S
Laboratory Identification:	CT67C	CT37E	CT37A	CT67J	CT67I	CT55H	CT67O	CT37J
Date Collected:	2/15/01	2/12/01	2/12/01	2/15/01	2/15/01	2/14/01	2/15/01	2/13/01
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	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
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
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
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 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
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
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	460	NA	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
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
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
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	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
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
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 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
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
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
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
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
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

BZTO104(e)016121

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW102S	LW103S	LW104S	RW1
Laboratory Identification:	CT37H	CT37K	CT37G	CT67K
Date Collected:	2/13/01	2/13/01	2/13/01	2/15/01
4-Nitrophenol	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
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dinitrotoluene	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
4-Chlorophenyl-phenylether	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
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	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
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	1400
Phenanthrene	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
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	4.4
Fluoranthene	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
Butylbenzylphthalate	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
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	2.0	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	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
Benzo(a)pyrene	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
Dibenz(a,h)anthracene	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

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	H	J1	K	L	LW1S	LW2S
Laboratory Identification:	CT67H	CT37F	CT37N	CT55F	CT37O	CT37D	CT37B	CT55G
Date Collected:	2/15/01	2/12/01	2/12/01	2/14/01	2/12/01	2/12/01	2/12/01	2/14/01
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Bromomethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Vinyl Chloride	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Chloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Methylene Chloride	60 U	4.5 U	NA	2.5 U	NA	4.7 U	4.4 U	7.0 U
Acetone	1200	7.1 U	NA	5.0 U	NA	6.1 U	5.0 U	27
Carbon Disulfide	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1-Dichloroethene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1-Dichloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
trans-1,2-Dichloroethene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
cis-1,2-Dichloroethene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Chloroform	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,2-Dichloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
2-Butanone	260	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
1,1,1-Trichloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Carbon Tetrachloride	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Vinyl Acetate	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
Bromodichloromethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,2-Dichloropropane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
cis-1,3-Dichloropropene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Trichloroethene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Dibromochloromethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1,2-Trichloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Benzene	610	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
trans-1,3-Dichloropropene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Bromoform	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
4-Methyl-2-Pentanone (MIBK)	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
2-Hexanone	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
Tetrachloroethene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1,2,2-Tetrachloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Toluene	2000	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Chlorobenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Ethylbenzene	160	1.0 U	NA	1.2	NA	1.0 U	1.0 U	9.7
Styrene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Trichlorofluoromethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1,2-Trichlorotrifluoroethane	60 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	4.0 U
m,p-Xylene	590	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	18
o-Xylene	240	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	49

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW4S	LW5S	LW7S	LW8S	Dup of LW8S W	LW11S	LW13S	LW101S
Laboratory Identification:	CT67C	CT37E	CT37A	CT67J	CT67I	CT55H	CT67O	CT37J
Date Collected:	2/15/01	2/12/01	2/12/01	2/15/01	2/15/01	2/14/01	2/15/01	2/13/01
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Methylene Chloride	2.0 U	4.8 U	2.0 U	2.0 U	2.0 U	6.5 U	NA	2.8 U
Acetone	41	6.6 U	83 U	5.0 U	5.0 U	43	NA	14 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
2-Butanone	100	5.0 U	8.2	5.0 U	5.0 U	10 U	NA	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Benzene	110	1.0 U	1.0 U	9.1	9.1	2.0 U	NA	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Toluene	25	1.0 U	1.0 U	1.0 U	1.0 U	2.4	NA	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Ethylbenzene	79	1.0 U	15	22	23	24	NA	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	NA	2.0 U
m,p-Xylene	240	1.0 U	9.1	4.7	5.0	53	NA	1.0 U
o-Xylene	120	1.0 U	1.0 U	1.0 U	1.0 U	40	NA	1.0 U

BZTO104(e)016124

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW102S	LW103S	LW104S	RW1
Laboratory Identification:	CT37H	CT37K	CT37G	CT67K
Date Collected:	2/13/01	2/13/01	2/13/01	2/15/01
VOLATILES (µg/L)				
EPA Method SW8260				
Chloromethane	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
Vinyl Chloride	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
Methylene Chloride	3.7 U	4.2 U	4.6 U	2.0 U
Acetone	160 U	9.1 U	8.9 U	28
Carbon Disulfide	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
1,1-Dichloroethane	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
cis-1,2-Dichloroethene	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
1,2-Dichloroethane	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
1,1,1-Trichloroethane	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
Vinyl Acetate	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
1,2-Dichloropropane	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
Trichloroethene	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
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	9.0
trans-1,3-Dichloropropene	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
4-Methyl-2-Pentanone (MIBK)	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
Tetrachloroethene	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
Toluene	1.0 U	1.0 U	1.0 U	18
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	80
Styrene	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
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	160
o-Xylene	1.0 U	1.0 U	1.0 U	110

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	H	J1	K	L	LW1S	LW2S
Laboratory Identification:	CT67H	CT37F	CT37N	CT55F	CT37O	CT37D	CT37B	CT55G
Date Collected:	2/15/01	2/12/01	2/12/01	2/14/01	2/12/01	2/12/01	2/12/01	2/14/01
1,2-Dichlorobenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,3-Dichlorobenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,4-Dichlorobenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Acrolein	1500 U	50 U	NA	50 U	NA	50 U	50 U	100 U
Methyl Iodide	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Bromoethane	60 U	2.0 U	NA	2.0 U	NA	2.0 U	2.0 U	4.0 U
Acrylonitrile	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
1,1-Dichloropropene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Dibromomethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,1,1,2-Tetrachloroethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,2-Dibromo-3-chloropropane	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
1,2,3-Trichloropropane	90 U	3.0 U	NA	3.0 U	NA	3.0 U	3.0 U	6.0 U
trans-1,4-Dichloro-2-butene	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
1,3,5-Trimethylbenzene	31	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	61
1,2,4-Trimethylbenzene	100	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	320
Hexachlorobutadiene	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
Ethylene Dibromide	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Bromochloromethane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
2,2-Dichloropropane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
1,3-Dichloropropane	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
Isopropylbenzene	30 U	1.0 U	NA	3.3	NA	1.0 U	1.0 U	19
n-Propylbenzene	30 U	1.0 U	NA	5.7	NA	1.0 U	1.0 U	36
Bromobenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
2-Chlorotoluene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
4-Chlorotoluene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	2.0 U
tert-Butylbenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	3.2
sec-Butylbenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	20
4-Isopropyltoluene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	17
n-Butylbenzene	30 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	15 M
1,2,4-Trichlorobenzene	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U
Naphthalene	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	23
1,2,3-Trichlorobenzene	150 U	5.0 U	NA	5.0 U	NA	5.0 U	5.0 U	10 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW4S	LW5S	LW7S	LW8S	Dup of LW8S W	LW11S	LW13S	LW101S
Laboratory Identification:	CT67C	CT37E	CT37A	CT67J	CT67I	CT55H	CT67O	CT37J
Date Collected:	2/15/01	2/12/01	2/12/01	2/15/01	2/15/01	2/14/01	2/15/01	2/13/01
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	100 U	NA	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	NA	2.0 U
Acrylonitrile	5.0 U	5.0 U	12 U	5.0 U	5.0 U	10 U	NA	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	6.0 U	NA	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
1,3,5-Trimethylbenzene	58	1.0 U	1.5	4.1	5.0	48	NA	1.0 U
1,2,4-Trimethylbenzene	130	1.0 U	1.2	6.4	7.1	150	NA	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
Isopropylbenzene	28	1.0 U	16	100	130	13	NA	1.0 U
n-Propylbenzene	36	1.0 U	25	83	100	24	NA	1.0 U
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	NA	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	5.7	6.2	2.0 U	NA	1.0 U
sec-Butylbenzene	7.0	1.0 U	2.3	14	15	7.5	NA	1.0 U
4-Isopropyltoluene	4.9	1.0 U	1.0 U	1.0 U	1.0 U	7.1	NA	1.0 U
n-Butylbenzene	6.2	1.0 U	2.6	6.8	7.1	8.4 M	NA	1.0 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U
Naphthalene	18	5.0 U	5.7	19	20	10 U	NA	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	NA	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW102S	LW103S	LW104S	RW1
Laboratory Identification:	CT37H	CT37K	CT37G	CT67K
Date Collected:	2/13/01	2/13/01	2/13/01	2/15/01
1,2-Dichlorobenzene	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
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	1.0 U	58
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.0 U	160
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	1.0 U	28
n-Propylbenzene	1.0 U	1.0 U	1.0 U	45
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
sec-Butylbenzene	1.0 U	1.0 U	1.0 U	10
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	5.9
n-Butylbenzene	1.0 U	1.0 U	1.0 U	9.2 M
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	29
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	H	J1,	K	L	LW1S	LW2S
Laboratory Identification:	CT67H	CT37F	CT37N	CT55F	CT37O	CT37D	CT37B	CT55G
Date Collected:	2/15/01	2/12/01	2/12/01	2/14/01	2/12/01	2/12/01	2/12/01	2/14/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	2.1 (e)	0.26 (c)	NA	0.30 (d)	NA	0.25 U	0.25 U	9.1 (b)
TPH-Motor Oil Range	0.50 U	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	15 (e)	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.007	0.016	0.015	0.010	0.001	0.001 U	0.010	0.013
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
Copper (6010)	0.002 U	0.002 U	0.004	0.002 U	0.002	0.002 U	0.002 U	0.002 U
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
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.01 U	0.03	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006	0.006 U	0.006 U	0.006 U	0.009	0.006 U	0.006 U	0.011
CONVENTIONALS								
Calcium (mg/L)	23.9	40.6	NA	20.6	NA	11.5	25.5	35.6
Magnesium (mg/L)	9.46	13.8	NA	7.21	NA	4.04	9.47	9.27
Potassium (mg/L)	2.6	1.8	NA	2.3	NA	1.4	2.0	2.7
Sodium (mg/L)	8.18	7.40	NA	6.48	NA	8.26	7.23	5.10
Alkalinity (mg/L CaCO3) (SM 2320)	160	200	NA	100	NA	64	120	140
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
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	160	200	NA	100	NA	64	120	140
Total Dissolved Solids (mg/L) (EPA 160.1)	250	240	NA	150	NA	120	170	210
Chloride (mg/L) (EPA 325.2)	3.4 J2	5.4	NA	3.0	NA	1.4	4.1	15
N-Nitrate (mg-N/L) (Calculated)	0.010 U	0.010 U	NA	0.010 U	NA	0.47	0.17	0.010
N-Nitrite (mg-N/L) (EPA 354.1)	0.012 J2	0.010 U	NA	0.010 U	NA	0.010 U	0.010 U	0.010 U
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.015	0.010 UJ	NA	0.010 U	NA	0.47 J2	0.17 J2	0.010
Sulfate (mg/L) (EPA 375.2)	2.8	6.1	NA	10	NA	4.4	6.8	5.7
FIELD PARAMETERS								
pH (avg)	5.53	6.52	6.54	6.17	6.09	6.07	6.56	6.01
Temperature (° C) (avg)	13.1	14.2	13.3	14.3	13.0	13.2	14.9	11.3
Conductivity (mS/cm) (avg)	297	331	230	202	694	104	217	305
Dissolved oxygen (mg/L) (avg)	1.08	1.29	3.06	0.57	3.15	2.56	1.90	0.59
Turbidity (NTU)	0	0	0	0	0	0	0	0
ETHANOL (mg/L)	5.0	NA	NA	NA	NA	NA	NA	NA

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW4S	LW5S	LW7S	LW8S	Dup of LW8S W	LW11S	LW13S	LW101S
Laboratory Identification:	CT67C	CT37E	CT37A	CT67J	CT67I	CT55H	CT67O	CT37J
Date Collected:	2/15/01	2/12/01	2/12/01	2/15/01	2/15/01	2/14/01	2/15/01	2/13/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	3.4 (b)	0.25 U	0.32 (b)	3.4 (b)	3.2 (b)	2.2 (b)	NA	0.25 U
TPH-Motor Oil Range	NA	NA	NA	0.50 U	0.50 U	0.50 U	NA	NA
TPH-Gasoline Range	NA	NA	NA	4.6 (a)	4.9 (a)	4.8 (a)	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.009	0.002	0.016	0.022	0.022	0.007	NA	0.002
Chromium (6010)	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NA	0.005 U
Copper (6010)	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	NA	0.002 U
Lead (7421)	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	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
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	0.006 U	NA	0.006 U
CONVENTIONALS								
Calcium (mg/L)	164	16.3	29.4	25.5	25.6	20.3	NA	NA
Magnesium (mg/L)	56.0	4.44	10.5	6.81	6.85	6.41	NA	NA
Potassium (mg/L)	5.6	2.6	2.5	2.6	2.5	1.6	NA	NA
Sodium (mg/L)	9.87	9.64	13.0	7.52	7.55	4.03	NA	NA
Alkalinity (mg/L CaCO3) (SM 2320)	810	81	160	170	160	140	NA	NA
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
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	810	81	160	170	160	140	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	760	140	200	220	210	190	NA	100
Chloride (mg/L) (EPA 325.2)	7.5 J2	6.3	2.8	3.4 J2	4.9 J2	3.1	NA	1.8
N-Nitrate (mg-N/L) (Calculated)	0.010 U	1.2	0.010 U	0.010 U	0.010 U	0.010 U	NA	NA
N-Nitrite (mg-N/L) (EPA 354.1)	0.013 J2	0.010 U	0.010 U	0.051 J2	0.035 J2	0.010 U	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	0.010 U	1.2 J2	0.010 UJ	0.041	0.035	0.010 U	NA	NA
Sulfate (mg/L) (EPA 375.2)	8.4	9.1	3.0	2.8	2.5 U	5.6	NA	NA
FIELD PARAMETERS								
pH (avg)	6.31	6.17	6.46	6.26	6.28	6.25	6.34	6.36
Temperature (° C) (avg)	13.5	13.7	14.2	13.6	13.6	13.2	12.2	10.6
Conductivity (mS/cm) (avg)	809	148	300	404	403	296	149	133
Dissolved oxygen (mg/L) (avg)	0.00	2.08	2.78	0.57	0.53	0.61	0.94	3.47
Turbidity (NTU)	0	0	0	0	0	0	0	27
ETHANOL (mg/L)	NA	NA	NA	5.0 U	5.0 U	5.0 U	NA	NA

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTERLY SAMPLING EVENT, FEBRUARY 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW102S	LW103S	LW104S	RW1
Laboratory Identification:	CT37H	CT37K	CT37G	CT67K
Date Collected:	2/13/01	2/13/01	2/13/01	2/15/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)				
Method OR-DEQ				
TPH-Diesel Range	0.25 U	0.25 U	0.32 (c)	4.1 (b)
TPH-Motor Oil Range	NA	NA	NA	0.50 U
TPH-Gasoline Range	NA	NA	NA	7.1 (a)
PRIORITY POLLUTANT				
METALS (mg/L)				
Arsenic (7060)	0.001	0.008	0.002	0.007
Chromium (6010)	0.005 U	0.005 U	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	0.002 U	0.002 U
Lead (7421)	0.001 U	0.001 U	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.017
CONVENTIONALS				
Calcium (mg/L)	NA	NA	NA	49.1
Magnesium (mg/L)	NA	NA	NA	15.2
Potassium (mg/L)	NA	NA	NA	4.0
Sodium (mg/L)	NA	NA	NA	6.67
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	230
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	1.0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	230
Total Dissolved Solids (mg/L) (EPA 160.1)	120	130	160	320
Chloride (mg/L) (EPA 325.2)	1.3	2.5	1.4	5.9 J2
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	0.010 U
N-Nitrite (mg-N/L) (EPA 354.1)	NA	NA	NA	0.023 J2
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	0.030
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	3.0
FIELD PARAMETERS				
pH (avg)	5.63	6.52	6.05	6.35
Temperature (° C) (avg)	9.5	11.5	11.4	12.7
Conductivity (mS/cm) (avg)	127	160	238	506
Dissolved oxygen (mg/L) (avg)	1.74	3.55	1.48	0.32
Turbidity (NTU)	41	26	13	0
ETHANOL (mg/L)	NA	NA	NA	5.0 U

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

Landau Associates
Environmental and Geotechnical Services

RECEIVED MAY 22 2001

TRANSMITTAL

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

Date: May 17, 2001

Attn: Mr. Tom Roick

RE: Time Oil Northwest Terminal

Project No.: 231001.131

Copies	Description
1	Letter re: Recommendation for Reduction of TPH Analysis, Time Oil Northwest Terminal, Portland, Oregon (5/17/01)

Message:

The above-noted letter is provided for your files. The referenced tables will be sent electronically.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/rgm
5/17/01 S:\WPROC\231\TRANSMIT.FAX\DEQ2Tm.doc
Enclosure

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

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Landau Associates
Environmental and Geotechnical Services

May 17, 2001

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

RE: RECOMMENDATION FOR REDUCTION OF TPH ANALYSES
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Roick:

On behalf of Time Oil Co., this letter provides our recommendation to modify the frequency of total petroleum hydrocarbon (TPH) analyses conducted for future groundwater sampling events at the Time Oil Northwest Terminal. This recommendation is based on groundwater sample results from the previous 16 quarterly sampling events, conducted April 1997 through February 2001.

Numerous TPH analyses (e.g., TPH-HCID, TPH-D, TPH-Dx, TPH-G) have been conducted during quarterly groundwater sampling events for screening of the presence/absence of petroleum-related contamination, to evaluate seasonal trends, and to assess overall TPH concentrations at existing well locations at the terminal. In response to your comments on our previous recommendation for reduction of analyses, dated February 21, 2001, we recommend the following modifications to the frequency of collection of groundwater samples for TPH analyses for future events:

- Reduce the frequency of TPH analyses 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. ~~TPH~~ results at most of these locations have been reported as nondetect (LW-1S) or detected sporadically. One well (J2) had detections on a more regular basis. Where detections occurred, all concentrations were less than 1 ppm. Annual sampling will be conducted during the first quarter event of each year.

- Eliminate TPH analyses at upper zone wells D, L, LW-5S, LW-101S through –104S and lower zone well LW-3D. TPH results in these wells have routinely been nondetect, only detected once (LW-104S) or detected sporadically (LW-3D). The detections were all less than 1 ppm. Additionally, these wells are located upgradient of the current PCP plume boundaries for both water-bearing zones and well outside the current influence or expected future influence of the groundwater interim action and Phase III study area.

Quarterly frequency for TPH analyses at upper zone well LW-10S and lower zone wells LW-9D and LW-10D, where previous TPH results have mostly been nondetect, will be retained. These wells are located

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downgradient from the PCP plumes in the upper and lower zones and are used to monitor the performance of the groundwater interim action. Also, TPH analyses will be conducted for screening of soil and groundwater samples collected during the initial tasks for the Phase III RI. As previously approved by DEQ, TPH analyses are not currently being conducted at upper zone wells H, K, LW-13S, and RW-3 and lower zone wells J3, LW-14D through 18D.

The locations of the wells recommended for modification in frequency of TPH analyses are shown on Figure 1. Analytical results for all monitoring wells sampled currently and historically at the terminal, including TPH analyses results, will be provided to you electronically in conjunction with this letter. These files are typically provided to you with the quarterly groundwater reports.

We propose that this recommendation be effective for the upcoming second quarter 2001 groundwater sampling event, currently scheduled for the week of May 28, 2001.

We hope that this letter provides you with the information that you need for DEQ and Time Oil to come to an agreement on this recommendation. We would like to get a response from you by May 25, 2001, if possible, so that we can make the appropriate arrangements for the sampling event. Please call me or Kevin Murphy with your comments.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/rgm
5/17/01 S:\WP\ROC\231001\TPHreductDEQ_let.doc
Attachments

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

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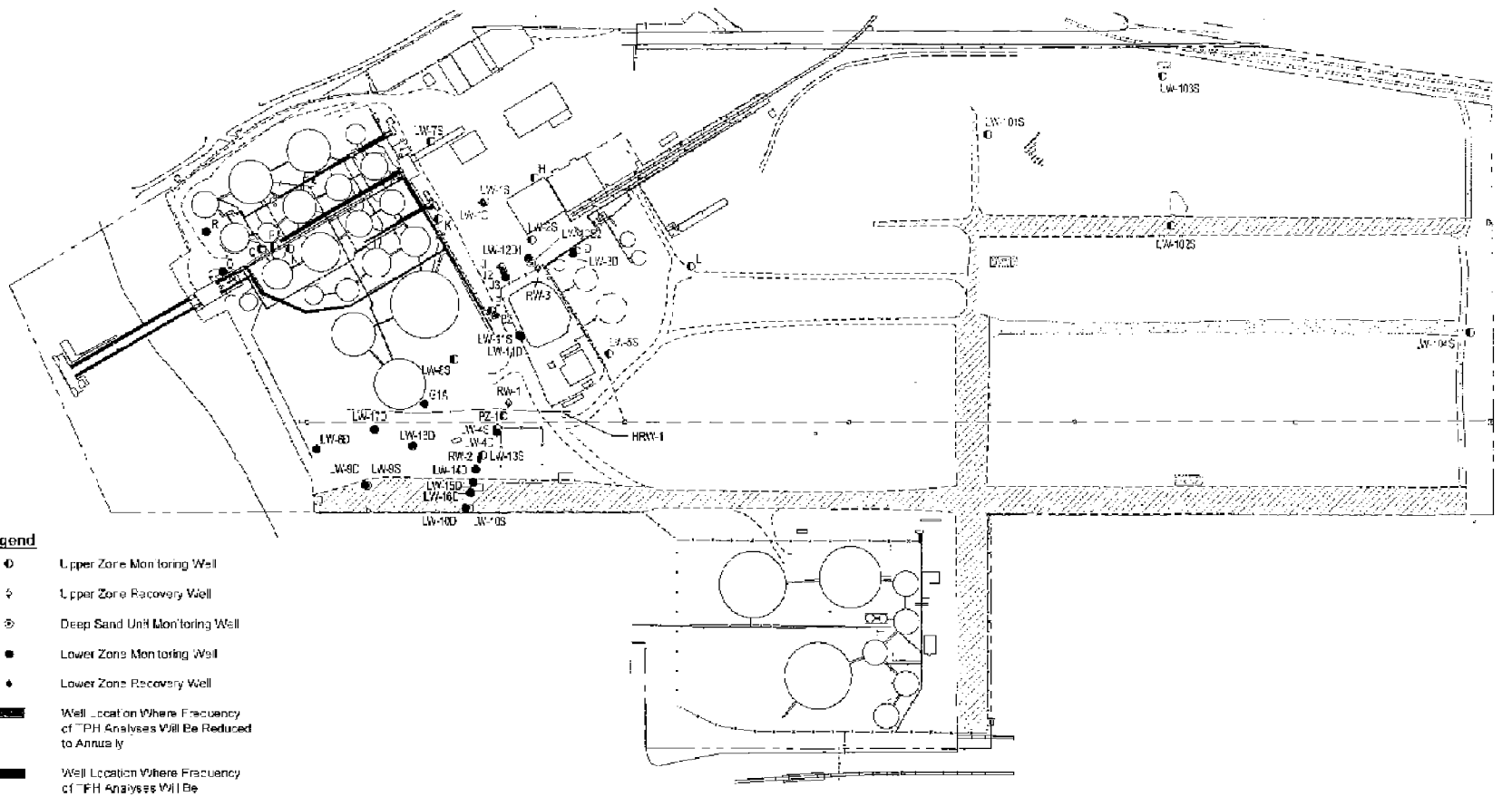

Legend

- Upper Zone Monitoring Well
- Upper Zone Recovery Well
- Deep Sand Unit Monitoring Well
- Lower Zone Monitoring Well
- Lower Zone Recovery Well
- Well Location Where Frequency of TPH Analyses Will Be Reduced to Annually
- Well Location Where Frequency of TPH Analyses Will Be Eliminated
- Storm Drain
- Horizontal Well
- Catch Basin
- Asphalt
- Gravel

0 200 400
Scale in Feet

Note

Locations for some wells/well points installed pre-1995 are approximate.

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Time Oil NW Terminal Portland, OR	**Monitoring Well and Recovery Well Locations**	Figure 1

BZTO104(e)016135

Landau
Associates
Environmental and Geotechnical Services

May 2, 2001

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

RE: WORK PLAN FOR 2001 STOCKPILE SOIL CHARACTERIZATION SAMPLING TIME OIL NORTHWEST TERMINAL

Dear Mr. Roick,

Attached is a technical memorandum that provides a work plan for conducting additional soil characterization of the stockpile at the Time Oil Northwest Terminal. As stated in the plan, the objective of the sampling will be to collect data for determination of soil concentrations under current conditions for use in the evaluation of future remedial action alternatives for the stockpile.

If the soil concentrations are favorable for offsite disposal, the data will be used as the characterization information necessary to evaluate disposal options. We are currently evaluating possible disposal at the following facilities: 1) Waste Management, Inc. in Arlington, Oregon, 2) Safety-Kleen Lone Mountain facility in Waynoka, Oklahoma, and 3) several facilities located in Canada. Both facilities in the United States are Sub-Title C landfill facilities; the Safety-Kleen facility provides a designated dioxin disposal cell and the Waste Management facility is permitted for macroencapsulation and disposal of dioxin. The Canadian facilities are operated under the authority of Canadian regulations.

The data generated from the physical and biological analyses specified in the work plan may also be used to evaluate a biological treatment approach for the stockpile. It is anticipated that evaluation of these data will provide the engineering and design information necessary for proper selection of a bioremediation approach.

Please feel free to call me or Kevin Murphy if you have any questions.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/rgm

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

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BZTO104(e)016136

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Martin Powers and Rebekah Brooks

DATE May 2, 2001

RE: WORK PLAN FOR 2001 STOCKPILE SOIL CHARACTERIZATION SAMPLING TIME OIL NORTHWEST TERMINAL

INTRODUCTION

This technical memorandum presents a work plan for the collection and analysis of additional soil characterization samples from the soil stockpile located at the Time Oil Northwest Terminal in Portland, Oregon (Figure 1). The objective of the sampling will be to collect data for determination of soil concentrations under current conditions for use in the evaluation of future remedial action alternatives for the stockpile. Specifically, the data collected from the soil stockpile will be used to evaluate the following:

- whether the material in the soil stockpile is suitable for direct land disposal or incineration at an offsite facility, and
- whether the material in the soil stockpile is amenable to solid-phase biodegradation as a potential remedial option. This determination will include collection of data to attempt to determine what factors, if any, would limit the biodegradation of the soil stockpile materials.

The soil stockpile characterization sampling will consist of the collection of representative soil samples from the stockpile and analysis of the samples for a group of chemical constituents, including those previously identified as constituents of potential concern (COPC) or constituents of potential ecological concern (CPEC) (Landau Associates 1999), in accordance with DEQ's guidance for risk assessments (DEQ 1999, 2000). The soil samples will also be analyzed for physical and biological parameters. Given the proper physicochemical conditions, naturally occurring microorganisms can rapidly degrade (mineralize) pentachlorophenol under both aerobic and anaerobic conditions. However, the rate and extent of *in situ* biodegradation is often limited by a number of physicochemical factors. The data generated from the physical and biological analyses will be used to evaluate these factors and the biodegradation potential of the stockpile material.

A description of the procedures for management of the stockpile cover, soil sample collection, analytical methods, and subsequent evaluations are provided in the following sections. Field sampling procedures are provided as Attachment A.

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MANAGEMENT OF THE SOIL STOCKPILE COVER

The soil stockpile is currently covered with a high density polyethylene (HDPE) cover measuring approximately 130 ft by 170 ft. The HDPE cover (Griffolyn T-85) is a 15-mil, 5-ply flexible membrane with nylon scrim reinforcing. The cover is secured to the stockpile by water-filled hydrotubes along its base and a tire web placed on the stockpile top and side slopes. The current cover was installed in 1999 to replace an earlier cover which exhibited weather-induced damage. The current cover was placed on top of the earlier cover to provide additional cover protection.

Prior to collection of the soil samples, the uppermost cover will be peeled back to allow direct access for the soil sample augers. Holes will be cut into the older cover, as necessary, to access the stockpile for sampling. It is anticipated that a remediation contractor will be used for manipulation of the cover. Following sample collection, the cover and hydrotubes will be replaced, in accordance with the Stockpile Management Plan (SMP) implementation protocols (Landau Associates 1997).

SAMPLE COLLECTION METHODS

The procedures for collection of representative soil samples from the soil stockpile are provided in Attachment A to this memorandum. In summary, soil samples will be collected from 18 grid-based random sample locations distributed over the entire surface area of the stockpile (Figure 2). Sampling will be conducted using a hand auger or limited access hollow-stem auger rig with care being taken so that the auger does not penetrate the liner located under the stockpile. The samples will be composited over the entire thickness of the stockpile at each location. In addition, composite soil samples will be collected from every group of three consecutive grid locations (e.g., grids 1, 2, and 3; grids 4, 5, and 6; etc.). A total of 6 composite samples will be collected from the 18 sample locations.

Quality assurance/quality control (QA/QC) procedures and health and safety protocols to be used during sampling will be conducted in accordance with the revised Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HSP) (Landau Associates 2001a,b). The QAPP and HSP will be reviewed by field personnel prior to mobilization to the site for sampling activities. Questions regarding the policies and procedures contained in these documents, if any, will be resolved by the Landau Associates and Time Oil project managers before initiation of field activities.

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ANALYTICAL METHODS

Following collection, the stockpile soil samples will be submitted to analytical laboratories for the analysis of the parameters listed in Table 1. The samples will be submitted to analytical laboratories as follows:

- Each of the 18 soil samples collected at the grid locations, and the associated QA/QC samples, will be submitted to Analytical Resources, Inc. (ARI) in Seattle, Washington for analysis of semivolatile organic compounds (SVOCs), including pentachlorophenol (PCP) by the selected ion monitoring method, and metals.

- The six composite soil samples will also be submitted to ARI for potassium, and pH analyses.

- The six composite soil samples will be submitted to Pace Analytical Services, Inc. in St. Paul, Minnesota for analysis of dioxins/furans.

- The six composite soil samples will be submitted to Microbe Inetck Labs in St. Louis, Missouri for analysis of biochemical parameters (except potassium and pH) and the biofeasibility parameters.

- The six composite samples will be homogenized into one sample and will be submitted to Rosa Environmental and Geotechnical Laboratory in West Seattle, Washington for analysis of physical parameters.

The sampling and analyses will be conducted in accordance with the QA/QC procedures provided in the QAPP (Landau Associates 2001), and as described in Attachment A.

RESULTS EVALUATION/REPORTING

Following receipt of the analytical results, Landau Associates will process the laboratory-provided data and validate the quality of the data using the procedures provided in the QAPP. Following validation, the analytical results will be evaluated to determine the most feasible method for treatment and/or disposal of the material in the soil stockpile in accordance with state and federal regulations. The results of this evaluation, the tabulated analytical results, and the recommended remedial alternative for biological treatment and/or disposal of the stockpile material will be submitted to DEQ along with the results of a focused feasibility study. A plan for implementation of the recommended alternative will also be provided to DEQ for approval prior to implementation.

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REFERENCES

DEQ. 2000. *Guidance for Conduct of Deterministic Human Health Risk Assessments.* Oregon Department of Environmental Quality, Portland, Oregon. May.

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Landau Associates. 2000a. *Draft Quality Assurance Project Plan, Time Oil Northwest Terminal.* March 22.

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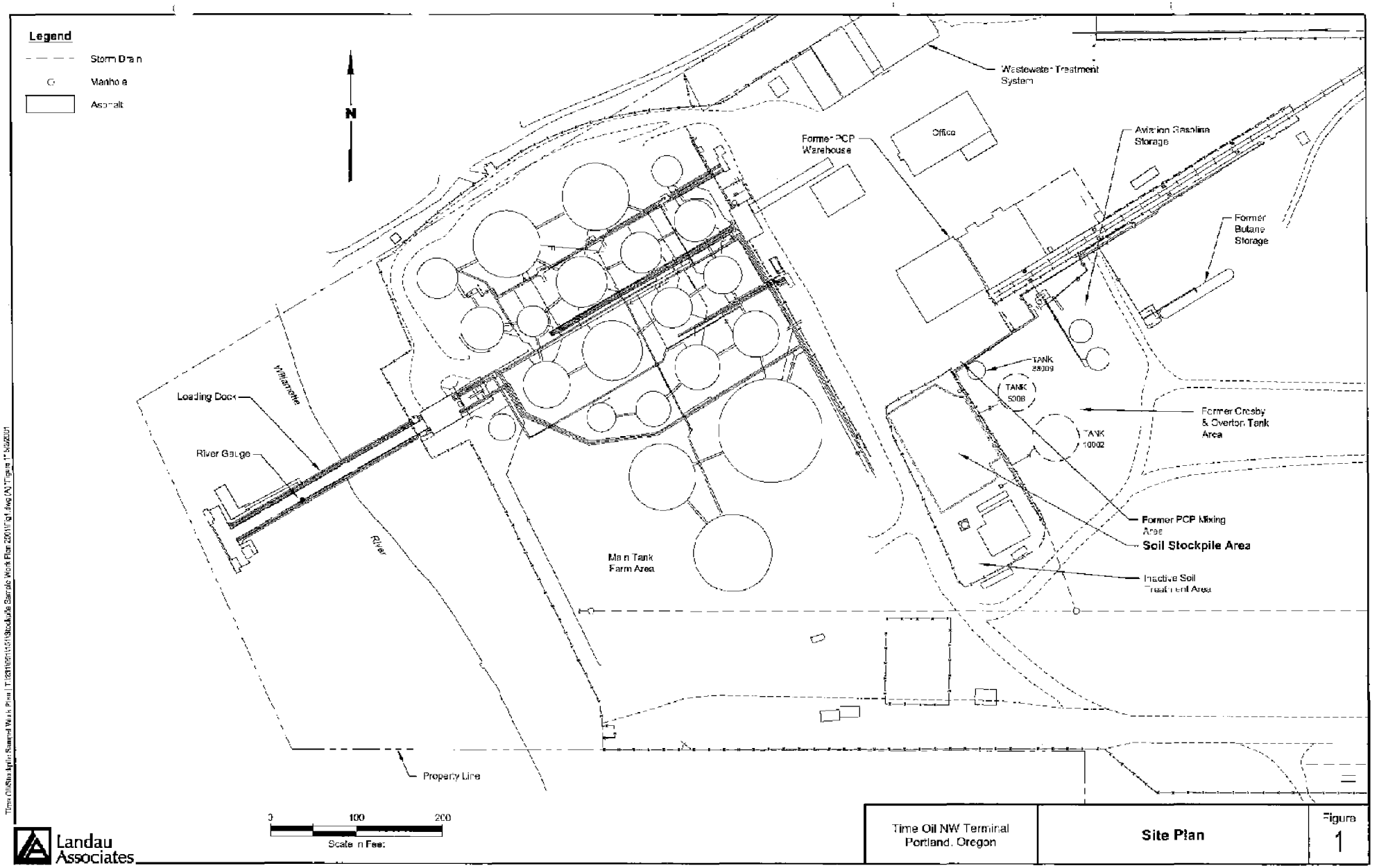

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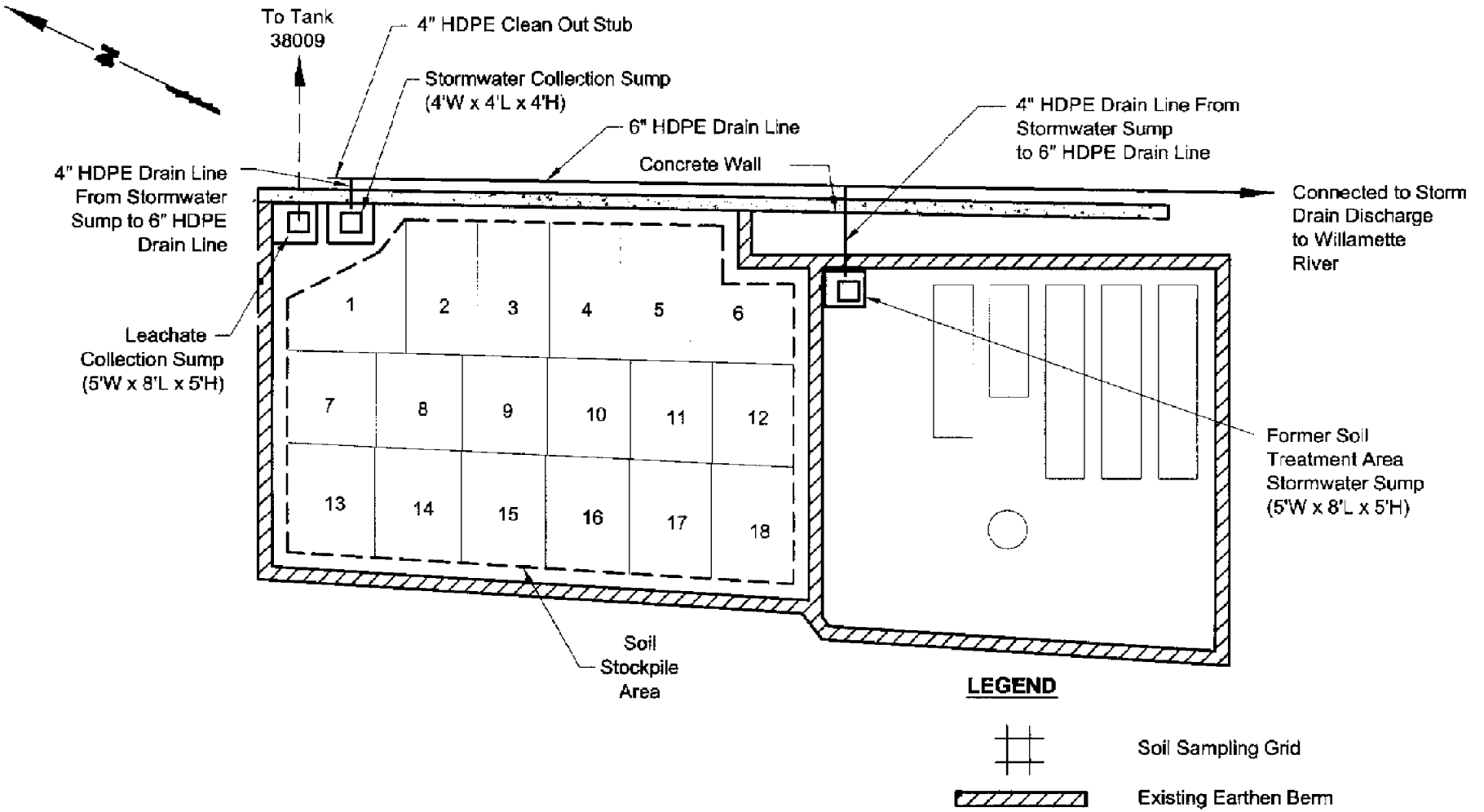

Landau Associates

Time Oil NW Terminal Portland, Oregon	**Grid Sampling Plan for Soil Stockpile**	Figure 2

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TABLE 1
LABORATORY ANALYSES

Analyte	Method (a)	Number of Samples(b)	Holding Times
Chemical Parameters:			
PCP (c)	8270 (SIM)	18	14 days
Other semivolatile organic compounds (c)	8270	18	14 days
Metals (d)	6010/7000 series	18	6 months
Dioxins/furans (e)	8290 (modified)	6	14 days
Biochemical Parameters:			
Ammonia nitrogen (f)	SM 4500-NH3FR	6	7 days
Nitrate nitrogen (f)	SM 4500-NO2B	6	28 days
Sulfate (f)	SM 9038	6	28 days
Potassium (d)	6010	6	6 months
Total phosphorous (f)	SM 4500-BPE	6	2 days
Soil pH (d)	150.1	6	2 hours
Total organic carbon (f)	SM 9060	6	28 days
Biological oxygen demand (BOD) (g)	SM 5210	6	2 days
Chemical oxygen demand (COD) (g)	SM 5220	6	7 days
Physical Parameters:			
Grain-size (sieve) (h)	ASTM D-421/422	1	NA
Soil moisture content (h)	ASTM D-2216	1	NA
Soil moisture retention (h)	SSSA Chap. 26-6	1	NA
Biofeasibility Parameters:			
Total Heterotrophs (i)	SM 9215c	6	48 hours
Identify PCP degrading microorganisms (i)	GC Method	6	NA
Endpoint kinetic assay for PCP-degrading microorganisms (i)	NA	6	NA

Notes:

NA = Not Applicable

(a) Analysis methods are from EPA SW-846, unless otherwise noted. SM methods are referenced in *Standard Methods for Water and Wastewater, 18th Edition*. The SSA method is referenced in Soil Scientist Society of America *Methods of Soil Analysis, Part I. Physical and Mineralogical Methods*. ASTM methods are referenced in the American Society for Testing and Materials Annual Standards—Soil and Rock.
(b) The number of samples indicated does not include QA/QC sampling.
(c) One 8-oz., unpreserved WMG container will be used for these analyses.
(d) One 4-oz., unpreserved WMG container will be used for metals and potassium analysis.
(e) One 8 oz., unpreserved WMG container will be used for dioxins/furans analyses.
(f) One 8-oz., unproserved wide mouth glass (WMG) container will be used for these analyses.
(g) One 8-oz., unpreserved WMG container will be used for BOD and COD analyses. The sample must be submitted to the laboratory within 24 hours of collection.
(h) One 16-oz., unpreserved WMG container will be used for analyses of the physical parameters listed.
(i) One 16-oz., unpreserved WMG container will be used for analysis of biological parameters.

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ATTACHMENT A
FIELD SAMPLING PLAN

This field sampling plan describes the procedures for collecting soil characterization samples of the soil stockpile at the Time Oil Northwest Terminal in Portland, Oregon. The procedures described herein are consistent with Oregon Department of Environmental Quality (DEQ) and Environmental Protection Agency (EPA) sampling protocols. Sampling and analysis for this activity will take place in accordance with the project Health and Safety Plan and Quality Assurance Project Plan (Landau Associates 2001a,b).

IDENTIFICATION OF SOIL SAMPLE LOCATIONS

The locations for the soil characterization samples will initially be identified using a grid-based random sampling approach. In summary, the method for sample identification will consist of dividing the surface area of the soil pile into 18 sample grids of approximately equal soil volume. One sample will be collected at a randomly-generated location from each of the 18 grids. Coordinates for the random sample locations within each grid will be generated using the method described in the EPA guidance, entitled *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media* (February 1989), as follows:

1. Assign the origin of an XY-axis at the lower left hand corner of each sample grid. The minimum X and Y coordinates will be defined as X_{min} and Y_{min} and both will be set equal to zero.

2. Measure the total length (X_{max}) and total width (Y_{max}) of each sample grid. X_{max} will be set equal to the distance, measured in feet, between the lower left hand corner of the sample grid and the lower right hand corner of the sample grid. Y_{max} will be set equal to the distance, measured in feet, between the lower left hand corner of the sample grid and the upper left hand corner of the sample grid.

3. For each of the 10 sampling grids, two random numbers (A and B) between 0 and 1 will be generated (using a HP calculator, or equivalent) and the following equation will be utilized to determine the X and Y coordinates of the sample location within the sample grid:
   $X = X_{min} + (X_{max} - X_{min}) * \text{Random Number A}$
   $Y = Y_{min} + (Y_{max} - Y_{min}) * \text{Random Number B}$
   Each X and Y coordinate will be rounded to the nearest half-foot.

4. Once the soil sample locations have been identified, each of the sample locations will be identified with a wooden stake, with the appropriate sample location identified.

5. Sample location identifications will be identified as follows:
   SSP-2001-(Grid Number).

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SAMPLE COLLECTION PROCEDURES

At each of the designated sample locations, a sample will be collected using a hand auger or a limited access hollow-stem auger drilling rig. The sample collected will be a composite sample representative of the entire thickness of the soil pile at the sample location. As such, each time the auger is brought to the surface, the material present in the hand auger bucket or split spoon sampler will be placed on clean plastic sheeting. To the extent possible, the volume of soil collected at each depth sampled at a single location will be approximately equal. If a hand auger is utilized to collect the soil samples, a 3-inch diameter clean PVC pipe will be inserted in the borehole as the hand auger is advanced, to reduce the potential for the borehole to collapse or slough. If a limited access auger drilling rig (e.g., Minuteman or an Acker Soil Mechanic) is utilized, the method of soil sample collection will be through split spoon samples driven through the center of hollow-stem augers. The borehole will be advanced to the top of the layer of gravel located near the bottom of the soil pile. Measurements will be made prior to drilling to determine the anticipated depth to the gravel layer. After reaching the maximum depth of the borehole, the sample material will be placed into a decontaminated stainless steel bowl, and thoroughly homogenized by field personnel using a decontaminated, stainless steel mixing spoon. Following homogenization of the sample material, the soil will be placed into appropriate sample containers provided by the laboratory.

During the collection of the soil samples, the Log of Exploration, Soil/Sediment Sample Collection Form, and the Chain of Custody Form will be completed by Landau Associates personnel, in accordance with the methods described in the QAPP. Copies of these forms are provided in Appendix E of the draft *Phase III Remedial Investigation Work Plan* (Landau Associates 2001c). In addition to the forms listed above, Landau Associates field personnel will follow protocols specified in the QAPP for project documentation, including taking field notes, labeling sample containers, photographing the soil sampling activity, and making notations on a site map showing sample locations.

QA/QC samples to be collected during the field activities will include one blind field duplicate from one of the grid locations and one field equipment blank. Collection procedures will be conducted in accordance with the QAPP.

SAMPLE SHIPMENT AND ANALYSIS

Following collection of the soil samples, the sample containers will be placed in a cooler for shipment to the laboratory. All samples will be shipped by overnight courier or hand delivered to the appropriate analytical laboratory. Sample shipment will be completed as soon as possible following completion of the requisite field forms to minimize the holding time for the samples. At a minimum,

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samples will be shipped from the field at the conclusion of each work day. Specific procedures for sample packing, shipment, and custody will be followed as specified in the QAPP.

The samples will be analyzed for the chemical, physical, and biological parameters listed in Table 1 of the main text. The samples will be submitted to analytical laboratories as follows:

- Each of the 18 soil samples collected at the grid locations, and the associated QA/QC samples, will be submitted to Analytical Resources, Inc. (ARI) in Seattle, Washington for analysis of semivolatile organic compounds (SVOCs), including pentachlorophenol (PCP) by the selected ion monitoring method, and metals.

- The six composite soil samples will also be submitted to ARI for potassium and pH analyses.

- The six composite soil samples will be submitted to Pace Analytical Services, Inc. in St. Paul, Minnesota for analysis of dioxins/furans.

- The six composite soil samples will be submitted to Microbe Inetek Labs in St. Louis, Missouri for analysis of biochemical parameters (except potassium and pH) and the biofeasibility parameters.

The six composite samples will be homogenized into one sample will be submitted to Rosa Environmental and Geotechnical Laboratory in West Seattle, Washington for analysis of physical parameters.

The analytical laboratories will complete the analyses of the samples within the appropriate holding times permitted by the respective sampling methods.

EQUIPMENT DECONTAMINATION

Decontamination procedures are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

All manual sampling equipment used (i.e., hand auger, split spoon samplers, stainless steel bowls, stainless steel spoons, etc.) will be decontaminated using a three step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution

2. Rinse and scrub equipment with clean tap water

3. Rinse equipment a final time with deionized water to remove tap water impurities.

Decontamination of sampling equipment that is suspected to come into contact with free phase liquid, or contains a visible sheen will include a hexane rinse (or other appropriate solvent) prior to the final rinse.

All downhole sampling equipment (i.e., hollow-stem augers) will be decontaminated using the following two-step process:

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1. After removing augers from the drill rig, remove excess soil from the auger and place the soil into 55-gallon drums for possible additional testing.

2. Following the removal of the excess soil, use a hot water pressure washer to clean the remaining visible soil from the augers. The supply source of water will be potable water available at the site.

The decontamination station for the downhole sampling equipment will be located at the base of the soil stockpile at an area designated by Time Oil personnel. Water generated during the decontamination process will be managed, as described in the following section. Decontamination of the reusable sampling devices will occur between collection of each sample and at completion of the project.

RESIDUAL WASTE HANDLING

Following collection of the soil samples and preparation for shipment to the laboratory, any remaining soil sample will be placed into 55-gallon drums and temporarily stored in the designated storage area at the terminal. Any remaining boreholes will be filled in with additional soil from the stockpile to reduce the hazard that could be created by the borehole.

Decontamination water derived from the collection of soil samples will be temporarily contained in properly labeled and sealed 55-gallon drums provided by Time Oil and transferred to tank 38009 for subsequent treatment by the terminal wastewater treatment system. Soil residuals from the drums will be placed on the soil stockpile.

Other waste material derived from sample collection (e.g., PPE, plastic sheeting, etc.) will be disposed of in accordance with applicable state and federal regulations.

REFERENCES

Landau Associates. 2001a. *Draft Project Health and Safety Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

Landau Associates. 2001b. *Draft Quality Assurance Project Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

Landau Associates. 2001c. *Draft Phase III Remedial Investigation Work Plan, Time Oil Northwest Terminal, Portland, Oregon.* March 22.

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Landau
Associates
Environmental and Geotechnical Services

REC'D MAY 14 2001

May 9, 2001

86-109
(E) D

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:
Rhonda Mann
For Rebekah Brooks
Project Manager

5/9/01 S:\WPROC\231\001\038\DEQ-apr01.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
April 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the March 2000 monthly report to DEQ.
- Continued preparation and internal reviews of the *First Quarter 2001 Groundwater Report.*
- Completed preparation and internal review of the *First Quarter 2001 Interim Action Status Report*, including evaluation of quarterly groundwater elevations and PCP distribution for performance of groundwater interim action.
- Collected a stormwater sample from the storm drain outfall from the stockpile, in compliance with the NPDES permit requirements.
- Received client comments on the *Groundwater Interim Action Completion Report.*
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 2.3 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.
- Evaluating expansion of interim action system operation in the lower zone by increasing the pumping rate at RW-2 and in the upper zone by pumping of RW-1.
- Prepared a letter providing documentation for stockpile management activities since 1998 and submitted to DEQ.
- Prepared and conducted internal and client reviews of a work plan for conducting soil characterization sampling of the soil stockpile to determine soil concentrations under current conditions for use in the evaluation of future remedial action alternatives for the stockpile.
- Prepared a work plan for conducting supplemental soil sampling in the Phase II areas and stormwater sampling from the east-west trending storm drain at the terminal.
- Submitted the *EPPI Results Report* to DEQ, including an updated schedule for east property activities.
- Continued client review of the *Phase III RI Work Plan*, including the updated Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

RESULTS COLLECTED

- No results were collected.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

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WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Prepare a recommendation letter to DEQ for future analyses of TPH for quarterly groundwater sampling events.
- Continue internal and client reviews for the *First Quarter 2001 Groundwater Report,* and the *First Quarter 2001 Interim Action Status Report.*
- Receive analytical results from the storm drain stormwater sample and compare to NPDES limits.
- Submit the *Groundwater Interim Action Completion 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.
- Implement the interim action startup plan within the upper zone, including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping, contingent on upper zone groundwater levels.
- Submit the work plan for soil characterization of the soil stockpile to DEQ, receive DEQ's comments, and conduct field activities.
- Receive and incorporate client comments on the *Phase III RI Work Plan* and submit to DEQ, including a preliminary schedule for Phase III activities.

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Landau Associates
Environmental and Geotechnical Services

REC'D JUN 15 2001

TRANSMITTAL

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

Date: June 11, 2001

Attn: Mr. Tom Roick

RE: Time Oil Northwest Terminal

Project No.: 231001.117

Copies	Description
1	Groundwater Interim Action Status Report – First Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon

Message:

Please find attached the above-referenced report. Please let me know if you have questions, or need additional information.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/rgm
6/11/01 S:\WPROC\231\TRANSMIT.FAX\DEQ2Trn.doc
Enclosure

cc: Mr. Don Butler, Time Oil Co.
Ms. Patty Dost, Schwabe, Williamson & Wyatt
Mr. Kevin Murphy, Time Oil Co.
Mr. 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

MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Jerry Ninteman, Landau Associates

DATE June 11, 2001

RE: GROUNDWATER INTERIM ACTION STATUS REPORT – FIRST 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 in Portland, Oregon for the first 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 first 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 Northwest 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 first quarter of 2001; groundwater was extracted from lower zone recovery well RW-2 at a rate of approximately 10 gpm. During this time period, RW-2 operated for 2,097 hours (approximately 87 days) and extracted approximately 1,080,000 gallons of groundwater, with one short (less than 8 hours) shutdown on March 6, 2001. Approximately 940,000 gallons of groundwater were treated at the terminal wastewater treatment facility and discharged to the sanitary sewer under a permit with Metro (Permit No. 400-121) in the first quarter of 2001. The remaining volume of extracted groundwater was contained in storage tank number 16804 at the terminal pending treatment at the end of the first 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 Northwest Terminal. Site-wide upper zone groundwater levels were 2 to 3 ft lower than levels observed in the first quarter of 2000

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and 4 to 6 ft lower than levels observed in the first quarter of 1999. 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 second quarter of 2001 to identify when the water level is sufficiently high to allow for groundwater extraction from HRW-1. However, unless the area receives a substantial amount of precipitation, water levels may not rise to a level sufficient to operate HRW-1 until late 2001.

Although the apparent hydraulic communication between the upper and lower zones in this area suggests that upper zone groundwater near RW-1 may be captured by pumping from RW-2, there may be some benefit to removing groundwater directly from upper zone monitoring well RW-1 when elevated PCP concentrations are observed there and HRW-1 is not pumping. Given the current water level in the upper zone, it may be possible to extract groundwater from RW-1 at a relatively low rate (probably less than 3 gpm). We recommend identifying a sustainable groundwater extraction rate from RW-1, pumping at that rate as soon as possible after approval by the Oregon Department of Environmental Quality (DEQ), and re-evaluating continued pumping after the next quarterly groundwater monitoring event.

DATA COLLECTION AND RESULTS

Quarterly groundwater level measurements were collected on February 12, 2001 to confirm that hydraulic capture of the lower zone PCP plume was maintained by the 10 gpm extraction rate from RW-2. Discrete water level measurements for the first 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 at and beyond the leading edge of the lower zone PCP plume (the PCP plume has historically been defined as the 1 µg/L PCP concentration contour), extending west to well LW-17D and south to well LW-10D.

One water sample was collected at the point of discharge from the water treatment system into the sanitary sewer on January 18, 2001. This sample showed that the treated groundwater contained PCP at a concentration of 14.3 µg/L. Subsequent sampling performed on March 7, 2001 demonstrated that the water treatment system reduced PCP concentrations to a level below the detection limit of 25 µg/L at the

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point of discharge. Both of these samples yielded PCP concentrations that were less than the discharge limitation of 40 µg/L, as defined in the Metro permit for discharge to the sanitary sewer.

Groundwater samples were collected from five interim action wells (LW-13S, LW-14D, LW 17D, LW-18D, and RW-2) on February 13 15, 2001, during the first quarter 2001 sampling event. PCP was detected at a concentration of 9.3 µg/L in upper zone well LW-13S. Samples from lower zone wells LW-17D and RW-2 contained PCP at concentrations of 0.56 and 30 µg/L, respectively. Well LW-6D, located near the Willamette River west-southwest of LW-17D, also contained a low level of PCP (0.46 µg/L). PCP was not detected at a detection limit of 0.25 µg/L in samples collected from wells LW-14D and LW-18D. PCP concentrations in the upper and lower zone groundwater, based on analytical results from the first 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 *First Quarter 2001 Groundwater Report* (Landau Associates 2001).

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Landau Associates. 2001. *Draft First Quarter 2000 Groundwater Report, Time Oil Northwest Terminal, Portland, Oregon.* May 25.

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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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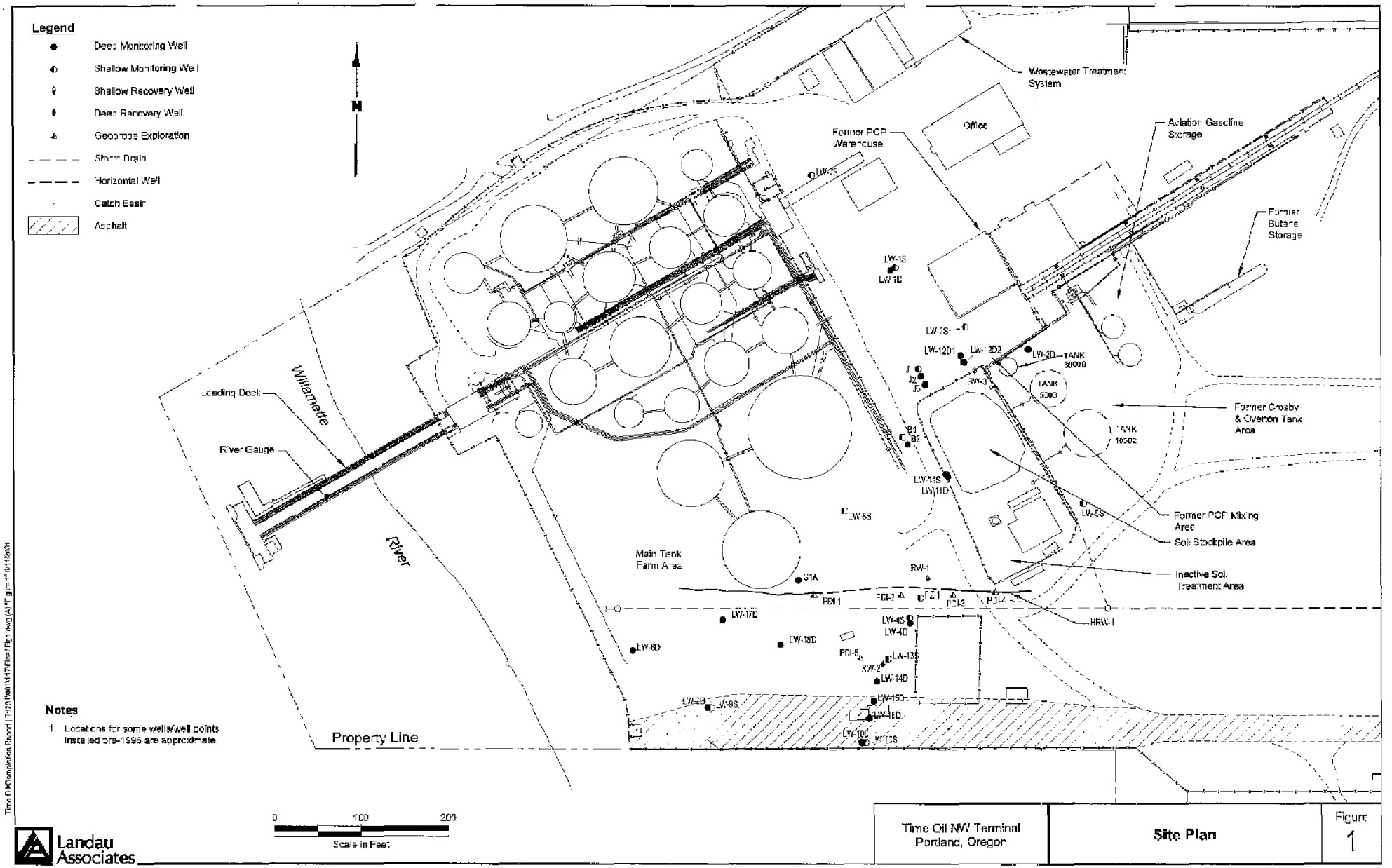

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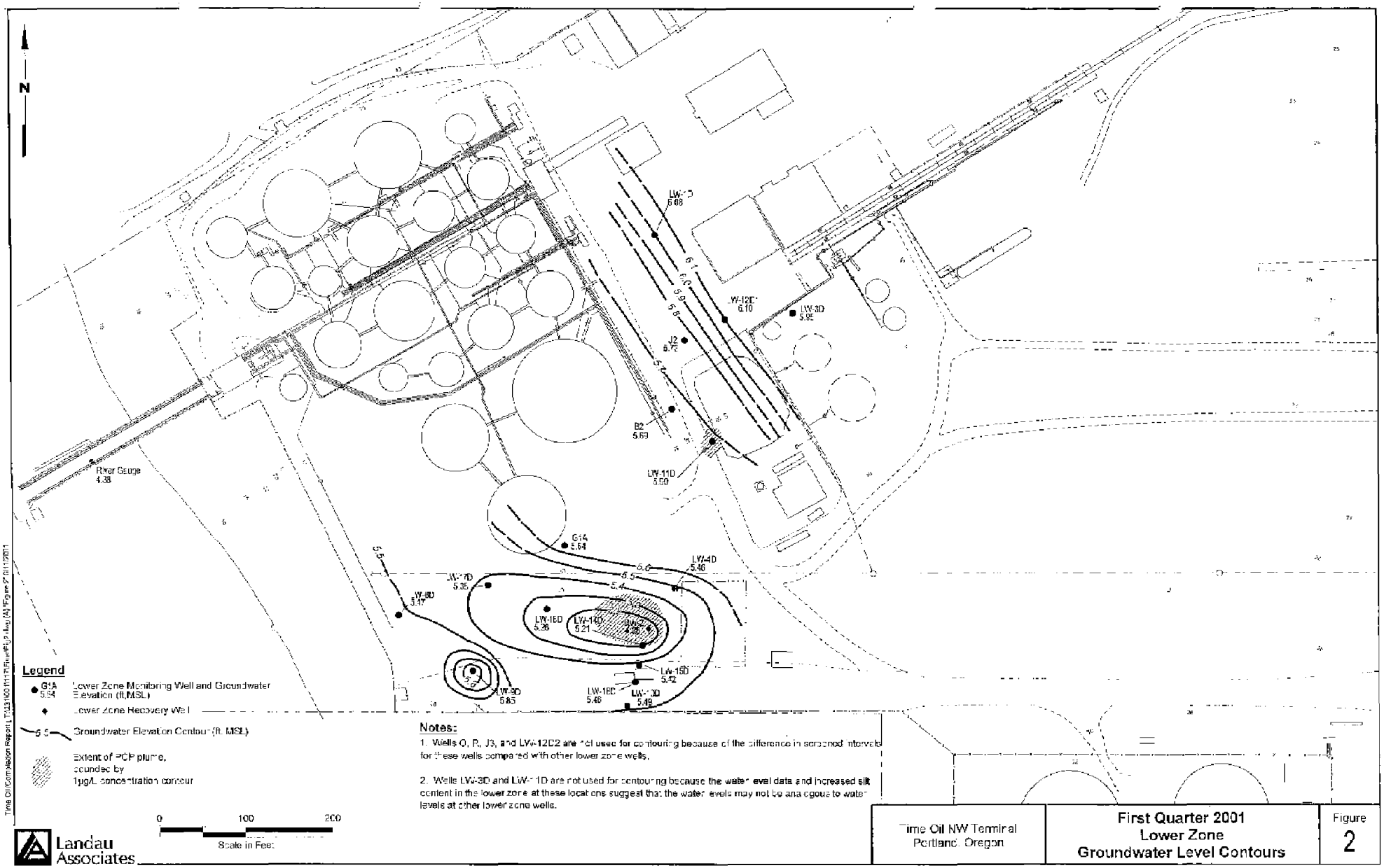

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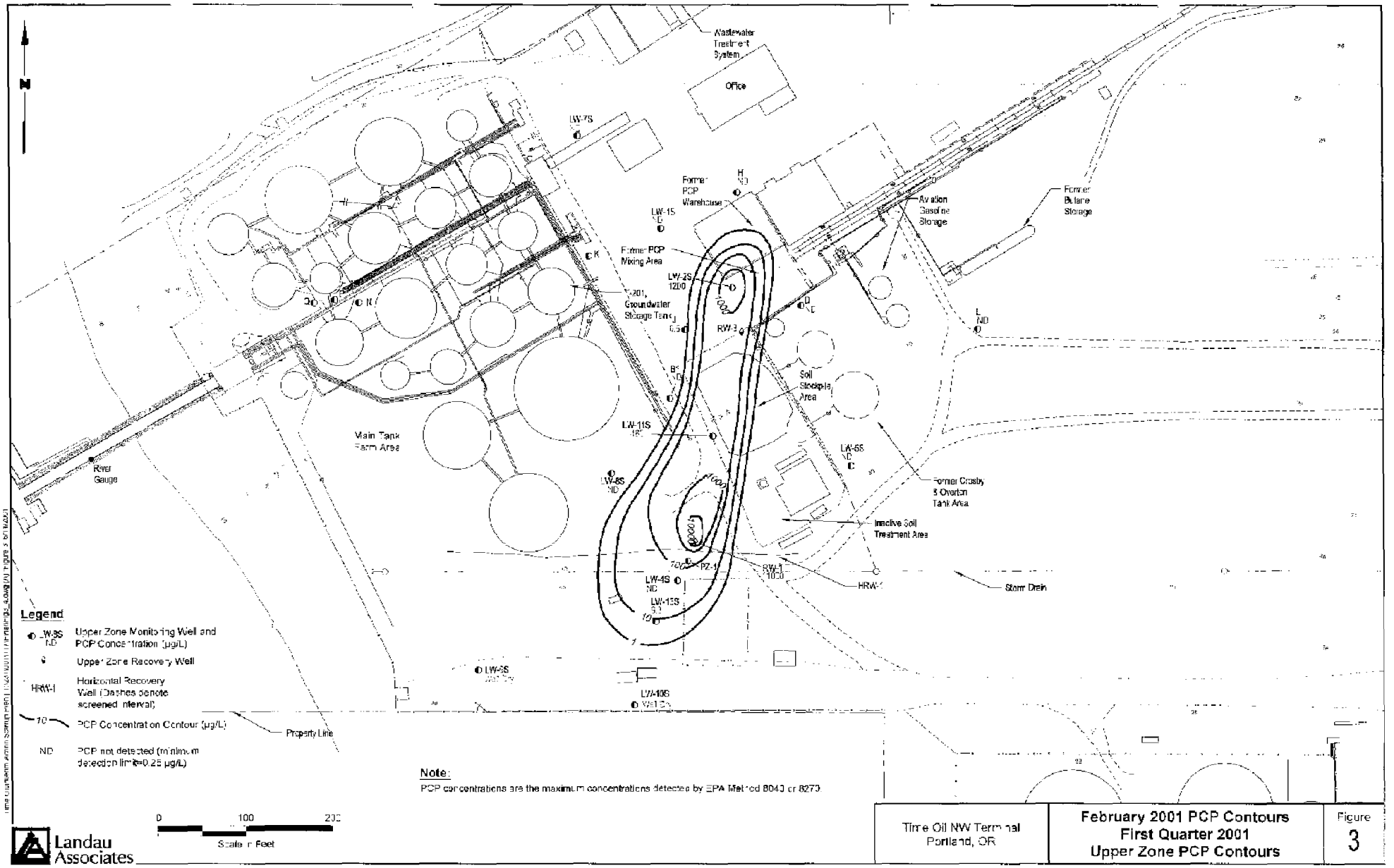

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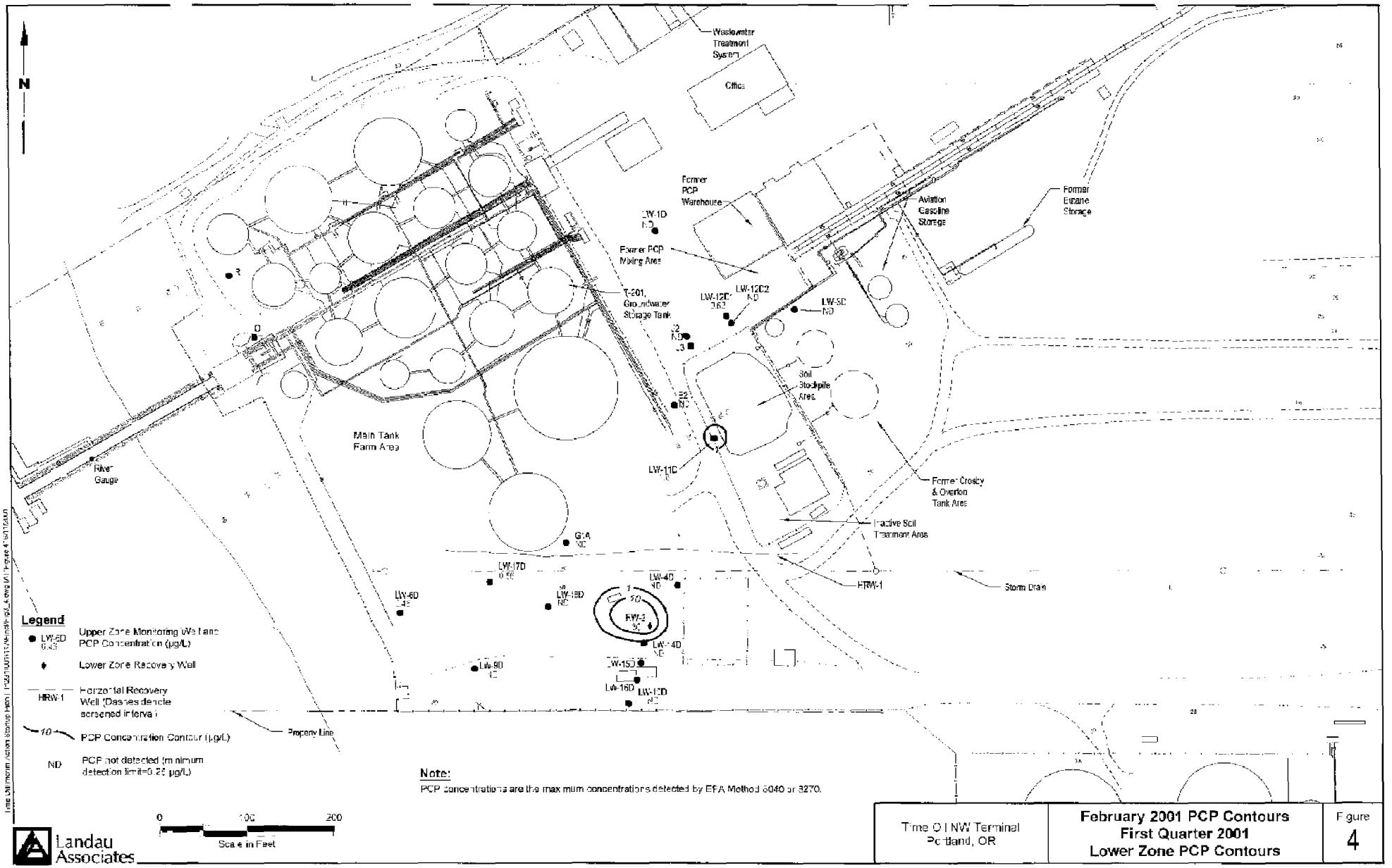

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TABLE 1
GROUNDWATER INTERIM ACTION OPERATIONAL HISTORY
LOWER WATER-BEARING ZONE
TIME OIL NORTHWEST TERMINAL

Monitoring Period	RW-2 Discharge				Treatment System Discharge			Comments
	Volume of Water Pumped (gal)	Sample Date	PCP Concentration (ug/L)	Estimated PCP Mass Removal (lb)	Volume of Water Treated (gal)	Sample Date	Discharge PCP Concentration (ug/L)	
Fourth Quarter 2000								
October 2000	439,003			0.35	0			Mass removal calculated using 11/00 PCP concentration.
November 2000	305,601	11/9/2000	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	5.89	
						12/20/2000	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*			

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

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TABLE 2
SUMMARY OF WATER LEVEL MEASUREMENTS
LOWER ZONE STARTUP MONITORING - FIRST 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	02/12/01	15:27	30.31	24.62	5.69	----	
G1A	02/12/01	16:01	29.72	24.08	5.64	----	
J2	02/12/01	15:23	29.65	23.92	5.73	----	
LW1D	02/12/01	15:35	28.31	22.23	6.08	----	
LW3D	02/12/01	15:11	30.80	24.85	5.95	----	
LW4D	02/12/01	16:39	30.17	24.71	5.46	----	
LW6D	02/12/01	16:03	30.84	25.37	5.47	----	
LW9D	02/12/01	16:11	30.98	25.13	5.85	----	
LW10D	02/12/01	16:15	31.12	25.63	5.49	----	
LW11D	02/12/01	15:16	29.04	23.14	5.90	----	
LW12D1	02/12/01	15:57	30.02	23.92	6.10	----	
LW14D	02/12/01	16:20	30.54	25.33	5.21	----	
LW15D	02/12/01	16:18	30.85	25.43	5.42	----	
LW16D	02/12/01	16:17	28.40	22.94	5.46	----	
LW17D	02/12/01	16:04	27.82	22.44	5.38	----	
LW18D	02/12/01	16:10	27.82	22.56	5.26	----	
RW2	02/12/01	16:37	30.68	26.40	4.28	----	
Other:							
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	----	

Notes:
---- 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 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)].

Landau Associates
Environmental and Geotechnical Services

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

Date: June 19

Attn: Mr. Tom Roick

RE: Time Oil Northwest Terminal

Project No.: 231001.132

Copies	Description
2	Technical Memorandum re: Supplemental Sampling and Analysis Plan, Phase II Remedial Investigation, Time Oil Northwest Terminal

Message:

Please find enclosed two copies of the above-referenced memorandum that was prepared for Time Oil Co. Please let me know if you have questions, or need additional information.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/rgm

cc: Patty Dost, Schwabe, Williamson and Wyatt
Kevin Murphy, Time Oil Co.
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 June 18, 2001

RE: SUPPLEMENTAL SAMPLING AND ANALYSIS PLAN
PHASE II REMEDIAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

INTRODUCTION

This technical memorandum describes the procedures for conducting additional sampling activities to supplement data collected as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal in Portland, Oregon. As indicated in the Phase II RI report (Landau Associates 2001a), the supplemental sampling will be performed in conjunction with field activities for the Phase III preliminary evaluation and RI. The primary objective of this plan is to provide sampling methodology to be used to further evaluate the extent of soil contamination in the identified Phase II source areas and to assess the potential for a storm drain to impact groundwater flow and quality. This plan provides field, sampling, and analytical procedures to be used during supplemental sampling activities, and was prepared consistent with the Oregon Department of Environmental Quality (DEQ) and Environmental Protection Agency (EPA) guidance documents (EPA 1986; 1987; 1989; 1993a,b; DEQ 1994).

The supplemental sampling activities will consist of the following:

- collection and analysis of soil from 15 soil borings to evaluate the subsurface lithology and the extent of pentachlorophenol (PCP) and polynuclear aromatic hydrocarbon (PAH) contamination associated with identified source areas

- collection and analysis of stormwater from the east-west trending storm drain to evaluate the potential for the storm drain to impact groundwater quality

- collection of water level measurements in storm drain pipe and nearby wells (i.e., RW-1 and PZ-1) to determine whether the stormwater drain discharges water to the groundwater or accepts infiltrating groundwater.

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Drilling of the soil borings will be conducted in accordance with applicable Oregon Water Resources Department (OWRD) regulations (OAR 690-240), as described in the *Phase III RI Work Plan* (Landau Associates 2001b). Quality assurance/quality control (QA/QC) procedures and health and safety protocols will be conducted in accordance with the revised *Quality Assurance Project Plan* (QAPP) and *Health and Safety Plan* (Appendices B and C, respectively; Landau Associates 2001b).

SUPPLEMENTAL SAMPLING PROCEDURES

The field sampling procedures and analysis methods for the soil and stormwater samples are provided in the following sections.

Soil Sampling

Soil samples will be collected from soil borings for chemical analysis and for logging of the subsurface lithology. The analytical results for the soil samples will be integrated with existing data to develop a more accurate characterization of the extent and volume of PCP- and PAH-contaminated soil for use in evaluating remedial alternatives. A total of 57 soil samples will be collected at various depths (ranging from 0.5 to 40 ft below ground surface) from fifteen sampling locations for chemical analysis. The approximate locations and recommended sample depths for each location are shown on Figure 1. The rationale for each of the fifteen sample locations and recommended sample depths are summarized in Table 1. Soil samples will be collected using direct-push drilling techniques and the sample collection methods described in the *Phase III RI Work Plan.*

All supplemental soil samples will be analyzed for PCP at the Analytical Resources, Inc. (ARI) analytical laboratory. Samples collected within the former Crosby & Overton area will also be analyzed for PAHs at ARI. Analytical methods for each of the analyses are specified in Table 1.

Stormwater Sampling

The main storm drain line at the terminal trends east-west and is located about 160 ft north of the southern property boundary. The storm drain conveys stormwater from the terminal entrance area, the topographic low east of the rail spur, and from the cover of the soil stockpile to the Willamette River. Stormwater will be collected from within the storm drain line at the two manholes closest to the discharge point to the river for chemical analysis. The first manhole is located about 70 ft west of the western extent of horizontal well HRW-1. The second manhole is located about 560 ft east of the first manhole, as shown on Figure 2. Analytical results from stormwater sampling will be evaluated to determine the potential for the storm drain to impact groundwater flow and quality (e.g., potential release of stormwater into groundwater through leaks in the storm drain pipe or potential infiltration of groundwater into the storm drain pipe).

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The stormwater samples will be collected when water is actively moving through the storm drain or, if necessary, after a storm event yields sufficient water in the manholes for sample collection. If river water infiltrates into the storm drain line so that stormwater from the terminal can not be differentiated from river water, sampling will be delayed until the river stage is sufficiently low so that this does not occur. Weighted tubing from a peristaltic pump will be lowered into the storm drain line to collect stormwater samples.

Field parameters including pH, temperature, conductivity, dissolved oxygen, and turbidity will be measured for each stormwater sample. Field parameters will be measured a minimum of three times and recorded on sample collection forms for water samples. After the field parameters are measured, stormwater will be placed in the appropriate containers supplied by the laboratory. Stormwater used for field parameter measurements will be poured back into the storm drain manhole.

The stormwater samples will be submitted to the laboratory for PCP analysis using the analytical method specified in Table 1.

Water level measurements will be collected in the storm drain pipe at locations SDM-1 and SDM-2 (Figure 2) and in nearby upper zone well RW-1 and piezometer PZ-1. These water levels will be evaluated to determine whether the storm drain pipe is a source of stormwater leaking into the groundwater, a sink for upper zone groundwater, or neither of the above. Whether the storm drain pipe acts as a source or sink for subsurface water flow may vary seasonally; therefore, these water level measurements will be collected for four consecutive quarters in conjunction with the quarterly groundwater monitoring events.

Quality Assurance and Quality Control

Collection and analysis of the supplemental samples will follow QA/QC procedures and standards outlined in the QAPP. Field QA/QC will include the collection of quality control samples, including blind field duplicate samples, matrix spike and matrix spike duplicate samples, and equipment rinsate blanks. Each of these quality control samples will be collected at the rate of one in every twenty soil samples collected with the following exception. Equipment rinsate blanks will be collected at the rate of one per sampling event (i.e., any continuous sampling period not interrupted by more than two working days). The procedures for collection of the quality control samples are provided in the QAPP.

Equipment Decontamination and Residual Waste Management

The decontamination procedures described in the *Phase III RI Work Plan* will be used by field personnel during supplemental sampling activities to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

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Waste management of the soil cuttings and decontamination water generated by supplemental sampling activities performed in conjunction with the Phase III RI will be handled in the same manner as required for Phase III RI activities.

SURVEYING

Soil sampling locations and invert elevations of storm drain manholes will be surveyed by using either a licensed surveyor, global positioning system (GPS), or by taped hand measurements. Surveying using a licensed surveyor will include horizontal coordinates (x,y) using the established local coordinate system for the terminal, and ground surface elevations using mean sea level datum.

REFERENCES

DEQ. 1994. *Oregon Administrative Rules (OAR) 340-122-045 and 046, Soil Cleanup Manual.* Oregon Department of Environmental Quality. April.

EPA. 1993a. *Subsurface Characterization and Monitoring Techniques, A Desk Reference, Volume I: Solids and Groundwater,* Appendices A and B.

EPA. 1993b. *Subsurface Characterization and Monitoring Techniques, A Desk Reference, Volume II: The Vadose Zone, Field Screening, and Analytical Methods,* Appendices C and D.

EPA. 1989. *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media.* U.S. Environmental Protection Agency. EPA/230/02-89-042. February.

EPA. 1987. *A Compendium of Superfund Field Operations.* 540/P-87/001. USEPA. December.

EPA. 1986. *Test Methods for Evaluating Solid Waste.* U.S. Environmental Protection Agency. EPA/SW-846, Third Edition, with 1995 updates.

Landau Associates. 2001a. *Phase II Remedial Investigation Report, Time Oil Northwest Terminal, Portland, Oregon.* February 9.

Landau Associates. 2001b. *Phase III Remedial Investigation Work Plan, Time Oil Northwest Terminal, Portland, Oregon.* June 18.

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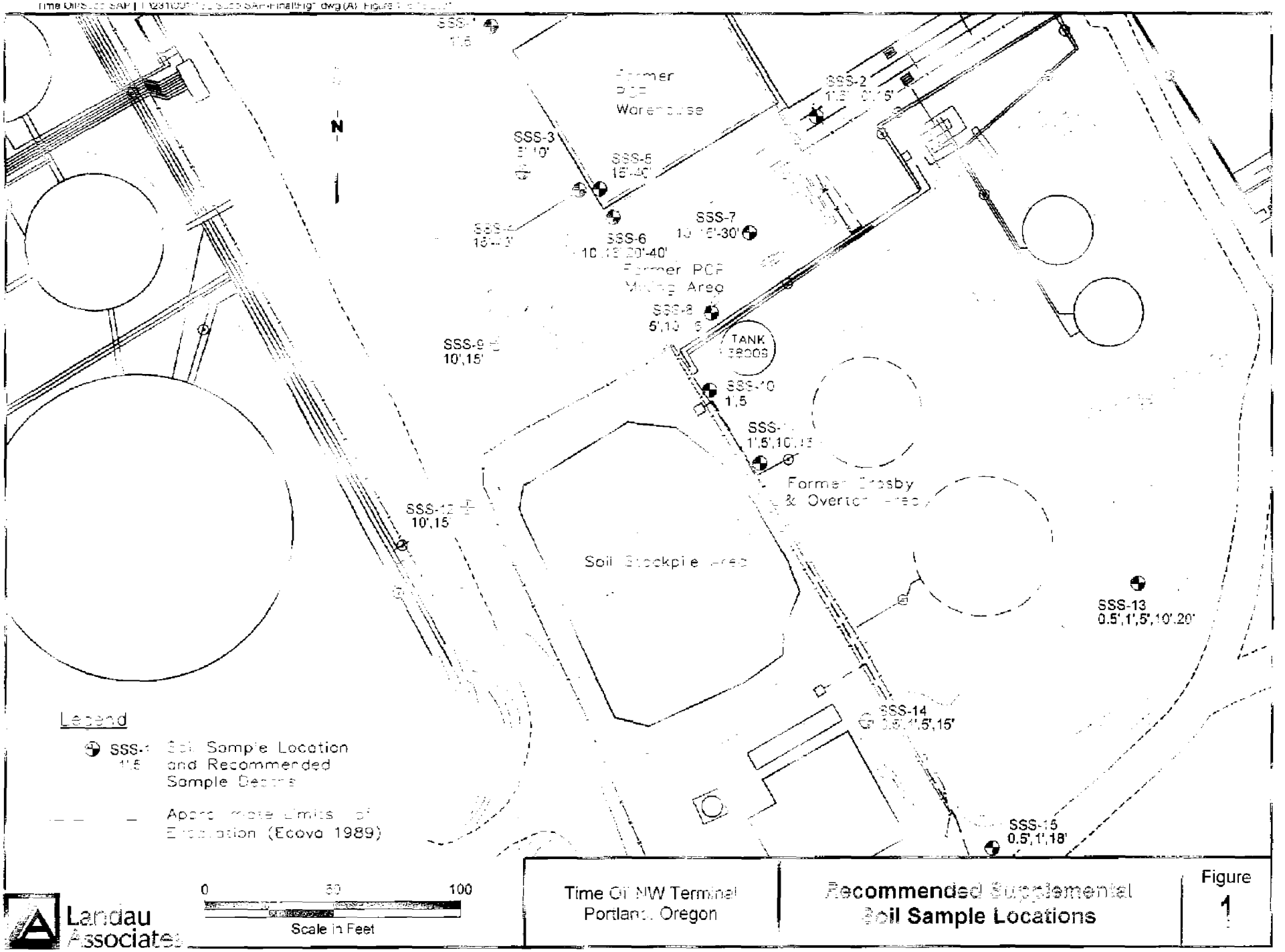

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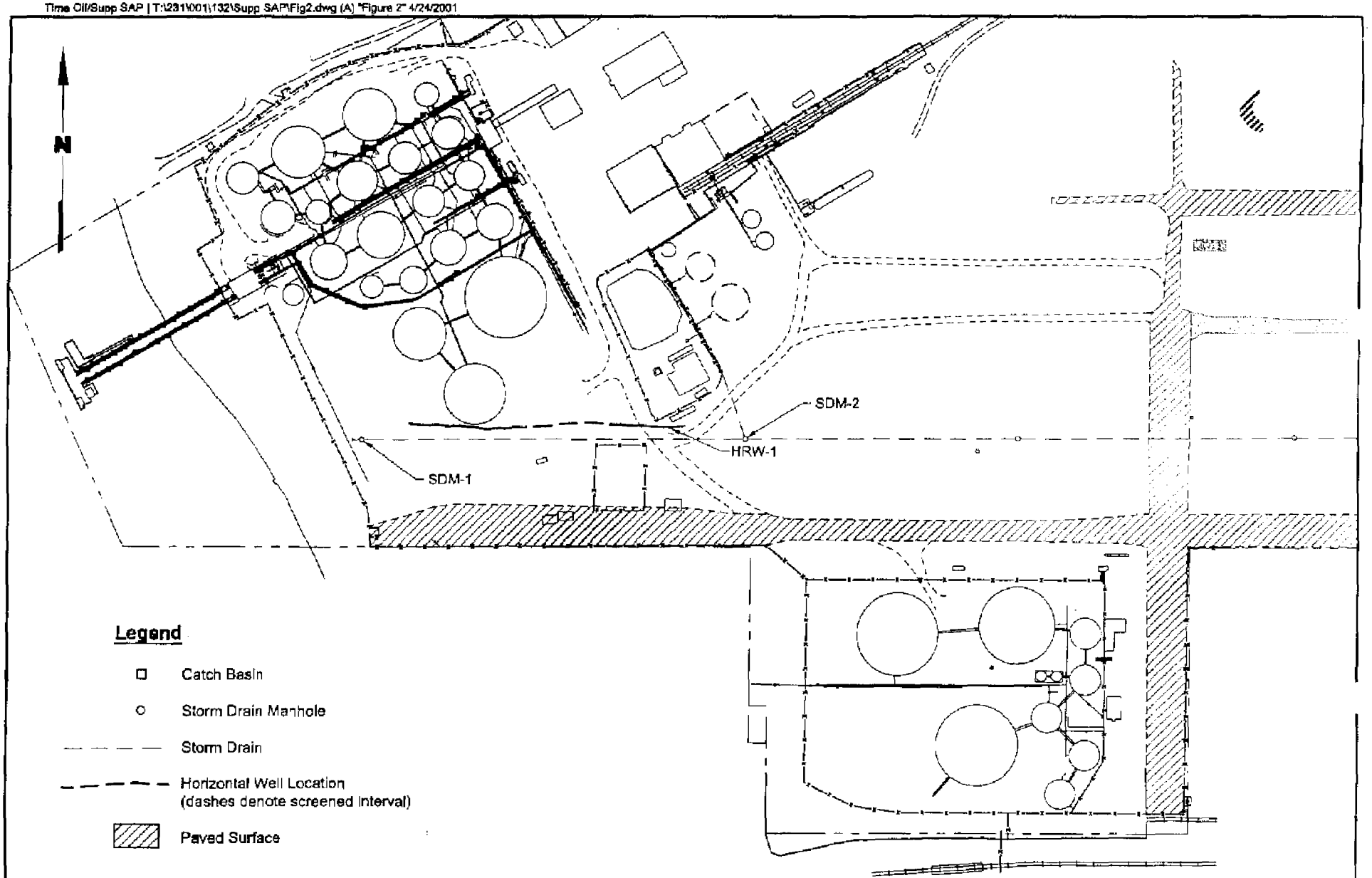
Time Oil/Supp SAP | T:\231\001\132\Supp SAP\Fig2.dwg (A) "Figure 2" 4/24/2001



Landau Associates

Time Oil NW Terminal
Portland, OR

Stormwater Sampling Locations

Figure
2

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TABLE 1
SUPPLEMENTAL SAMPLING SUMMARY
TIME OIL NORTHWEST TERMINAL

Recommended Sample Location	Sample Type	Sample Depth (ft BGS)	Analytes	Analytical Methods (a)	Rationale
SSS-1	Soil	1	PCP	8270 SIM	Estimate whether nearby surface contamination extends below the ground surface.
	Soil	5	PCP	8270 SIM	
SSS-2	Soil	1	PCP	8270 SIM	Estimate the vertical and horizontal extent of PCP contamination beyond the
	Soil	5	PCP	8270 SIM	northeast corner of the 1989 excavation.
	Soil	10	PCP	8270 SIM	
	Soil	15	PCP	8270 SIM	
SSS-3	Soil	5	PCP	8270 SIM	Estimate the extent of contamination beyond the western end of the 1989 excavation.
	Soil	10	PCP	8270 SIM	
SSS-4	Soil	15	PCP	8270 SIM	Estimate the vertical extent of the remaining contamination below and at
	Soil	20	PCP	8270 SIM	the southwest corner of the former PCP warehouse.
	Soil	25	PCP	8270 SIM	
	Soil	30	PCP	8270 SIM	
	Soil	35	PCP	8270 SIM	
	Soil	40	PCP	8270 SIM	
SSS-5	Soil	15	PCP	8270 SIM	Estimate the vertical extent of the remaining contamination below and at
	Soil	20	PCP	8270 SIM	the southwest corner of the former PCP warehouse.
	Soil	25	PCP	8270 SIM	
	Soil	30	PCP	8270 SIM	
	Soil	35	PCP	8270 SIM	
	Soil	40	PCP	8270 SIM	
SSS-6	Soil	10	PCP	8270 SIM	Estimate the vertical extent of the remaining contamination below and at
	Soil	18	PCP	8270 SIM	the southwest corner of the former PCP warehouse.
	Soil	20	PCP	8270 SIM	
	Soil	25	PCP	8270 SIM	
	Soil	30	PCP	8270 SIM	
	Soil	35	PCP	8270 SIM	
	Soil	40	PCP	8270 SIM	
SSS-7	Soil	10	PCP	8270 SIM	Estimate the vertical extent of the remaining contamination at the eastern side of
	Soil	15	PCP	8270 SIM	the 1989 excavation.
	Soil	20	PCP	8270 SIM	
	Soil	25	PCP	8270 SIM	
	Soil	30	PCP	8270 SIM	
SSS-8	Soil	5	PCP	8270 SIM	Estimate the extent to which contamination extends beyond the southeast side of
	Soil	10	PCP	8270 SIM	the 1989 excavation.
	Soil	15	PCP	8270 SIM	
SSS-9	Soil	10	PCP	8270 SIM	Characterize contamination in the smear zone downgradient of the source area.
	Soil	15	PCP	8270 SIM	
SSS-10	Soil	1	PCP and PAHs	8270 SIM and 8270	Estimate the vertical and horizontal extent of contamination southeast of the
	Soil	5	PCP and PAHs	8270 SIM and 8270	former PCP mixing area.
SSS-11	Soil	1	PCP and PAHs	8270 SIM and 8270	Estimate the vertical and horizontal extent of contamination southeast of the
	Soil	5	PCP and PAHs	8270 SIM and 8270	former PCP mixing area.
	Soil	10	PCP and PAHs	8270 SIM and 8270	
	Soil	15	PCP and PAHs	8270 SIM and 8270	
SSS-12	Soil	10	PCP	8270 SIM	Characterize contamination in the smear zone downgradient of the source area.
	Soil	15	PCP	8270 SIM	

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TABLE 1
SUPPLEMENTAL SAMPLING SUMMARY
TIME OIL NORTHWEST TERMINAL

Recommended Sample Location	Sample Type	Sample Depth (ft BGS)	Analytes	Analytical Methods (a)	Rationale
SSS-13	Soil	0.5	PCP and PAHs	8270 SIM and 8270	Estimate the vertical and horizontal extent of contamination southeast of the former PCP mixing area.
	Soil	1	PCP and PAHs	8270 SIM and 8270	
	Soil	5	PCP and PAHs	8270 SIM and 8270	
	Soil	10	PCP and PAHs	8270 SIM and 8270	
	Soil	20	PCP and PAHs	8270 SIM and 8270	
SSS-14	Soil	0.5	PCP	8270 SIM	Estimate the vertical and horizontal extent of contamination southeast of the former PCP mixing area.
	Soil	1	PCP	8270 SIM	
	Soil	5	PCP	8270 SIM	
	Soil	15	PCP	8270 SIM	
SSS-15	Soil	0.5	PCP and PAHs	8270 SIM and 8270	Estimate the vertical and horizontal extent of contamination southeast of the former PCP mixing area.
	Soil	1	PCP and PAHs	8270 SIM and 8270	
	Soil	18	PCP and PAHs	8270 SIM and 8270	
SDM-1	Stormwater	NA	PCP	8270 SIM	Evaluate stormwater quality upgradient of the upper zone PCP plume.
SDM-2	Stormwater	NA	PCP	8270 SIM	Evaluate stormwater quality downgradient of upper zone PCP plume and groundwater interim action area.

Note:
(a) Analytical methods listed are EPA SW-846 methods.

BZTO104(e)016169

TIME OIL SITE
Portland, Oregon

Prepared for:

Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Hanson Building Material America
Beazer East
#1 Oxford Center, Suite 3000
Pittsburgh, Pennsylvania 15219

Prepared by:

Envirocon, Inc.
10400 N. Burgard Way
Portland, Oregon 97203

June 28, 2001

ENVIROCON

ENVIROCON

ENVIROCON, INC.
10400 NORTH BURGARD WAY
PORTLAND, OR 97203
(503) 285-6164
(503) 285-6205 FAX
www.envirocon.com
Cell 503-803-3485

June 27, 2001

Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Attention: Mr. Kevin Murphy

Subject: Proposal for Time Oil Site

Dear Mr. Murphy:

Envirocon, Inc. (Envirocon) appreciates the opportunity to present this proposal to Time Oil Company for the remediation of pentachlorophenol-contaminated soils at your facility in Portland, Oregon. Envirocon has prepared a competitive and realistic proposal, which can be successfully performed at the prices quoted. We believe the option to dispose of soils at Hazco's treatment facility in Canada offers Time Oil an extremely cost effective alternative while limiting potential liability.

Thank you for taking the time to review the enclosed materials. Please don't hesitate to contact us at (503) 285-6164 with any questions concerning the information provided. We look forward to being of service to Time Oil Company on this project.

Sincerely,

Kara Kosmicki for Gene Tienken

Gene Tienken
Pacific Branch Manager

BZTO104(e)016171

1.0 INTRODUCTION

Remediation projects often require those conducting the work to possess and apply a diverse group of skills in order to successfully complete the project to the satisfaction of the client, regulatory agencies, and the general public. Each project is different and thus the ability to think proactively and react quickly to changing conditions is essential if budgets and schedules are to be maintained. Envirocon is confident that the following key factors make us the most qualified contractor for the Time Oil project.

2.0 EXPERIENCE

Experience is what often determines the success of a project. Since its establishment in 1988, Envirocon has successfully completed over 1,100 projects including numerous remediation projects similar in scope to the Time Oil Site.

In order to offer the highest quality and most complete service package available, Envirocon has chosen HAZCO Environmental Services (HAZCO) of British Columbia, Canada as its treatment and disposal subcontractor. HAZCO was also founded in 1988 and is the largest environmental service contractor in Western Canada. They have successfully performed the remediation of numerous pentachlorophenol-contaminated sites and their treatment and disposal facilities have an exemplary record of compliance. HAZCO has never received a citation for permit infraction at their bioremediation and landfill facilities.

Both the Envirocon and HAZCO management staff that would be assigned to this project have a minimum of 10 years experience in their respective fields. They have successfully performed projects in the Northwest for such clients as the Kaiser Aluminum and Chemical Company (KACC), Weyerhaeuser, Port of Vancouver, Bechtel, Goldendale Aluminum, the Bureau of Land Management, the U.S. Forest Service, Energy Northwest, and the Port of Seattle. Many of these projects had extensive involvement by federal, state, and regulatory agencies as well as the general public. All of the projects were successfully completed on schedule and within budget.

3.0 DEVELOPING INNOVATIVE COST SAVING SOLUTIONS

Envirocon's extensive experience offers our clients another benefit, it allows us to review proposed design specifications and offer innovative alternative methods for completing projects at lower costs and greater efficiency. The option of treatment and disposal of the pentachlorophenol-contaminated soils in Canada offers a number of benefits. These benefits include the fact that the soils' RCRA code is not applicable in Canada and thus they can be safely

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and economically treated as a special waste. The strength of the U.S. dollar also allows substantial savings when comparing treatment in Canada to alternatives in the U.S.

4.0 CORPORATE PHILOSOPHY

Envirocon is successful because we complete projects ahead of schedule and at budget and we are rewarded with repeat business from satisfied clients. The Time Oil site project can be completed at the prices and schedule delineated in Envirocon's bid. We do not make our profits from change orders. If the scope of work of a project does not change, there will be no change orders. Our Portland Office Management staff vividly demonstrated this philosophy in performing the Spokane Junkyard Superfund Site project for KACC.

Envirocon's effort to give our client's the best possible product does not stop with our bid. Throughout the project, Envirocon continues to look ahead and work closely with our clients to bring to their attention to design changes or modifications that we feel will benefit them and the project. Envirocon's Pacific Branch Office in Portland, Oregon would perform this project. The individuals listed in the bid would be those who would perform the project. Our management staff takes ownership of a project and lives with it 7 days a week until it is successfully completed. This high degree of personalized services coupled with our extensive equipment, staff, and financial resources are what sets Envirocon apart from its competitors. We are confident that our clients will agree with this assertion and we encourage Time Oil and Beazer to contact any of our former clients and verify their satisfaction with Envirocon's high level of customer service and professionalism.

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COST PROPOSAL

Revised 7/24/01

PHASE I

OFFSITE DISPOSAL OF STOCK PILE SOILS

I. MOBILIZATION

Includes: Preparation of stockpile area, set up of scales, preparation of rail car loading area and preparation of a site specific health and safety plan. Also includes obtaining of all relevant permits and export agreements.

SUBTOTAL: $19,945.00

II. OFFSITE DISPOSAL

Includes: Rail load out of approximately 4000 tons of pentachlorophenol contaminated soil for disposal at the Hazco treatment and disposal facility located in British Columbia.

SUBTOTAL: 4000 tons @ $196.65 per ton = $786,600.00

TOTAL PHASE I: $806,545.00

COST PROPOSAL

Revised 7/24/01

PHASE II

EXCAVATION AND DISPOSAL OF INPLACE SOILS

I. MOBILIZATION

Includes: Preparation of control zones, preparation of rail car loading area and preparation of a site specific health and safety plan. Also includes obtaining of all relevant permits and export agreements.

SUBTOTAL: $12,200

II. BUILDING DEMOLITION

Includes: Demolition and offsite recycling and disposal of a 5000 square foot building. Includes demolition and offsite recycling of the raised concrete floor.

SUBTOTAL: $12,685.00

III. EXCAVATION

Includes: Excavation of 3,150 tons of contaminated soil adjacent to and underlying previously demolished structure. Excavation is anticipated to terminate at the ground water table (approximately 15' BGS).

SUBTOTAL: 3150 tons @ $5.52 per ton = $17,388.00

IV. OFFSITE DISPOSAL

Includes: Rail load out of approximately 4000 tons of pentachlorophenol contaminated soil for disposal at the Hazco treatment and disposal facility located in British Columbia.

SUBTOTAL: 3150 tons @ $196.65 per ton = $619,447.50

V. **DEWATERING**

Includes: Mobilization and set up of two 21,000 gallon Baker Tanks, pumping of excavation water and transfer of excavation water to Time Oil treatment system.

SUBTOTAL: 42,000 gallons @ $.14 per gallon = $5,880.00

VI. **BACKFILL**

Includes: Placement and compaction of 3150 tons of onsite borrow into excavation.

SUBTOTAL: 3150 tons @ $2.90 per ton = $9135.00

TOTAL PHASE II: $676,735.50

ASSUMPTIONS

1. On-site activities can be carried out in Level C or D PPE and supplied air will not be required.
2. Preservation or relocation of utilities will not be required.
3. No local permits other than a city grading permit will be required.
4. Maximum excavation depth is approximately 15 to 17 feet.
5. No more than 500 feet of pumping will be required for transfer of water from excavations to Time Oil's treatment system.
6. Demolition of the building will not require handling or removal of asbestos, PCB ballasts, or lead paint.
7. Repair, improvement, or modification of rail loading spur at Time Oil site will not be required.
8. No compaction testing will be required for backfill.
9. All laboratory analytical testing required shall be performed by others.
10. On site water source for dust control and decontamination purposes shall be supplied by client at no cost.
11. Soils shall be dry such that addition of solidification reagents prior to off-site transport shall not be necessary.
12. Proposal is predicated on the signing of mutually agreeable contract.
13. Assumes acceptance of export and import of waste by U.S. EPA and Environment Canada.

HAZCO

June 20,2001

ENVIROCON INC.
104000 North Burgard Way,
Portland Oregon
97203

Attention; Mr. Gene Tienken, Pacific Branch Manager

RE: CLARIFICATION OF PROPOSAL FOR TRANSPORT AND DISPOSAL OF SOIL CONTAINING PENTACHLOROPHENOL FORM THE TIME OIL SITE.

Dear Gene;

This responds to your request for clarification on the acceptability of the soils from the Time Oil site. In our Technical Proposal, Section 8, Conditions, we stated:

> "The chemical characteristics of the soil being in general accordance with the data submitted to Envirocon and Hazco by Time Oil on June 14, 2001 [file STOCKPILE-CLIENT prepared by Landau Associates]"

We have reviewed the data in this file and can confirm that the chemical characteristics are within the limits of materials that Hazco is permitted to accept at our Richmond Bioremediation Facility (RBF). Hazco has successfully bioremediated similar soil at the RBF.

The data indicate that the soil will be classified as Class 9.2 waste under the Canadian Transportation of Dangerous Goods Act and as a Special Waste under British Columbia's Waste Management Act. The classification of the soil in the United States does not affect the classification in Canada or our acceptance of the soil at the RBF.

Please call Jim McCrea or me if there is need for any additional clarification.

Yours truly,

Gregory Campbell, P. Eng.,
Vice-President, Pacific Region

HAZCO *ENVIRONMENTAL SERVICES LTD.*
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ENVIROCON PROJECT EXPERIENCE

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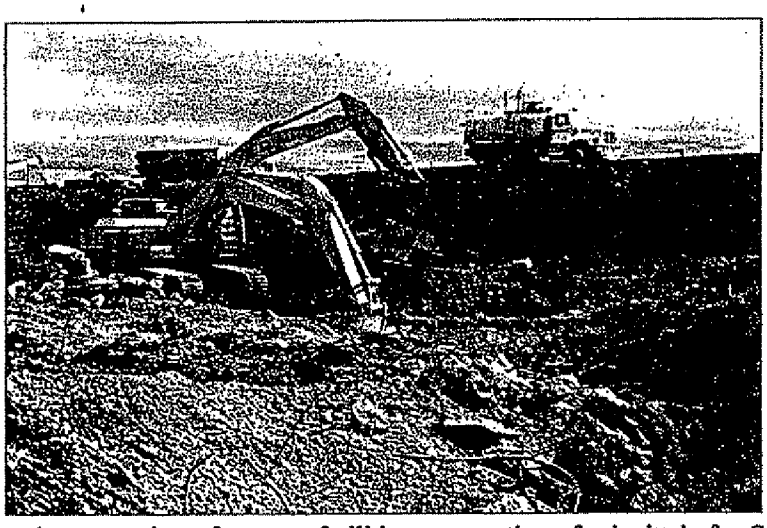

Remedial Action for the 100 B/C Group 1 Waste Sites Hanford, Washington

Project Description:

Envirocon conducted the remediation and demolition of radioactively contaminated retention basins, control structures, and associated piping systems along the Columbia River at the Hanford 100 B/C Area approximately 45 miles north of Richland, Washington. The work included design and construction of support facilities, preparation of submittals for Contractor approval, excavation of contaminated soils from 18 waste sites, demolition of concrete and steel structures, support of Contractor analytical efforts, backfill of excavated areas, and site re-grading.

The contamination resulted from past disposal practices associated with refueling the two oldest nuclear reactors on the Hanford Site. These reactors were used to produce Plutonium for nuclear weapons, and were operational from 1943 through 1969. Water from the nearby Columbia River was cycled through the reactors, discharged through large-bore piping into retention basins and trenches, then routed back into the Columbia River. Radioactive fuel material settled in the system, contaminating the soil and associated structures. Contaminants included low levels of Europium, Cesium, Plutonium, heavy metals, and other hazardous waste.

All work performed by Envirocon on the Hanford Site was conducted in compliance with strict environmental and cultural protection requirements. Discovery of Native American artifacts during site preparation and waste site excavation was likely; initial identification and protection of those items depended heavily on Envirocon field personnel. When cultural artifacts were encountered, work in the area was suspended, the Contractor was notified, and assistance was provided to the client to manage the discovery in a manner compliant with the contract and with existing inter-agency agreements, particularly the Tri-Party agreement to which the Confederated Tribes are signatory.

Similarly, Envirocon's Work Plans for each site took into consideration protection of the fragile, high desert ecology at the Hanford Site. Toward that end, Envirocon used several methods to reduce or eliminate the impacts of weather events. Protection measures included prudent scheduling of work, grade control, straw bales, berms, and application of crusting agents or water to excavation areas and stockpiles. The most stringent controls were implemented in areas near the Columbia River and adjacent riparian zones.

This project was one of the first subcontracted cleanups on the Hanford Site, and was closely monitored by the DOE, EPA, Washington State, and other stakeholders. Envirocon handled more than 400,000 cubic yards of contaminated soils on this project and demolition rubble totaled in excess of 10,000 cubic yards of concrete, structural steel, and piping appurtenances.

Earthwork Activities

The scope of work included excavation of soils, loadout into roll-off containers, and transfer of containerized material to an interim storage area. Envirocon also assisted the Contractor in sampling and verifying final cleanup of each waste site and with radiological survey and decontamination of the roll-off containers. Excavation was accomplished using 100,000-pound excavators working off of benches to depths of over 40-feet. Loadout support was provided by articulated front-end loaders with bucket capacities to four cubic-yards. Clean overburden was hauled to stockpiles using 25-ton off-road rock trucks, while contaminated soil was loaded into plastic-lined, 20-cubic yard rolloff containers on trucks equipped with hydraulic hoist mechanisms. Dust control was provided by two, 3,000-gallon water trucks with top-mounted water canons as well as

conventional spray bars and hose connections. Workers were typically dressed in Modified Level "C" PPE (no APR required). Laser targets and a Total Station provided excavation grade control; as-built drawings were generated using Auto-Cad software.

Loaded containers were hauled to a decontamination and survey station where the Contractor's Radiological Control Technicians (RCT) surveyed filled containers for external (loose) contamination. Concurrently, Envirocon laborers decontaminated containers as necessary then folded and sealed the plastic liner over the load using electric heat guns. Finally, laborers secured a tarpaulin over the sides of the container using bungee cords. The loaded truck was then released from the station and driven across a computer-controlled scale. Finally, the loaded container was set off in a staging area, to be picked up by the transportation subcontractor. Coordination of full and empty container availability was a daily challenge for both Envirocon and the Contractor.

Envirocon assisted the Contractor in obtaining confirmation samples to prove the excavated areas met cleanup standards. This was accomplished using a 25-ton rough terrain crane to position and move a "moon rover" four-wheeled vehicle over the bottom and side-slopes of the excavation. The vehicle was equipped with computers, instrumentation, as well as a GPS system, and required extremely careful handling by the crane operator.

Demolition Activities

In addition to soil remediation, the workscope included demolition of steel and concrete structures, the original function of which was to control discharged cooling water between the reactors and the Columbia River. These included heavily reinforced concrete valve boxes, diversion structures, tank rings, manholes, concrete pipe encasements, and concrete and steel containment structures as large as 3-million gallon capacity. Concrete thickness ranged to 3+ feet, reinforced by #8 and #12 bar on 16-inch centers in both directions. Some structures extended below grade as far as 38-feet. Demolition was accomplished using pneumatic demolition hammers mounted on 100,000-pound excavators. Envirocon also worked with a tooling supplier to develop a "fish-tail" cutter, mounted on a demolition hammer to cut and size steel tank floorplates and sidewalls for disposal. This tooling allowed production cutting of 3/8-inch steel at a rate of up to eight feet-per-minute, while eliminating the potential personnel exposure to radiation and fire normally associated with flame cutting. Envirocon craft personnel in Level B protection flame cut and sized re-bar, pipe, and structural steel. Conventional oxy/acetylene torches were uses for this work, along with consumable, oxygen lance cutting equipment providing cutting speeds to 20-inches-per-minute in 3/8" steel. Envirocon met the Waste Acceptance Criteria for this project and all loads sent to the Hanford on-site Environmental Remediation Disposal Facility (ERDF) were accepted.

In completing the demolition phase of this project Envirocon discovered, identified, and safely handled ACP (transite) pipe, asbestos pipe coating, lead/ACM gasket material, ACM rope valve packing, elemental lead shielding material, as well as fuel-rod rupture products. When hazardous materials were discovered and tentatively identified by Envirocon field personnel, Envirocon site management worked with the client to obtain samples, minimize worker exposure, and mitigate the impacts to work progress. If sampling confirmed the hazardous nature of the discovery, Envirocon assisted the Contractor in developing a handling plan, placing the material in appropriate containers, and arranging for transfer to the disposal site.

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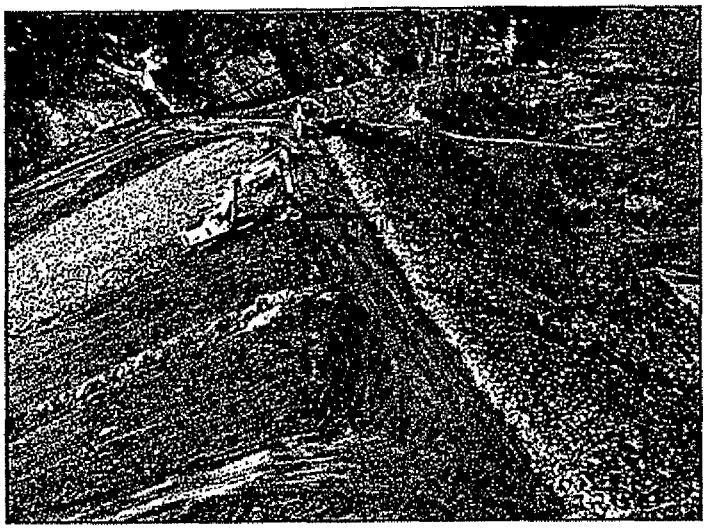

Blackbird Mine Reclamation
Cobalt, Idaho

Project Description:

Envirocon and Industrial Constructors Co. (ICC) formed a joint venture, which was successful in winning the initial contract for mine reclamation activities at a metals mine in Idaho. Envirocon was responsible for executing all phases of the work including all project management, contract administration, and client relations. After successfully completing the first phase of the project in 1995, the client negotiated with Envirocon for the remaining project work, which extended the contract duration through four construction seasons. The project is located in a remote area of Idaho, which only has a 6-month construction season.

The project objective was to improve water quality by restoring areas previously impacted by the mine. This was accomplished by relocating waste rock, capping waste rock, constructing water collection and diversion structures, and the construction of two clay-core dams. The two clay-core dams were constructed to contain and store water requiring treatment. The Client requested after the first construction season that Envirocon participate in constructability reviews and work cooperatively with the Design Engineer to control design and construction costs. During construction, Envirocon actively presented "value engineering" options to the Client which minimized construction costs and change orders.

The first clay core dam was 95-feet high and measured over 435 feet at the crest. Construction of this dam took 10 months to complete over two construction seasons. The foundation excavation and grout curtain were completed in one construction season with the dam being built during the second season. The dam included a concrete intake structure, concrete spillway, and over 150,000 cubic yards of embankment material. The clay for the dam was processed and hauled from a borrow source over 15 miles from the project site. Sand for the chimney drain was processed and hauled from a borrow source over 50 miles from the project site.

Upstream of the 95-foot high dam in two side drainages, earthen dams were constructed to collect and convey clean surface water around the dam storage system. Once around the dam storage system, the clean water was placed into a concrete-lined channel and conveyed off-site. The water conveyance system contained over 16,000 feet of collection piping and clay-lined slopes and ditches.

Downstream of the 95-foot high dam a cement, bentonite and soil cut-off wall was installed near the property boundary. The cut-off wall and associated water collection system were installed to prevent ground water from leaving the site prior to treatment. The ground water collection system consisted of over 15,000 feet of collection piping. Between the cut-off wall and the 95-foot high dam, over 400,000 cubic yards of waste rock were relocated and regraded prior to being capped. The cap covered over 25 acres between the cut-off wall and the dam. The soil cap incorporated an armor rock that was disked into the surface to prevent erosion. A concrete-lined channel approximately 5,000 feet in length was constructed through the capped waste-rock to convey the clean creek water and surface run-off through the site. The concrete channel carried surface water from the toe of the 95-foot high dam to the property boundary downstream of the cut-off wall before discharging back into the original streambed. The concrete channel varied in dimension with the largest section having 19-foot high walls.

The second clay-core dam was 175-feet high and measured over 350 feet at the crest. Construction of the 175-foot high clay core dam took 9 months to complete over two construction seasons. The foundation excavation and grout curtain were completed in one construction season with the dam being built during the second season. Construction on the two dams proceeded simultaneously. The 175-foot high dam included a concrete intake-structure, gabion-wall spillway with geosynthetic liner, pump station, and over 95,000 cubic yards of embankment material.

Dam access and material import provided the greatest challenges as Envirocon was required to pioneer access to the dam site in an area where the native ground had slopes greater than 100 percent. During foundation excavation, a 150-foot by 75-foot soil-nail wall was installed on the right abutment due to rock instability.

Up drainage from the 175-foot high dam, waste rock areas were consolidated in order to minimize the quantity of water that would require eventual treatment. Over 500,000 cubic yards of waste rock were relocated to the original open pit as part of the waste rock consolidation. In addition to the waste rock removal, a water conveyance system was installed to separate waters that would eventually require treatment. The water conveyance system consisted of over 14,600 linear feet of piping and ditches, some of which were clay-lined.

To improve water quality down stream from the 175-foot high dam, sediments were removed from over 1,000 feet of stream channel and placed in the open pit. Prior to performing the sediment removal, two earthen sediment-control dams were constructed to prevent sediment from eroding into the adjacent drainage. Each dam contained 10,000 cubic yard of embankment materials.

Envirocon processed the clay, sand, and other borrow materials required for the project from public and private lands located near the site. As part of the project, Envirocon worked with several local and Federal agencies to secure use permits for the project. The permits included a community septic and drinking water system, borrow pit processing, and a road use permit with the Forest Service. Under our road use permit, Envirocon worked with the Forest Service to upgrade several road sections encompassing approximately 1 mile to enhance traffic safety and water shed quality. The roadwork included road widening, drill and shoot, retaining structures, and riprap placement in the adjacent creek.

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South Plants Structures Demolition/ Removal Project Phase 2/ Balance of Areas Soil Remediation Project Rocky Mountain Arsenal, Colorado

Project Description:

Envirocon was awarded a contract for the demolition of 48 structures and the excavation of 200,000 cubic yards of Human Health Exceedance (HHE) soils at the former South Plants Area at Rocky Mountain Arsenal near Denver, Colorado. The Rocky Mountain Arsenal (RMA) is World War II era nerve and chemical warfare agent production facility that was owned and operated by the United States Army between in 1942 and 1946.

In 1989, the U.S. Army and the sole remaining chemical company entered into a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency, the U.S. Department of the Interior, U.S. Fish and Wildlife Service, and the Agency for Toxic Substance and Disease Registry. As a condition of the agreement, the parties have agreed to implement a 10-year remedial action plan that is CERCLA compliant. The eventual goal of the remediation plan is to restore the entire RMA property into a national wildlife refuge.

General

An important aspect of this project involved the management of the ratio between soil and debris being shipped to the on-site Hazardous Waste Landfill (HWL). Envirocon was required to manage the soil/debris ratio at between 2:1 and 3:1 to ensure adequate soils were available to cover the debris being generated. This aspect of the project was managed on a daily basis and the ratio was maintained successfully throughout the project. Additional tasks associated with this project included operation and maintenance of an equipment and vehicle decontamination facility, establishment and maintenance of haul roads to support truck traffic, underground storage tank and piping removal, fencing removal, asbestos abatement, foundation removal, and support area maintenance. Envirocon has successfully and safely worked over 75,000 man-hours on this project without an OSHA recordable or lost time incident.

Demolition

The scope of work for this contract included the demolition, sizing, transportation, and disposal of 48 structures within the South Plants Area at RMA. The buildings included large multi-story brick and concrete structures, woodframe warehouses with transite or galbestos roofs and siding, an electrostatic precipitator and incinerator structure with attached 136-foot elevator tower, and a 200-foot high stack. This demolition package also included the demolition of five structures with chemical agent manufacturing history including a 200-foot high brick emissions stack. Twelve of the structures were declared structures under the Chemical Weapons Convention (CWC) treaty and required additional "hold point" considerations prior to and during demolition activities.

Envirocon's work tasks on this project included all aspects of demolition from initial inspection through final disposal. The process for each building began with a comprehensive inspection and hazardous materials survey. Each building was inspected for its structural integrity and surveyed for asbestos and other hazardous materials. This inspection was also used to identify potential workplace safety concerns and finalize appropriate demolition methodology in accordance with OSHA Subpart T. Subsequent to the inspection, an Engineering Survey Report was prepared which prescribes the actions necessary to prepare the building for demolition (removal of unsafe conditions, abatement of asbestos, removal of hazardous waste, capping or blinding of drains, utilities, etc.). Upon approval by the Program Management Contractor (PMC), abatement of all hazardous materials and elimination of all release points to the environment proceeded. A final inspection by the PMC contractor subsequent to the hazardous materials abatement occured before demolition could proceed.

Demolition of the structures was performed using hydraulic excavators equipped with shears, grapples, and concrete pulverizers as well as a crane with a steel wrecking ball depending upon their height and the configuration of structural members. The brick stack associated with one of the chemical agent history buildings was demolished by suspending a concrete pulverizer from a crane and methodically "munching" the stack down. . Envirocon used a variety of demolition techniques to safely demolish the 48 structures including five structures with components greater than 80' in height. During the demolition work, dust abatement was performed using a water spray from water trucks and a water cannon. As needed, odor control chemicals, tarps, and tackifiers were employed to reduce the potential for fugitive emissions. Waste materials generated during the project were sized appropriately loaded onto trucks and shipped to an on-site landfill for disposal. Recyclable materials were cut to the appropriate size and shipped to an accepted off-site location.

Soils Remediation

The second aspect of this project involved the precise excavation and transportation of approximately 200,000 cubic yards of contaminated soils from 26 different designated areas (SAR Sites). Prior to the commencement of any excavation activity, storm water and erosion control measures were established, utilities were located and de-energized, monitoring wells and survey monuments were protected, and limits of excavation established. The depths of the excavations ranged from 1 foot to 10 feet with areas ranging from 59 square yards to 25,000 square yards. Three of the areas were excavated in Level B PPE while conducting real-time monitoring for chemical warfare agents. The additional areas were excavated in Level C PPE upgrading to Level B as necessary based upon air monitoring results and historical data. The contract prescribed that during a discrete 6-week period Envirocon would be required to excavate and transport approximately 98,600 cubic yards of soil to be used as protective cover in on the newly installed synthetic liner in Hazardous Waste Landfill Cell 2. When this effort was actually undertaken, only about half the original projected volume was required. However, Envirocon excavated and hauled nearly 50,000 cubic yards in 3 weeks and achieved daily production rates approaching 500 loads per day. The remainder of the quantity was excavated and hauled to the HWL at production rates that attained contract milestone requirements while ensuring that mandatory daily soil-to-debris ratios were met. Excavations greater than 5 feet in depth were backfilled to within 5 feet of original grade with final slopes no steeper than 4:1 (horizontal to vertical).

Additional excavation activities included the removal of approximately 13,500 linear feet of chemical sewer and excavation of approximately 80,000 cubic yards of associated soils. These chemical sewer trenches were a minimum of 10 feet in depth and either 11.5 feet or 21 feet wide at the bottom per specifications. All chemical sewer activities were conducted in Level B PPE. Because of insufficient records kept during the time that RMA was operating, Envirocon was required to perform exploratory excavations to locate the alignment and depth of chemical sewers. From this, it became possible to establish the excavation limits required for the removal of the sewer pipe and associated contaminated soils. After removal of the sewer pipe and contaminated soils, the trenches were back-filled to 5 feet below original grade with sidewalls sloped to a 4:1 grade.

Excavation of SAR Sites was conducted utilizing a combination of excavators, rubber-tired loaders, and dozers, while chemical sewers were excavated entirely by excavator. After initial staking by the client, grade and alignment control of each excavation was accomplished by a grade checker utilizing a rotating laser level transmitter and target. In many instances, a target was mounted directly on the excavating equipment to assist the equipment operator to control grade. This was particularly beneficial during excavation of chemical sewers, during which no personnel were permitted to enter the excavation. All survey control of chemical sewers was accomplished in Level B PPE using a telescoping boom manlift with the basket suspended over the excavation. One excavator was equipped with a Bucket Pro® graphical grade-display system that enabled the operator to know the position of the bucket's teeth relative to finished grade in real time. This is the first such system purchased and utilized in Colorado, and is a particularly valuable tool in precision excavating and work that does not permit clear vision of the bucket by the operator (i.e., under water.)

Decontamination of haul vehicles was accomplished in two operations. Any loose material that might have spilled during loading operations onto the side rails or other parts of the haul truck was removed by dry decon methods prior to the truck leaving the loading area. Each haul vehicle then passed through the decontamination facility, at which point the truck was washed by decon personnel utilizing pressure washers and fire hoses to remove any remaining material from the vehicle and tires which might fall onto the haul road during the trip to the HWL.

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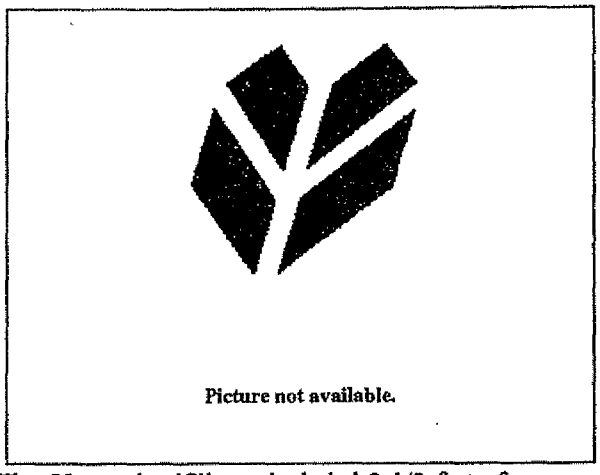

Closure of BOP Landfill Disposal Area
Gary, Indiana

Project Description:

Envirocon constructed a landfill cover system for a steel mill disposal area. The landfill cover materials, other than the geosynthetic components, consisted of slag obtained and processed at the mill. These materials required mechanical screening prior to placement in order to meet the specified grain size distribution.

The 55 acre landfill cap included 3 1/2 feet of cover materials, more than 2 million square feet of 40 mil PVC liner, and 725,000 square feet of geocomposite drainage material. More than 300,000 cubic yards of granular slag sand was transported from 5 miles away within the steel plant and placed for liner sub-base and protective cover. The cover also included installation of a gas vent and underdrain (8,900 linear feet) system, stormwater control channels, and a 260,000 square foot armor cover system consisting of a polyethylene geocell material. In the primary drainage channel from the top of the landfill, a gabion mattress system was installed, wired, and filled with rock for a distance of 800 feet. The 4-inch deep geocell was placed on the steeper slopes (approaching 1:1) for stability and erosion control. The geocell was anchored to the slopes and infilled with slag. Envirocon was then required to spread compost, fertilize and seed over the entire slag cover, using an innovative soil amendment mix to enhance growth in this difficult soil matrix.

Several alternative suggestions offered by Envirocon on the original cover system design were accepted by the client and resulted in significant cost savings to the project. The project was also completed more than three weeks ahead of schedule.

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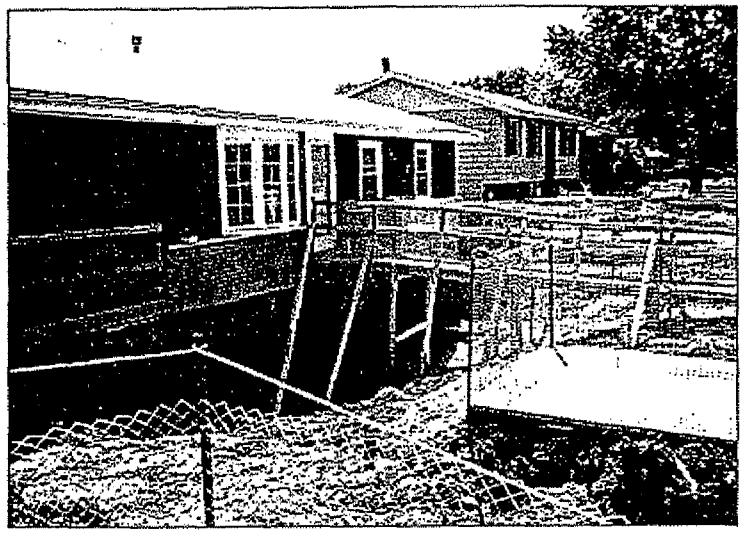

Residential Areas Site, Removal Action
West Chicago, Illinois

Project Description:

During its operation from 1932 to 1973, the Rare Earth Facility (REF) was reportedly the largest producer of rare earth and thorium compounds in the world. The REF was operated to extract thorium and other rare earth elements from raw ore. The facility began operation in 1932, when the Lindsay Light and Chemical Company began producing thorium and other rare earth materials. In 1958, the Lindsay Light and Chemical Company merged in the American Potash & Chemical Company, and in 1967, as part of a corporate merger, Envirocon's client acquired the facility.

Production of thorium, a radioactive material, yielded radioactive tailings containing thorium and residual levels of radium and uranium. Tailings were stockpiled at the REF, and during the early years of operation of the REF (1930's into the 1950's and possibly later) were available for use as fill material at residential and other properties throughout the area. During transportation to these sites, some tailings may have spilled along the haul routes. In addition, the tailings stockpiled at the REF may have been subject to wind dispersal. As a result, soils at numerous properties throughout the West Chicago area became contaminated with thorium.

Before work can begin on a property, the U.S. EPA must release the property for design and cleanup. Envirocon assists in soil sampling and characterization activities. The known extent of contamination and location of property improvements are mapped by Envirocon in detail and incorporated into a remedial design. Envirocon conducts meetings with each property owner to finalize the design and define the scope of work required for remediation and restoration. The result of Envirocon's design work is a clear, detailed, and property specific work order signed by the property owner and the client.

Remediation work includes removal of the contaminated soils as well as trees, shrubs, concrete, asphalt, swimming pools, decks, buildings and other improvements affected by the work. After the EPA verifies all contaminated soils have been removed; backfill, landscaping and other restoration activities proceed. Envirocon self performs approximately 84% of all design, remediation and restoration work. To date, remediation and restoration work has been completed at more than 600 properties.

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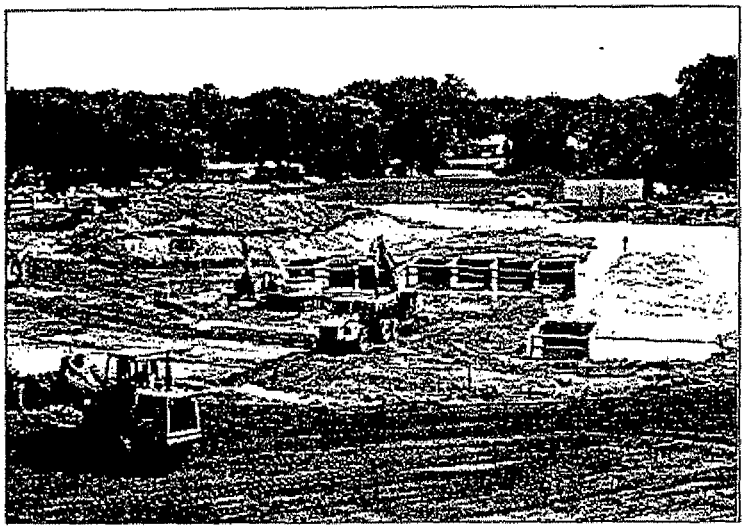

Reed Keppler Park Remediation
West Chicago, Illinois

Project Description:

From 1932 to 1967 the previous owners of the Rare Earth Facility (REF) in West Chicago, Illinois processed monazite ore to extract thorium and rare earth compounds. Thorium process wastes (mill tailings) were a byproduct of the production of thorium, a radioactive material. Envirocon's client acquired the REF as part of a corporate merger in 1967. Thorium and rare earth compound extraction operations were discontinued in 1973.

Reed Keppler Park in West Chicago, Illinois, encompasses approximately 100 acres and includes the site of a former gravel quarry. The gravel quarry operated until 1939 and provided railroad ballast for the construction of railroad bed in the local area. Ten acres of the gravel quarry were used as a municipal landfill between 1939 and 1967. From the 1930's to the early 1950's, radioactive thorium mill tailings were disposed of at the landfill site. Remediation of the site to remove thorium process wastes is being conducted under a Unilateral Administrative Order issued by U.S. EPA Region V on September 25, 1996. Reed Keppler Park is a heavily used public park with numerous ballfields, family aquatic center, Boy Scout center, tennis courts, and other recreational facilities.

Envirocon provided remedial design and construction services for the Reed Keppler Park Site. Envirocon's scope of work included assisting in soil sampling and site characterization, topographic survey, design and development of excavation and restoration plans including the final landfill cover, assisting in community relations, site clearing and grubbing, storm water control structures, sanitary sewer, excavation of 113,600 cubic yards of material, transporting 7,559 truck loads of contaminated materials, backfill, installation of final cover, concrete work, asphalt work and landscaping. Envirocon self performed approximately 86% of the work with its own personnel and equipment.

Site preparation activities including the construction of public roads, storm sewer, storm water detention basins, site perimeter fencing, public parking lots and staging area where completed in preparation for excavation activities.

Shipping and disposal costs associated with transporting excavated contaminated soils to a licensed disposal facility were a major cost to our client. In order to reduce these costs, Envirocon developed and implemented a unique method for excavating, sorting, and sampling suspect soils to verify whether they were contaminated. Execution of this "overburden" excavation method resulted in a 45,300 cubic yard reduction in the amount of material shipped to an off-site disposal facility. This reduction in material shipped off site resulted in a substantial cost savings to our client. The 45,300 cubic yards of material was used to backfill excavated areas, reducing costs associated with purchasing backfill material.

Site restoration of 14.7 acres of the park was completed in July 2000. The Reed Keppler Park Site has been reopened for pubic use.

HAZCO PROJECT EXPERIENCE

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HAZCO

PROJECT SUMMARIES - 2000

Project Name: *Fell Avenue Site Remediation*

Project Value:	$4.0 million
Date Completed:	In process
Owner:	Confidential
Owner Rep:	Confidential
Consultant:	Jerry Naus, O'Connor Associates
HAZCO Project Manager:	Scott Young
HAZCO Superintendent:	Carmen Rymut

Project Description: As part of an overall soil remediation program, Hazco completed multiple stages of excavation, transportation and disposal of hydrocarbon impacted soils totaling approximately 100,000 tonnes. Completion of the project works required extensive excavation dewatering and water treatment. The project also involved the design and installation of approximately 1 km of bentonite cut-off wall. HAZCO is currently operating and maintaining the water treatment system for the site. Drawing from on site wells, the water is treated through two separate treatment trains, which use a combination of organic clays and granular activated carbon. HAZCO is now responsible for the ongoing maintenance of the system including emergency call outs.

Project Name: *Excavation, Trucking and Barging of Contaminated Soils, Victoria, BC*

Project value:	$1.0 million
Date Completed:	Spring 2000
Owner:	Major Oil Company
Owner Rep.:	Morrow Environmental
Hazco Project Manager:	Scott Young
Hazco Superintendent:	Ron Bobke

Demolition of large service station, convenience store and canopy. Excavation of 10,000 tonnes of contaminated soils that were shipped by truck and barge to Hazco's bioremediation facilities for treatment. Site was backfilled to geo-technical specifications required for the construction of new service station and carwash.

Project Name: *Excavation across Provincial Highway, Royston, BC*

Project value:	$850,000
Date Completed:	Fall 2000
Owner:	Major Oil Companies
Owner Rep.:	Morrow Environmental
Hazco Project Manager:	Scott Young
Hazco Superintendent:	Ron Bosel

Petroleum hydrocarbon contamination from two former bulk plants had spread under a provincial Highway in an environmentally sensitive part of rural British Columbia. Hazco's initial contract to remove the contaminated soil from one of the service stations was expanded to include the both the soils under the road as well as the soils at the second service station. Performance of this work and the associated removal and replacement of water services required detailed planning in conjunction with the Ministry of Highways and local water supply district, and rapid execution to minimize disruptions to services. Hazco excavated 18,000 tonnes of soil and replaced the utilities and Highway within 4 weeks. The contaminated soils from

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one site were transported to Hazco's bioremediation facility near Courtney for treatment, while soils from the second site are being treated within an existing onsite bio-cell.

Project Name: *Excavation across Island Highway and Water Treatment, Campbell River, BC*

Project value:	$1.1 million
Date Completed:	Fall 2000
Owner:	Major Oil Company
Consultant:	Morrow Environmental
Hazco Project Manager:	Scott Young
Hazco Superintendent:	Ron Bobke

On and offsite excavation of 13,000 tonnes of impacted soils in an area with a high water table required working "in the wet" and treatment of 500 GPM of water. Hazco worked with Morrow during pilot testing and development of a treatment system that could handle this flow rate and still meet site specific MOE discharge criteria to allow discharge to the Campbell River. Excavation across the entire width of Island Highway required a staged approach to ensure that two-way traffic could be maintained throughout. Removal and restoration of multiple sewer and water lines and restoration of streets, sidewalks and the Island Highway required co-ordination with MOE, MOTH and the District of Campbell River. Hazco was responsible for development of project work plan, traffic management and restoration plans.

Project name: *Excavation, Water Treatment, Rail Spur Removal and Replacement, Kelowna, BC*

Project value:	$350,000 to December 2000
Date Completed:	Estimated summer, 2001
Owner:	Major Oil Company
Owner Rep.:	Mr. Eric Nickel, Morrow Environmental
Hazco Project Manager:	Gord Allan
Hazco Superintendent:	Gord Allan

A spill of diesel fuel had migrated up to the foundations of an adjacent building and off-site under the street and railroad tracks. In order to remove the contaminated soil, Hazco used an excavator with a "twist wrist" bucket to excavate up to the building foundation, and then placed controlled density fill at the foundation. Excavation under the street and the railroad tracks presented geotechnical issues due to a high flow of groundwater, requiring the removal and treatment of 600-litres/ minute of contaminated water. The rail spur was removed, 2700 tonnes of soil excavated and the rail line replaced within 48 hours. In total, Hazco removed 4500 tonnes of soil, which was shipped to Hazco's Interior Bioremediation Facility at the Westside Landfill for bioremediation. Additional work is planned for the summer of 2001.

Project Name: *Supply and Installation of Vapour Extraction and Treatment System, Delta, BC*

Project value:	$600,000
Date Completed:	Fall 2000
Owner:Lantic:	Real Properties
Consultant:	Morrow Environmental Services
Hazco Project Manager:	Scott Young
Hazco Superintendent:	Maurizio LeDonne

The operation of a former chemical plant resulted in high concentrations of toluene and xylene in the sand fill and groundwater. Previous remediation by Hazco had contained the plume to prevent migration to wetlands and to an environmentally sensitive area of the Fraser River. Final remediation required the installation of a complex extraction system consisting of 84 vapour extraction wells, 94 groundwater

BZTO104(e)016191

HAZCO

Project Name: *Excavation and Disposal of Hydrocarbon Contaminated Soil, Hazleton, BC*

Project value:	$250,000
Date Completed:	Summer, 2000
Owner:	BC Hydro
Owner's Representative:	Doug Grimes
Consultant:	Gerry O'Hara, Golder Associates, 298-6623
Hazco Project Manager:	Paul Halliday
Hazco Superintendent:	Ron Bosel

Remediation of contaminated soils under a former diesel generating station on the lands of the Ksan First Nation was planned based on the excavation of a limited volume of soils and on site bioremediation. Hazco's detailed assessment of costs at the proposal stage included the evaluation of hauling the soils to a nearby landfill, and resulted in Hazco being awarded the contract for this more cost-effective approach. During implementation of the contract, the Owner decided to excavate to greater depths than originally planned – up to eight metres deep. Hazco's ability to transport the soils off site was instrumental in the implementation, as the available space on site would not have been sufficient for the additional soils. This is one example of Hazco's ability to look beyond the proposed scope of work and develop alternatives that are cost-effective for the Owner.

Project Name: *Excavation, Transport and Bioremediation of Hydrocarbon Contaminated Soils, Vancouver*

Project value:	$500,000
Date Completed:	Summer, 2000
Owner:	CN Rail
Owner Rep:	Pierre Harnois, Golder Associates Innovative Applications Inc.
Hazco Project Manager:	Paul Halliday
Hazco Superintendent:	Ron Bobke

Excavation and stockpiling of 28,000 tonnes of soils in an active railway yard required close coordination among the Owner, the Consultant and Hazco. The contaminated soils were transported by truck to HAZCO's bioremediation facility in Richmond, BC. Soil excavation and transportation was completed in the summer of 2000. Bioremediation is in progress.

Project Name: *Removal of VOC by High Vacuum Extraction, Burnaby, BC*

Project Value:	$600,000
Date Completed	fall, 2000
Owner	Confidential
Owner Rep.	Golder Associates
Hazco Project Manager	Scott Young
Hazco Superintendent	Ron Bobke/Frank Keller

Hazco provided the Owner with a comprehensive service package including supply of two high vacuum extraction systems and modification of an existing water treatment plant. In addition, Hazco supplied positive air displacement pumps, installed extraction wells and the piping systems from the wells to the vacuum extraction plant. Hazco provided both professional and technical staff during the commissioning phase, and continues to be responsible for maintenance. The project is an example of Hazco's ability to provide detailed design, construction, procurement and commissioning services on a complex project site.

BZTO104(e)016192

HAZCO

PCP REMEDIATION
PROJECT SUMMARIES

Project Name: *Removal and Treatment of Soils Containing Pentachlorophenol, West Isle Site Victoria, BC*

Project value:	$2.3 million
Date Completed:	1994
Owner:	Department of Indian Affairs and Environment Canada
Consultant:	Jim McCrea, Golder Associates
Hazco Project Manager:	Gregory Campbell
Hazco Superintendent:	Keith Hoffman

The operation of a sawmill and wood preserving facility resulted in spills of wood preserving compounds containing chlorophenols into the soil and eventual migration to the foreshore of Plumper Bay, a marine environment. Hazco demolished the building foundations and installed a subsurface water collection system to prevent the further migration of contaminants into Plumper Bay. All water was treated in a GAC unit that was designed and supplied by Hazco. Hazco then selectively excavated 25,000 tonnes of soil, placing the silt and sand layers in separate stockpiles for classification by the Consultant. An excavator with a "twist wrist" bucket was instrumental in minimizing the volume excavated and in segregating the contaminated soils. Only 8,000 tonnes were classified as C+ material requiring transportation and off-site treatment. Hazco transported the soil to a facility in Alberta and successfully reduced the chlorophenol content within eight months. The bioremediation was confirmed by independent sampling of the treated soils. Critical factors in the award of the work to Hazco included the planned excavation and stockpiling procedures and a bioremediation method that Hazco had developed to treat chlorophenols.

Project Name: *Treatment of Soils Containing Petroleum Hydrocarbons and Pentachlorophenol, Vancouver, BC*

Project value:	$700,000
Date Completed:	1999
Owner:	Canfor
Consultant:	Pottinger, Gaherty Environmental Consultants Ltd.
Hazco Project Manager:	Paul Halliday
Hazco Superintendent:	Keith Hoffman

Excavation of 28,000 tonnes of soils from a site with a high water table and adjacent to the Fraser River required "working in the wet". Hazco's detailed planning was instrumental in completing the excavation and backfill activities without impacting the adjoining properties or the marine environment. Selective excavation using a "twist-wrist" bucket enabled close control of the excavation and resulted in only 1,000 tonnes of soils being shipped to Hazco's Richmond Bioremediation Facility for treatment. The remaining 27,000 tonnes was sent to a landfill without treatment. The soils were transported to Hazco's Richmond Bioremediation Facility for treatment. Successful treatment required a staged approach to de-grade the petroleum fractions prior to bioremediation of the chlorophenols.

HAZCO

Project Name: *Shelley Sawmill Decommissioning, Prince George, B.C.*

Project Value:	$1.1 million
Date Completed:	May 1995
Owner:	Northwood Pulp & Timber
Owner Rep:	Ernie Redford (604) 962 - 9611

Project Description: Removal and disposal of approximately 9000 tonnes of pentachlorophenol contaminated soils from the vicinity of a former dip tank. Work included installation of a sheetpile cell area to enable excavation of contaminated soils from below the surrounding water table. Contaminated soils were landfarmed to reduce PCP levels then landfilled. HAZCO was selected as the successful bidder because of our experience at the West Isle site. Northwood representatives visited the West Isle site during the remediation phase.

Project Name: *Barging and Bioremediation of Pentachlorophenols, Nanaimo, BC*

Project Value:	$106,000
Date Completed:	October, 2000
Owner:	CIPA Lumber
Owner Rep:	Axis Projects Inc.
Hazco Project Manager:	Cameron McLean
Hazco Superintendent:	Cameron McLean

Project Description: Hazco was retained to load 1,350 tonnes of contaminated soil containing Special Waste concentrations of pentachlorophenols, transport the soil to Richmond, and treat it in the Richmond Bioremediation Facility. Although treatment started in the early winter, initial testing has shown that degradation is in progress. Bioremediation is continuing.

PRELIMINARY WORK PLAN

The scope of work for the remediation of the Time Oil Site in Portland, Oregon includes the excavation of approximately 2,100 cubic yards of pentachlorophenol-contaminated soils and, the loading of these soils and an additional 4,000 tons of stockpiled soils into railcars for transport and disposal to a treatment and disposal facility in Richmond, British Columbia, Canada. The work also includes the potential demolition of a 5,000-foot building, possible dewatering of excavations, and backfilling completed excavations. Mobilization will occur in mid August 2001 and the project is scheduled to be completed by the end of September 2001. On-site operations will be conducted 10 hours per day and 5 days per week.

1.0 SUBMITTALS AND PERMITTING

Upon receiving approval to proceed from Time Oil and Beazer, Envirocon will work with Hazco to obtain the appropriate approvals to export the hazardous waste soils from the United States to Canada. It will be necessary to submit a Notification of Intent to Export to The United States Environmental Protection Agency (EPA) and an Import/Export Notice to Environment Canada. Environment Canada should issue an approval of the notice within 30 to 60 days. The EPA will then issue an Acknowledge of Consent Based on Envirocon's conversations with Hazco. It is anticipated that approximately 6 weeks may be required to obtain the required approvals to ship the contaminated soil. Envirocon is not anticipating obtaining any additional permits other than a simple excavation and grading permit from the City of Portland, if required. All permits will be in place prior to Envirocon's mobilization to the site.

2.0 MOBILIZATION

Site mobilization shall commence in mid August 2001. Envirocon anticipates a 1 or 2 day mobilization period, including placement of temporary facilities, and the setup of control zones and decontamination stations.

2.1 Temporary Facilities

Temporary facilities will be mobilized to the site the first day onsite. A portable toilet with a wash sink will be positioned inside the site support zone away from anticipated trailer and vehicle traffic areas and routes. An equipment storage trailer will be mobilized to the site and contain PPE, potable drinking water, and miscellaneous tools and equipment. Envirocon's Portland Office is located next door to the Time Oil site and will serve as the project office

BZTO104(e)016195

2.2 Equipment Mobilization

Envirocon will mobilize a 55,000-pound excavator, one backhoe with a concrete breaker, one 5 cubic yard front-end loader with bucket scales, a 35,000-pound bulldozer, one 12 cubic yard dump truck, one 2000-gallon water truck and, a vibratory compactor, to the project site the first 2 weeks on site.

2.3 Personnel Decontamination

Envirocon will install one mobile personnel decontamination station. The mobile station shall consist of a three-bucket boot wash system, eyewash, and a used Tyvek and glove receptacle. The station shall be situated at the border of the exclusion zone and the contaminant reduction zone adjacent to truck exit/entry points but situated so that they will not be in the path of heavy equipment traffic. Boot covers shall be utilized in areas where a dry decontamination is preferable. A PPE trailer shall be set up in the support zone for employee change out and PPE supply storage.

2.4 Equipment Decontamination

Equipment shall be decontaminated through utilization of a combination of a dry decontamination procedure and a mobile decontamination pad designed by Envirocon. A design Envirocon has utilized at several Superfund sites is a prefabricated metal grate and tray. The station will be constructed to have a total liquid containment capacity of 500 gallons. The station draws fresh water from connection to the hydrant system. A pressure washer or water truck and fire hose are utilized as the washing mechanism. A sump pump transfers spent decontamination wastewater from the station to the wastewater holding tanks. Wastewater will be recycled whenever possible to be used for excavation and stockpile dust control.

2.5 Health and Safety

The Envirocon site health and safety plan specifically address issues and hazards, which could be encountered during the project. These include such items as the operation of heavy equipment, heat and/or cold stress, and contact with pentachlorophenol-contaminated soils. All Envirocon employees are 40 hour OSHA trained and shall have read the site safety plan prior to mobilization on site. An orientation meeting shall be held at the site the first day of mobilization. The meeting shall be conducted with client representatives present to review any safety concerns at the site. Morning tailgate safety meetings shall be conducted daily thereafter and documented on Envirocon's daily construction logs.

BZTO104(e)016196

3.0 REMOVAL OF SOIL STOCKPILE

After the completion of mobilization activities Envirocon will begin loading contaminated soils from the existing 4,000-ton stockpile into rail cars. Rail cars shall be gondolas with 90- to 95-ton capacity. Soils shall be loaded into the rail cars utilizing a 5 cubic yard front-end loader equipped with bucket scales. Loading of the 4,000 tons will take approximately 3 weeks, including a 7-day lag for transit for cars to and from Canada.

4.0 BUILDING DEMOLITION

During the second or third week on site, Envirocon will demolish a 5,000 square foot structure underlain by hot spots of pentachlorophenol-contaminated soils. The building is a wood frame warehouse with tin sheeting for the walls and roof and a concrete slab floor. According to the information provided by Time Oil, no asbestos, lead, or PCB ballast are present within the structure. Envirocon will demolish the structure in 2 to 3 days utilizing an excavator and a backhoe with a concrete breaker. Envirocon will send the building components to local recycling facilities, wherever feasible. Non-recyclable components shall be disposed of in a permitted landfill.

5.0 EXCAVATION OF IN-PLACE CONTAMINATED SOILS

Excavation activities shall begin the third week on site after the completion of demolition activities and continue for approximately 1 1/2 weeks. A 55,000-pound excavator will perform excavation of approximately 2,100 cubic yards of contaminated soils. The excavator will direct load soils into 12 cubic yard dump trucks for transport to the stockpile staging area. Any overburden soils will be stockpiled immediately adjacent to the excavations. Excavation is expected to last 6 days. All excavation shall be performed to predetermined depths by equipment operators experienced in removing soil in 6-inch to 1-foot lifts. Depths shall be checked periodically to avoid over excavation. Dust control for excavation activities will be provided by a fire hose connected to a hydrant or a water truck. Envirocon will attempt to preserve and utilize the existing stockpile cover whenever possible to cover soils not being worked.

5.1 Excavation Dewatering

Excavation of soils beneath the water table may require that limited dewatering be conducted. Envirocon will mobilize two 21,000-gallon holding tanks to contain water. The water shall be transferred from the tanks into Time Oil's water treatment system.

BZTO104(e)016197

6.0 OFF-SITE DISPOSAL OF EXCAVATED AND STOCKPILED SOILS

All contaminated soils shall be loaded into lined, wrapped, placarded, and manifested rail gondolas for transport and to Hazco's treatment and disposal facility in Richmond, Canada. Rail loading and off site disposal are anticipated to take place over the course of 4 to 6 weeks. Upon arrival of soils in the BNSF yard in Canada, Hazco shall unload the rail cars and transfer the material to trucks. The contaminated soils will then be transported to Hazco's Richmond Bioremediation Facility. This facility includes a double synthetic liner and a leachate collection system. There, soils shall be treated in a segregated designated cell by bioremediation until pentachlorophenol concentrations are less than or equal to 5.0 mg/kg. After successful biotreatment, the soils shall be relocated on the site to Hazco's industrial landfill for permanent disposal.

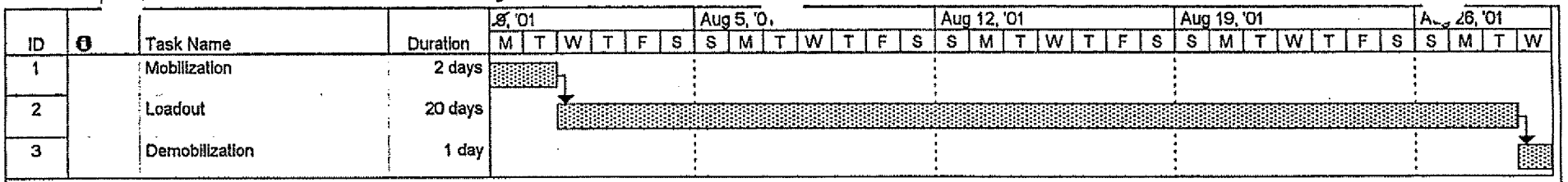
7.0 BACKFILL

Envirocon will commence backfill activities on site after confirmation sampling by Time Oil has indicated that cleanup levels have been met. Backfill material shall come from an on-site source pile and will be completed in approximately 4 days. Envirocon will utilize a 55,000-pound excavator, a 35,000-pound bulldozer, a vibratory compactor and a 12 cubic yard dump truck to perform fill activities. Soils shall be placed in 12-inch lifts and compacted.

8.0 DEMOBILIZATION

Envirocon will demobilize from the site in late September or early October 2001, upon the completion of rail load out activities. All equipment shall be thoroughly decontaminated prior to mobilization and miscellaneous materials, supplies, and trash removed to restore the site to original conditions.

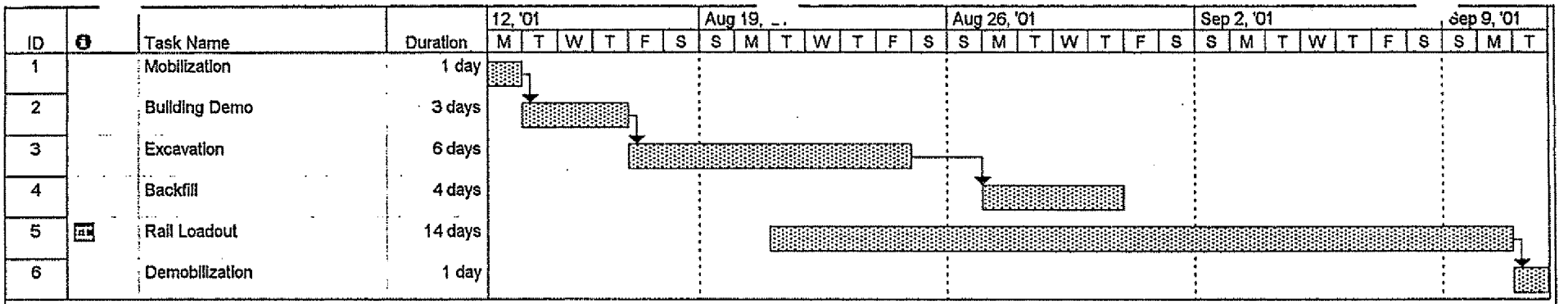
BZTO104(e)016198



Project: Time Oil Phase 1
Date: Wed 6/27/01

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

BZTO104(e)016199



Project: Time Oil Phase 2
Date: Wed 6/27/01

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

BZTO104(e)016200

WASTE DISPOSAL AGREEMENT FOR
THE EXPORT OR IMPORT OF HAZARDOUS WASTE

BETWEEN:

(The "Importer")

AND:

(The "Exporter")

This Agreement for the export or import of hazardous waste between the Exporter and the Importer is intended to comply strictly with the Export and Import of Hazardous Waste Regulations of the Canadian Environmental Protection Act.

The Agreement between the parties is as follows:

1. Notification by the Importer

1.1 The Importer agrees to dispose of waste by disposal method ___, as described in Schedule 1, Part 1, Column II of the Export and Import of Hazardous Waste Regulations.

1.2 The Importer shall within three (3) days of acceptance of delivery of the hazardous waste send a completed and signed copy of the hazardous waste manifest accompanying the shipment to:

The Chief, Hazardous Waste Division
Office of Waste Management
Department of the Environment
Place Vincent Massay, 12th Floor
351 St. Joseph Boulevard
Hull, Quebec, CANADA K1A 0H3

1.3 The Importer shall within thirty (30) days after the hazardous waste is disposed of in accordance with the Agreement, send written confirmation of the disposal to:

The Chief, Hazardous Waste Division
Office of Waste Management
Department of the Environment
Place Vincent Massay, 12th Floor
351 St. Joseph Boulevard
Hull, Quebec, CANADA K1A 0H3

2. Inability To Perform

2.1 The Importer agrees that in the event that delivery of the hazardous waste has been accepted, but the hazardous waste cannot be disposed of in accordance with the terms of this Agreement, the Importer will take all practicable measures to help the Exporter fulfill the terms of the undertaking given in the Notice for Export and Import ("Notice"). The Exporter has attached to this Agreement a copy of the Notice.

Importer	Exporter
By:_____	By:_____
Title:_____	Title:_____
Date:_____	Date:_____

HAZCO

Hazardous Waste Import/Export Procedure

This procedure applies to the export of all hazardous wastes from Canada to the United States, as well as the import of hazardous waste from the United States to Canada. Waste that is non-hazardous in the United States, but hazardous in Canada must follow this procedure for import into Canada. The procedure must also be followed for export of hazardous waste from Canada into the United States. Waste that is hazardous in the United States and non-hazardous in Canada requires a United States notification.

UNITED STATES	CANADA	NOTIFICATION REQUIRED
Hazardous Waste	Hazardous Waste	Both US and Canadian
Hazardous Waste	Non-hazardous Waste	US Notification
Non-hazardous Waste	Hazardous Waste	Canadian Notification
Non-hazardous Waste	Non-hazardous Waste	None

CANADIAN PROCEDURE

In Canada, the import and export of Hazardous wastes is regulated through the Canadian Environmental Protection Act (CEPA) Import and Export of Hazardous Waste Regulation. All imports / exports of federally regulated hazardous waste must have prior approval from Environment Canada prior to shipment.

The following steps must occur:

1. Complete Canadian Import/Export Notice (Environment Canada Form #04-2621) that is used to notify regulatory authorities in Canada of the intent to export or import hazardous waste. The following information is required:

   - Names and addresses of the Importer and Exporter, together with the Generator / Receiver numbers of each.
   - Site addresses and contact numbers for the shipping and receiving facilities.
   - Name, address and Carrier number for the transporter.
   - Hazardous Waste Information in accordance with International Waste Identification Code (IWIC), TDG PIN, quantity, Packing Group and Packaging Type.
   - Planned dates for shipment as well as points of entry/exit and custom offices
   - Form is to be signed by the Importer and Exporter or their Agents. If signed by an Agent, a copy of the Power of Attorney needs to be attached.

2. Prepare and sign Import/Export Disposal Agreement between the generator and the receiver (see attached Addendum). This does not serve as a contract to do business, but simply states that if a business contract is entered into, both parties will comply with the regulations.

3. Both importer and exporter must provide an insurance certificate addressed to Environment Canada showing that they have at least $ 5,000,000 in liability insurance.

HAZCO *ENVIRONMENTAL SERVICES LTD.*
200, 5720 - 4TH STREET SE, CALGARY, ALBERTA T2H 1K7
TELEPHONE (403) 297-0444 • FAX (403) 253-3188 • WESTERN CANADA 1-800-667-0444

4. Copies of the Import/Export Notice, Import/Export Disposal Agreement, and proof of insurance must be sent to Environment Canada in Hull, Quebec either by mail or facsimile.

5. Consent from Environment Canada must be received by the exporter and importer prior to any shipment of waste. This takes 30 to 60 days to issue as the notification information is circulated to both provincial and state authorities. If those authorities have no objections to the import / export, Environment Canada issues a 'Written Confirmation'. This is valid for a time period of one year without renewal.

6. Each shipment must be accompanied by hazardous waste transportation documentation for both Canada (Waste Manifest) and United States (Uniform Hazardous Waste Manifest), as well as the Written Confirmation and the Addendum / Agreement.

7. Once the waste has been received and disposed, copies of completed manifests and disposal certificates must be distributed to both federal and provincial regulatory authorities in both Canada and the United States.

AMERICAN PROCEDURES

The American procedures are contained in 40 CFR, CHAPTER I – PART 262, particularly in 262.53 and 252.54.

1. Exporter submits a letter to EPA-HQ providing the information required by section 262.53 – notification of Intent to Export. The information is similar to that required by Environment Canada.
2. EPA will provide a complete notification to the receiving country.
3. EPA will issue an EPA Acknowledgment of Consent to the Exporter if the receiving country consents.
4. The Acknowledgment of Consent must be attached to the waste manifests, and accompany the shipment.

Date:

United States Environmental Protection Agency
Office of Enforcement and Compliance Assurance
Office of Compliance, Enforcement Planning, Targeting and Data Division
Mail Code 2222A
Ariel Rios Federal Building – Room 6144
12th & Pennsylvania Avenue, N.W.
Washington, DC 20460

Attention: Mr. Robert Small, Environmental Protection Agency, Specialist
Phone No.: (202) 564-5043
Fax No.: (202) 564-0025

Re: Notification of Intent to Export Hazardous Wastes Material to Canada

Dear Mr. Small:

_____, respectfully submits this letter as notification of our intent to export hazardous waste material to Canada. This notification is intended to comply with the requirements included in the applicable Code of Federal Regulations (CFR) Title 40 (Protection of Environment) Section 262.53. The following information is provided to comply with the notification requirements as stipulated in 40 CFR Section 262.53:

Primary Exporter / Generator: _____

Site Address: _____

US EPA ID No.: _____

Material Description: _____

Amount: _____

EPA Hazardous Waste #: _____

US DOT Shipping Name: _____

Hazardous Class: _____

UN ID Number: _____

Transporter: Hazco Environmental Services Ltd.
200, 5720 – 4th Street S.E.
Calgary, Alberta
T2H 1K7

Frequency of Shipments: _____

United States Exit Point: _____

Canada Entrance Point: _____

Final Destination: _____

In summary our intention is to transport up to _____ tons of _____ _____ under proper hazardous waste manifest documents from _____ _____ in the continental USA to Alberta, Canada. The material will be transported from _____ to _____, Canada. We are currently waiting for the final approvals from the Canadian Government and _____ to treat this material at their approved facility.

If required, additional technical information may also be obtained from the following sources:

Contractor of Record: _____

I hope that the information contained in this letter is sufficient for EPA approval to transport the hazardous waste material as stated herein to Canada. Please do not hesitate to contact the undersigned directly with any questions and or comments regarding this notification at _____.

Sincerely,

Company Name

Contact Name
Title

ENVIROCON RESUMES

ENVIROCON

DAVID JACOBS

TITLE Project Director

Mr. Jacobs has over 13 years of experience in performing environmental remediation, construction, consulting, and demolition projects for public and private sector clients throughout the western United States. His current responsibilities include oversight of projects; preparation and review of costing and technical proposals; supervision of project managers, technical staff, and field staff; report preparation; cost tracking; and regulatory and client interface.

His selected project experience includes:

- Project Manager for multi-year remediation project at the Union Pacific Yard Sacramento, CA. Work in 2000 consisted of the excavation and segregation of 175,000 cubic yards of soil and debris into 500 cubic yard stock piles, onsite treatment of 30,000 tons of heavy metal impacted soils, loading of 140,000 tons of soils into rail cars for offsite disposal and the placement of 75,000 cubic yards of imported fill. Complexities of this site involved maintaining excavation production rates at 3500 cubic yard/day while complying with rigid dust control requirements, extreme summer hot weather conditions, and segregating soils into five separate waste classifications.

- Project Director for mine tailings consolidation and capping project for the Bureau of Land Management, Hunters, Washington. This project required the excavation, consolidation and capping of mine tailings containing elevated levels of lead, arsenic and other heavy metals. The project was performed in a remote area of Eastern Washington and took place over working seasons due to winter shutdown. The initial phase of the project required dewatering of the tailings. This work consisted of extensive clearing which included the harvest of 30,000 mbf of timber, the rerouting of one half mile of stream and the installation of 1700 lineal feet of 8" ground water collection pipe at depths of up to 25 feet. The second phase of the work included the excavation, grading and capping of contaminated mine tailings in two separate repository areas. During the project over 170,000 square feet of geotextiles were deployed, including prefabricated drainage composites and 8-ounce nonwoven fabrics. Extensive erosion control measures were installed including 11,000 square feet of cable concrete, 5,000 square feet of open cell confinement system and 40,000 square feet of erosion control matting.

- Project Director for Sacramento Army Depot Superfund Site in Sacramento, California. Multi-million dollar Environmental Construction project for Army Corps of Engineers. Site activities included remediation of 80,000 yards of heavy metal contaminated soil from former Army Base Burn Pits and Settlement Lagoon Ponds. Onsite phases included, 1) Containment cell 35' deep for stabilized soil with specified clay cap, 2) 45,000 yard Excavation of Burn Pit soil and debris, 3) 35,000 yard Excavation and long haul with multiple decontamination of Lagoon soil, 4) Design and performance of screening, concrete crushing, pugmill mixing stabilization system for all 2" minus material, 5) Debris and metal washing and recycling, 6) Installation of double lined containment for the processing area, 7) Wetlands restoration and complete site grading to plan upon completion. This project also required treatment of soils and debris (Lead, Arsenic, Chromium, and Cadmium) to TCLP and California Regional Water Control Board DI-WET standards to enable onsite cell encapsulation of treated material. Project conducted with strict Army Corps of Engineers oversight that included Air and Radiation Monitoring. All equipment processing work was completed in level "C" conditions with a strong emphasis placed on daily production goals.

- Project Director for a Superfund project in Hercules, California. Performed remediation of lead, arsenic, cadmium, chromium and TPH contaminated soil at a former explosives plant. Scope of work included excavation, and transportation of 60,000 tons of soil, screening and onsite stabilization of 20,000 tons of soil contaminated with heavy metals, backfill of site to specified grade. Soils were transported offsite by rail and truck.

DAVID JACOBS (Cont.)

- Project Manager at the Spokane Junkyard Superfund Site, Spokane, Washington. This project required the excavation of 14,800 tons of lead and PCB contaminated soils and 15,300 tons of overburden soils, onsite stabilization of 2,500 tons of lead contaminated soils, construction of 11,000 cubic yard containment cell, installation of a 53,300 square foot multiple layer geosynthetic cover system, construction of a six station air and weather monitoring system, and the installation of a 18,000 ton soil cap

- Project Manager for Union Pacific, The Dalles, Oregon. Responsible for the construction and installation of groundwater extraction system at NPL site. This project included import and placement of 3,500 tons of fill material to bring the site to required grade, direct bury of one mile of HDPE pipeline, construction of six well houses and foundations, construction of a concrete decontamination pad, relocation of a building, installation of two aboveground storage tanks, installation of 1,500 feet aboveground piping with associated metal stands and concrete bases, cleanout of oil/water separator, installation of 12 pumps and associated system motors, controllers, flow meters, and turbidimeters.

- Project Manager at the PP&L Superfund Site, Clackamas, Oregon. This project required the excavation, screening on-site stabilization, transportation and offsite disposal of 28,000 tons of lead and PCB contaminated soils. Soils were transported by both truck and rail. Heavy precipitation necessitated the de-watering and treatment of over 300,000 gallons of heavy metal and oil contaminated groundwater on-site. Approximately 500 tons of metal debris were decontaminated on-site and sent for salvage. At the completion of excavation activities, geo-membrane liner was placed in the excavations and they were backfilled to a specified grade.

- Project Manager overseeing the excavation, screening, and on-site stabilization of approximately 3,150 cubic yards of lead contaminated soils at an industrial site in Portland, Oregon. Soils contained approximately 35% debris by volume and required extensive screening prior to processing. Processed soils were transported to an off-site facility for disposal as non-RCRA hazardous waste. The site was then backfilled to a specified sub-grade.

- Project Manager for a project at the Port of Vancouver, Vancouver, Washington. Performed the excavation and on-site vapor extraction of 18,000 cubic yards of TCE contaminated soils as a time-critical project for a road extension. Contaminants were contained within an area used for a road extension and had reached the groundwater table. Time was of the essence in removing contaminated soils and backfilling the excavation to grade. 12,000 cubic yards of TCE contaminated soils and 6,000 cubic yards of clean overburden soils were removed and transported, asphalt and concrete building foundations were removed, on-site sizing of concrete and asphalt was performed, and the site was backfilled to DOT specifications. The stockpiled soils were placed in three adjacent treatment cells and the soils successfully treated onsite by ex-situ vapor extraction. Treated soils were later utilized as fill material.

- Project Engineer for two state Superfund projects in Culver City, California. Performed remediation of 25,000 tons of solvent and heavy metal contaminated soil at a former printed circuit board plant. Scope of work included excavation, and onsite ex-situ vapor extraction of 25,000 tons of VOC contaminated soils, onsite stabilization of 2500 tons of soil contaminated with heavy metals, backfill of site to specified grade. Soils were transported offsite by rail and truck.

- Project Manager at the Reynolds Metals Superfund site in Troutdale, Oregon. Responsible for the excavation, solidification, and off-site disposal of 12,000 net tons of cryolite, 10,000 tons of potliner and 2,000 tons of TPH impacted spoils. The conditions at the site required the solidification of 90% of the material before off-site shipment. Cryolite from a pond was excavated, mixed with a drying agent to prevent formation of free liquids, and loaded into trucks for transport to a solid waste landfill. In addition, a 1,000 foot road complete with turning loop, loading zone and truck scales was installed. Road installation minimized required truck decontamination and allowed the project to be successfully performed in a one-month period despite continuos rainfall.

DAVID JACOBS (Cont.)

- Project Manager for a project in White City, Oregon that required the excavation, screening, and off-site disposal of 17,000 tons of PCB and TPH contaminated soils. This project also required segregation of soil and debris into four separate hazard classes. Scope of work also included demolition of storage shed, excavation and restoration of sensitive wetlands, construction of four log check dams in ditch line on-site, backfill and installation of a 54,000 square foot asphalt parking lot and cleaning of 12,000 square foot concrete floor to remove PCB contamination,

- Project Manager at the Amalgamated Metals Site in Mill City, Oregon. The project included excavation, transportation and disposal of 10,500 tons of lead contaminated soils and debris from a U.S. Forest Service site. The site was situated in a remote wilderness area and required the protection of a adjacent waterway and the construction of a lined and bermed interim staging and stockpile area. Other activities performed at the site included: demolition and decontamination of metal and concrete structures, construction, grading, and maintenance of Forest Service haul roads, and manual cleaning of several thousand square feet of bedrock.

EDUCATION

M.S., Environmental & Occupation Health, California St. University, Northridge
B.S., Chemistry, California State University, Northridge

TRAINING/ CERTIFICATIONS

40-Hour Hazardous Waste Site Operations Training
8-Hour Hazardous Waste Site Supervisor Training
Competent Person Training Excavation and Trenching, AGC
CPR Certified/Level B

JEFF JOHNSON

TITLE Project Manager

EXPERIENCE

Mr. Johnson has over 20 years of experience in the environmental remediation and civil construction industries. His duties include estimating, project management, scheduling, client and regulatory interface, His background includes the following: Soil excavation and stabilization, utility installation, site grading, landfill cell construction, installation of landfill liner and cover systems, demolition, wetland rehabilitation, and road construction. Mr. Johnson also has extensive experience in underwater excavation and dredging.

His selected project experience includes:

- Construction Manager for Union Pacific, The Dalles, Oregon. Responsible for the construction and installation of groundwater extraction system at NPL site. This project included import and placement of 3,500 tons of fill material to bring the site to required grade, direct bury of one mile of HDPE pipeline, construction of six well houses and foundations, construction of a concrete decontamination pad, relocation of a building, installation of two aboveground storage tanks, installation of 1,500 feet aboveground piping with associated metal stands and concrete bases, cleanout of oil/water separator, installation of 12 pumps and associated system motors, controllers, flow meters, and turbidimeters.

- Construction Manager at the Sacramento Army Depot, Sacramento, California. Multi-million dollar environmental construction project for Army Corps of Engineers. Site activities included remediation of 80,000 yards of heavy metal contaminated soil from former Army Base Burn Pits and Settlement Lagoon Ponds. Onsite phases included, 1) Containment cell 35' deep for stabilized soil with specified clay cap, 2) 45,000 yard Excavation of Burn Pit soil and debris, 3) 35,000 yard Excavation and long haul with multiple decontamination of Lagoon soil, 4) Design and performance of screening, concrete crushing, pugmill mixing stabilization system for all 2" minus material, 5) Debris and metal washing and recycling, 6) Installation of double lined containment for the processing area, 7) Wetlands restoration and complete site grading to plan upon completion. This project also required treatment of soils and debris (Lead, Arsenic, Chromium, and Cadmium) to TCLP and California Regional Water Control Board DI-WET standards to enable onsite cell encapsulation of treated material. Mr. Johnson coordinated work with strict Army Corps of Engineers oversight that included Air and Radiation Monitoring. All equipment processing work was completed in level "C" conditions with a strong emphasis placed on daily production goals.

- Project Manager for mine tailings consolidation and capping project for the Bureau of Land Management, Hunters, Washington. This project required the excavation, consolidation and capping of mine tailings containing elevated levels of lead, arsenic and other heavy metals. The project was performed in a remote area of Eastern Washington and took place over working seasons due to winter shutdown. The initial phase of the project required dewatering of the tailings. This work consisted of extensive clearing which included the harvest of 30,000 mbf of timber, the rerouting of one half mile of stream and the installation of 1700 lineal feet of 8" ground water collection pipe at depths of up to 25 feet. The second phase of the work included the excavation, grading and capping of contaminated mine tailings in two separate repository areas. During the project over 170,000 square feet of geotextiles were deployed, including prefabricated drainage composites and 8-ounce nonwovwen fabrics. Extensive erosion control measures were installed including 11,000 square feet of cable concrete, 5,000 square feet of open cell confinement system and 40,000 square feet of erosion control matting.

- Construction Manager for multi-year remediation project at the Union Pacific Yard Sacramento, CA. This year's work consists of the excavation and segregation of 165,000 cubic yards of soil and debris into 500 cubic yard stock piles, onsite treatment of 30,000 tons of heavy metal impacted soils, loading of 140,000 tons of soils into rail cars for offsite disposal and the placement of 75,000 cubic yards of imported fill.

JEFF JOHNSON (Cont.)

Complexities of this site involved maintaining excavation production rates at 3500 cubic yard/day while complying with rigid dust control requirements, extreme summer hot weather conditions, and segregating soils into five separate waste classifications.

- Site Supervisor for five years at an active 240-acre solid waste municipal landfill in Portland, Oregon. Responsible for all field operations including landfill cell construction, leachate collection systems, capping and proper burial of up to 4,000 tons per day of solid waste. Supervised hourly employees including equipment operators, laborers, mechanics and special waste handlers.

- Construction Manager for a Superfund project in Hercules, California. Performed remediation of lead, arsenic, cadmium, chromium and TPH contaminated soil at a former explosives plant. Scope of work included excavation, and transportation of 60,000 tons of soil, screening and onsite stabilization of 20,000 tons of soil contaminated with heavy metals, backfill of site to specified grade. Soils were transported offsite by rail and truck.

- Construction Manager at the Spokane Junkyard Superfund Site, Spokane, Washington. This project required the excavation of 14,800 tons of lead and PCB contaminated soils and 15,300 tons of overburden soils, onsite stabilization of 2,500 tons of lead contaminated soils, construction of 1 1,000 cubic yard containment cell, installation of a 53,300 square foot multiple layer geosynthetic cover system, construction of a six station air and weather monitoring system, and the installation of a 18,000 ton soil cap

- Construction Manager for a project at the Port of Vancouver, Vancouver, Washington. Performed the excavation and on-site vapor extraction of 18,000 cubic yards of TCE contaminated soils as a time-critical project for a road extension. Contaminants were contained within an area used for a road extension and had reached the groundwater table. Time was of the essence in removing contaminated soils and backfilling the excavation to grade. 12,000 cubic yards of TCE contaminated soils and 6,000 cubic yards of clean overburden soils were removed and transported, asphalt and concrete building foundations were removed, on-site sizing of concrete and asphalt was performed, and the site was backfilled to DOT specifications. The stockpiled soils were placed in three adjacent treatment cells and the soils successfully treated onsite by ex-situ vapor extraction. Treated soils were later utilized as fill material.

- Project Superintendent at the Reynolds Metals Superfund site in Troutdale, Oregon. Responsible for the excavation, solidification, and off-site disposal of 12,000 net tons of cryolite, 10,000 tons of potliner and 2,000 tons of TPH impacted spoils. The conditions at the site required the solidification of 90% of the material before off-site shipment. Cryolite from a pond was excavated, mixed with a drying agent to prevent formation of free liquids, and loaded into trucks for transport to a solid waste landfill. In addition, a 1,000 foot road complete with turning loop, loading zone and truck scales was installed. Road installation minimized required truck decontamination and allowed the project to be successfully performed in a one month period despite continuos rainfall.

- Construction Manager / Goldendale Aluminum Project, Goldendale, WA. Performed the demolition of 19 wet electrostatic precipitators and associated cooling towers and structures. Project was completed on schedule despite extreme weather conditions.

- Project Superintendent / Pendleton Woolen Mills Project, Camas, WA. Performed the accelerated demolition of a 72,000 square feett former manufacturing building to facilitate capping of pesticide impacted soils. Precise demolition techniques were required to avoid impacting adjacent occupied structures and walkways. Additional work onsite entailed the removal of 676 PCB light ballasts, decommissioning of five aboveground tanks, and screening 11,000 cy of soil to be used in construction of an engineered cap.

- Project Superintendent for a project in White City, Oregon that required the excavation, screening, and off-site disposal of 17,000 tons of PCB and TPH contaminated soils. This project also required segregation of

soil and debris into four separate hazard classes. Scope of work also included demolition of storage building, excavation and restoration of sensitive wetlands, construction of four log check dams in ditch line on-site, backfill and installation of a 54,000 square foot asphalt parking lot and cleaning of 12,000 square foot concrete floor to remove PCB contamination,

- Project Superintendent at the Amalgamated Metals Site in Mill City, Oregon. The project included excavation, transportation and disposal of 10,500 tons of lead contaminated soils and debris from a U.S. Forest Service site. The site was situated in a remote wilderness area and required the protection of a adjacent waterway and the construction of a lined and bermed interim staging and stockpile area. Other activities performed at the site included: demolition and decontamination of metal and concrete structures, construction, grading, and maintenance of 14 miles of Forest Service haul roads, and manual cleaning of several thousand square feet of bedrock.

EDUCATION / TRAINING

40-hour Hazardous Waste Operations Training
Oregon Full-Scale Worker, Asbestos Certification
CPR & First Aid Training
Risk Management & Loss Control, Train-The-Trainer, and Accident Investigation workshops
Competent person training for trenching and excavation

HAZCO RESUMES

ENVIROCON

HAZCO

GREGORY CAMPBELL, P. Eng.
Vice President, Pacific Region

Mr. Campbell has a degree in Mechanical Engineering and 15 years experience in the management of the environmental service business. He started Hazco's B. C. office in 1993, and has built it into the largest environmental contractor in British Columbia. Mr. Campbell is the Vice-President of the Pacific Region with overall regional responsibility for all business activities, including Safety. Hazco employs over 50 personnel in the region serving the needs of clients in the areas of site remediation, transportation of dangerous goods and the operation of both soil and water treatment facilities.

SELECTED WORK EXPERIENCE

Hazco Environmental Services Ltd., Richmond, B. C. (1993 to date)

- Development, permitting and operation of soil treatment facilities in Richmond, Courtenay, and Kelowna, BC.
- Management of remediation services related to the development of Pacific Place. Hazco has been the remediation contractor on the site since 1993.
- Management of the Tree Island steel remediation project involving over $5.0 MM in services since 1995.
- Design, manufacturing and servicing of treatment equipment for solid, liquid and vapor wastes.

Laidlaw Environmental Services Ltd., Richmond, BC, Facility Manager (1991 to 1993)

- Facility Manager for BC's first Hazardous Waste Facility.
- Packaging, transportation and disposal of flammable, oxidizer, poisonous, and corrosive hazardous wastes.
- Treatment using chemical, physical, and biological technologies.

Domtar Inc., Surrey, BC, Environmental and Production Superintendent (1986 to 1991)

- Superintendent of BC's largest gypsum wallboard producer with responsibility for all environmental matters and for plant operations.

EDUCATION

- B. A. Sc. Mechanical Engineering, University of British Columbia, 1986
- Member Association of Professional Engineers and Geoscientists of BC.

TRAINING

- 40 HR Hazwopper/OH&S
- WHMIS
- H2S ALIVE

Transportation of Dangerous Goods
Special Waste Regulations
Contaminated Sites Regulations (CSR)

HAZCO

J. L. (JIM) McCREA

Mr. McCrea has over 35 years experience in industry, consulting and construction/remediation. His background includes the planning and management of large remediation projects in both Canada and the United States. Mr. McCrea joined Hazco in 2001 and is responsible for the development of new business initiatives for Hazco, including projects in the United States.

SELECTED WORK EXPERIENCE PRIOR TO HAZCO

Golder Associates Ltd., Vancouver, BC (1993 – 2000)

- Project Director or Senior Project Manager for multi-discipline remediation projects in the private and public sector.
- Project Manager for the detailed design of tailings and water management facilities for a large new mine development in Central Peru. Required project teams from four countries.
- Responsible for contract development and administration of numerous engineering and construction/remediation projects, including Lump Sum projects.
- Technical advisor on soil and water treatment technologies.

Self- Employed, Vancouver, BC (1992)

- Assignments included preparation of proposals for multi-discipline remediation projects.

Cominco Engineering Services Ltd., Vancouver, BC (1990-1992)

- Director, Environmental Technology, with responsibility for development of technology-based service businesses in Canada and the United States.

International Technology Corporation, Houston TX (1986-1990)

- Project Director for a Unit Price USACE project in Louisiana to remediate a Superfund site using a transportable incineration unit. Excavated and treated over 100,000 tons of soil.
- Project Manager for a Unit Price USACE project in Nebraska using a prototype transportable incineration unit.

Exxon Minerals & Affiliated Companies, Houston TX and Australia (1979-1986)

- Managed the "Upstream" portions of an oil shale development program in Australia.
- Engineering Advisor responsible for evaluation of mineral properties and acquisitions.

Various Mining Companies, Canada and USA (1962-1979)

- Managed feasibility studies and acquisition programs in the precious metals, base metals and coal sectors, including assignments in Iran, South Africa and Chile.
- Plant Superintendent positions at copper and lead/zinc mining operations in Canada.

EDUCATION

B. Sc., Metallurgical Engineering, Queen's University, Kingston, Ontario, (1962)
M. B. A., University of British Columbia, Vancouver, BC (1968)

TRAINING

- 40 Hr OSHA
- Special Waste Regulations
- Transportation of Dangerous Goods
- Contract Administration

HAZCO

KEITH MAGNUS
Operations Manager, Pacific Region

Mr. Magnus has over 24 years experience in construction and remediation, and has been employed by Hazco since formation of the company in 1988. He has held positions of Site Supervisor and General Superintendent prior to his promotion to Operations Manager in 1997. Mr. Magnus is responsible for the day to day operations of Hazco's remediation activities, waste management services and bio-remediation operations in British Columbia.

SELECTED WORK EXPERIENCE

Hazco Environmental Services Ltd., Richmond, B. C. (1993 to date)

- Planning and directing the work of eight Site Supervisors and 40 other personnel providing remediation contracting services.
- Supervision of Waste Management Services throughout British Columbia.
- Management of bio-remediation facilities in Richmond, Kelowna and Courtney, B. C. that receive 150,000 tonnes of soils annually.
- Selection of earth moving equipment and maintenance of Hazco's fleet of heavy equipment.
- Truck, rail and barge transport of waste materials, including Dangerous Goods.
- Project management, estimating and cost control for soil excavation, transport and treatment projects with individual contract values of over $1.0 million.
- Design and servicing of remediation equipment systems.
- Planning and supervision of soil excavation and disposal projects.
- Planning and supervision of water treatment installations.

Hazco Environmental Services Ltd., Calgary, Alberta (1988 to 1993)

- Planning and supervision of soil excavation, transportation and disposal projects.
- Supervision of the installation and removal of underground storage tanks.
- Operation of excavators and other heavy equipment on contaminated sites.

Prior To 1998

- Operation of heavy equipment on oil field and civil construction projects throughout Alberta.

TRAINING

- 40 HR Hazwopper/OH&S
- WHIMS
- H2S ALIVE
- Transportation of Dangerous Goods
- Special Waste Regulations
- Contaminated Sites Regulations (CSR)

Landau Associates
Environmental and Geotechnical Services

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June 8, 2001

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:
Glenda Moon
For Rebekah Brooks
Project Manager

6/8/01 S:\WPROC\231\01\038\DEQ-May01.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
May 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the April 2000 monthly report to DEQ.
- Completed preparation of the *First Quarter 2001 Groundwater Report* and submitted to client for review.
- Prepared a recommendation letter to DEQ for future analyses of TPH for quarterly groundwater sampling events, conducted client review, and submitted to DEQ. Received approval of the recommendation from DEQ beginning with the second quarter 2001 groundwater sampling event, scheduled for June 4-7, 2001.
- Completed internal review of the *First Quarter 2001 Interim Action Status Report,* submitted to client, and incorporated client comments.
- Incorporated client comments on the *Groundwater Interim Action Completion Report* and submitted report to DEQ. Received approval from DEQ on the report without comment.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 2.9 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.
- Continued evaluation of expansion of interim action system operation in the lower zone by increasing the pumping rate at RW-2 and in the upper zone by pumping of HRW-1 and/or RW-1, possibly using an enhanced vacuum pump.
- Submitted the work plan for soil characterization of the soil stockpile to DEQ, received DEQ's comments and approval for implementation, and conducted field activities.
- Received approval from DEQ on the Stockpile Management Documentation letter without comment.
- Incorporated client comments on a work plan for conducting supplemental soil sampling in the Phase II areas and stormwater sampling from the east-west trending storm drain at the terminal.
- Received analytical results from the storm drain stormwater sample and compared to NPDES limits. All results at nondetect concentrations or well below the NPDES limits.
- Continued client review of the *Phase III RI Work Plan*, including the updated Quality Assurance Project Plan (QAPP) and Health and Safety Plan.

RESULTS COLLECTED

- No results were collected.

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Problems Encountered and Steps to Resolve

- No problems were encountered.

Work to be Performed Next Month

- Prepare and submit monthly report to DEQ.
- Conduct the second quarter 2001 groundwater sampling event, June 4-7.
- Submit the *First Quarter 2001 Groundwater Report* and the *First Quarter 2001 Interim Action Status 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.
- Implement the interim action startup plan within the upper zone, including baseline water level monitoring and hydraulic capture zone evaluation for upper zone pumping, contingent on upper zone groundwater levels.
- Receive, process, and begin validation and evaluation of the analytical results from the soil stockpile characterization sampling.
- Meet with DEQ on the *EPPI Results Report.*
- Receive and incorporate client comments on the *Phase III RI Work Plan* and submit to DEQ, including a preliminary schedule for Phase III activities.
- Submit the work plan for conducting supplemental soil sampling in the Phase II areas and stormwater sampling from the east-west trending storm drain at the terminal to DEQ.

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Landau Associates
Environmental and Geotechnical Services

July 27, 2001

JUL 30 2001

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' request for a change in scope and budget for 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 scope and budget update provides expected future expenditures between July 1 and December 31, 2001 for planned Phase I and Phase II activities not covered by previous authorizations. Also, as discussed by telephone on May 31, 2001, this letter provides our proposal for the transfer of budgets between tasks to extend the currently authorized budget to the end of the calendar year, 2001, for other defined tasks. Requests for budget authorizations for yet to be defined tasks (e.g., GIS database support and additional potential responsibilities after terminal closure) will be covered in a subsequent letter(s) after the scopes for these tasks are defined.

The previous authorization (03-610-LANDAU11) covered costs through June 30, 2001. The request for additional budget in this letter is to cover defined tasks that extend until December 2001, including the regularly scheduled groundwater sampling events for the third and fourth quarter events, 2001 (Task 131) and project management (Task 135). An amount of $32,000 is requested for additional budget to cover these tasks through the end of 2001, as shown in Table 1. Because we were able to achieve savings in some previously scoped and budgeted tasks, we also propose to transfer funds from tasks completed under budget, or those not scheduled for completion before December 2001, to cover the newly defined task for soil stockpile characterization. A transfer of approximately $35,000 from previously budgeted tasks is proposed to cover the costs for this task (Task 151), as shown in Table 1.

As discussed in meetings and telephone conversations with Time Oil and the Oregon Department of Environmental Quality (DEQ) and as documented in the monthly project status reports, the scope for the project has continued to change over the past year in response to additional requests by DEQ and Time Oil. As you verbally approved on several occasions, the 10 percent contingency amount authorized in the previous change order (03-610-LANDAU11) was applied to additional costs incurred by the project for requests by Time Oil for new scope items since July 2, 2000. A detailed tabulation of these new scope items are provided in Table 2. No new budget authorization is requested for these tasks.

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The additional costs estimated in this letter are based on 2001 labor rates and our ongoing discount provided to Time Oil in recognition of our longstanding business relationship. These rates are documented in the Landau Associates letter to Time Oil, dated January 8, 2001. As in the past, this work will be provided on a time and materials basis under our existing contract.

The scope of services for activities covered by transfer of existing funds or by authorization of new funds are provided below.

SCOPE OF SERVICES

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 6 months. Lists of completed tasks since the last scope and budget update request in August 2000 (under Time Oil work order 03-610-LANDAU11) were included with the monthly invoices. Table 1 summarizes tasks, project expenditures (through June 30, 2001), and authorizations by Time Oil to date, and provides our proposal for transfer of funds from existing tasks to cover the new stockpile characterization task. New scope items completed under verbal authorization from Time Oil for activities completed from July 2, 2000 through June 30, 2001 are listed in Table 2. Budget assumptions included in the estimation of costs for the continuing groundwater sampling events in 2001 are listed in Table 3.

As in the past, these budget estimates assume that most analytical laboratory and all drilling and licensed surveyor costs will be paid directly by Time Oil. Therefore, our budget requests do not include budget for payment of these services, with the exception of specified analytical costs for the soil stockpile characterization. These costs were discussed with Time Oil prior to conducting the analyses.

Because Time Oil requested that budgets for previously defined tasks be zeroed out with the last authorization, new task numbers were established in recognition of this budget adjustment. The new task numbers are as follows:

130 Phase I/II Remedial Investigation

140 Phase I/II Risk Assessment

150 Phase I/II Feasibility Study

Task 110, previously established for the Groundwater Interim Action, remains active. All other project tasks have been classified inactive or dormant. The status of each of the active project tasks is provided below.

Task 110 – Groundwater Interim Action

The groundwater interim action is currently ongoing. At this time, we are not requesting any additional funds for implementation. The unused budgets for the design and construction task ($2,638)

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and the completion report task ($2,738), along with $15,000 of the remaining budget for the startup monitoring task ($35,625) are proposed for transfer to Task 150 for the new soil stockpile characterization task. The startup monitoring funds are proposed for transfer at this time because it appears that startup of the groundwater interim action in the upper zone is unlikely to occur this year due to abnormally low rainfall and consequent low water levels in the upper zone. If startup of the groundwater interim action system in the upper zone does occur before the end of 2001, additional funds may be requested to cover those transferred from this task.

Task 130 – Remedial Investigation

Defined Phase I and Phase II RI activities are complete, except for the following: 1) quarterly groundwater sampling events, 2) additional soil and storm drain sampling activities, and 3) project management. This letter requests additional budget for costs to complete the third and fourth quarter 2001, groundwater sampling events and expected project management costs through December 2001, only. The additional sampling activities will be covered under the existing budget.

The previously authorized budget for application of GIS to project data was used to prepare a request for proposal for GIS consulting services to develop a GIS database for the Time Oil Northwest Terminal data. Any additional activities for the GIS database task will require future authorization, after the task is further defined. Also, additional costs under Task 130 for preparation and production of the final Phase II RI report ($4,470) were outside of the defined scope identified for this task. Additional scope items 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. We propose using the contingency budget to cover this amount.

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

Quarterly Groundwater Sampling Events. The third and fourth quarter 2001 groundwater sampling events are expected to be comparable to the second quarter 2001 event. An increase in the number of monitoring wells is expected during the Phase III RI, but this will not likely occur until Spring 2002. Anticipated activities associated with the quarterly 2001 groundwater events include the following:

- Groundwater sampling/field activities for two quarterly sampling events.
- Validation/processing of the analytical data.

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- Preparation of two quarterly groundwater reports for submittal to client for review and to DEQ.

As shown in Table 1, a budget of $27,000 is requested to complete these activities.

Additional Sampling Activities. A work plan was submitted to DEQ on June 18, 2001 for performance of supplemental sampling and analysis of soil associated with the Phase II RI source areas and of stormwater from the east-west trending storm drain at the terminal. The work plan is currently awaiting DEQ approval.

Remaining outstanding activities include the following:

- Field collection of soil and stormwater samples,
- Processing/validation/evaluation of data, including recalculation of soil volumes for PCP concentrations exceeding assumed action levels
- Preparation of a technical memorandum for submittal to client and DEQ for review
- Response to client and DEQ comments.

The field activities will be conducted in conjunction with field activities for the Phase III RI, currently planned for late summer 2001. Approximately $2,600 was spent to prepare the work plan. This leaves approximately $20,200 in the previously authorized budget to complete this task. No additional funds are requested for this task.

Project Management. Project management activities are ongoing. About $14,600 remains of the previously authorized budget. This amount is expected to cover the majority of the project management costs through December 2001. However, based on the activities planned for the remainder of the year and the preparation of an additional scope and budget update letter at the end of the calendar year for the year 2002, we request an additional $5,000 to cover project management costs through December 2001.

Task 140 - Risk Assessment

We currently anticipate that significant risk assessment efforts will not occur during 2001. As discussed with you previously, a portion of the authorized budget for the sensitivity analysis ($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 remaining budget for the sensitivity analysis ($5,023) and half of the budget for general risk support ($2,500) will be transferred to Task 150 to cover part of the costs for the new soil stockpile characterization task. At this time, the remaining budget for risk support ($2,500) is expected to be sufficient to cover risk assessment activities foreseen in 2001. However, if risk

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assessment activities are expanded before the end of the year, additional funds may need to be requested to cover those transferred from this task.

Task 150 - Feasibility Study

Planned tasks previously authorized under the feasibility study (FS) budget have not yet been started. As approved by Time Oil, the previously established budget of $15,100, which was allocated for pilot testing, was used to cover various new scope items associated with this task. A list of the new scope items completed under this task (Task 150) through June 30, 2001, is provided in Table 2.

Only about $400 of the $5,000 budget for general FS support has been used. Because we currently anticipate that significant feasibility study efforts will not occur during 2001, a portion of the remaining budget for the general FS support task ($1,500) will be transferred to Task 150 to cover a portion of the new soil stockpile characterization task. At this time, the remaining budget for FS support ($3,100) is expected to be sufficient to cover FS activities foreseen in 2001. However, if FS activities are expanded before the end of the year, additional funds may need to be requested to cover those transferred from this task.

As described earlier, the new soil stockpile characterization task, with a budget of approximately $35,000, will be covered through transfers from tasks completed under budget or from tasks not expected to be completed by the end of 2001. A description of the soil stockpile characterization task is provided below.

Soil Stockpile Characterization. This newly defined task was established for collection of soil concentration data from the soil stockpile under current conditions for use in the evaluation of future remedial action alternatives for the stockpile. As stated earlier, a budget of $35,000 has been proposed to complete the following activities:

- Field collection of soil stockpile samples
- Analytical costs for dioxin/furan analysis, biofeasibility tests, and a physical soil test
- Processing/validation/evaluation of data
- Evaluation of remedial action alternatives, including assessment of possible offsite treatment and disposal in the United States and Canada, and review of the Canadian environmental regulations for applicable requirements
- Site visit to the HazCo treatment/disposal facility in Richmond, British Columbia (M. Powers)
- Review of audit documents from the HazCo facility and from the ChemWaste facility in Alberta.
- Preparation of a report for submittal to client and DEQ
- Response to client and DEQ comments.

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Because the cost to complete these activities is proposed to be covered by previously authorized funds, no additional funds are requested at this time for the soil stockpile characterization task.

BUDGET

Accrued project charges through week ending June 30, 2001 and estimated additional costs for future tasks through December 2001 are provided in Table 1. The costs include Landau Associates' labor and associated nonlabor expenses, and subconsultant costs for risk assessment activities. As noted earlier, the analytical laboratory, driller, and surveyor costs are not included in cases where Time Oil contracts directly for these services.

The estimated total budget increase for future work to be conducted through December 2001 for tasks not proposed for coverage under existing authorized funds is $35,200. This amount is comprised of the additional $32,000 identified under Task 130 and, as with previous scope and budget update requests, a 10 percent contingency ($3,200) to cover unforeseen additional tasks during this period. Total project costs, including expenditures to date and estimated additional costs for future work under this request, is estimated at about $1,784,565.

* * * * * * *

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

BZTO104(e)016226

TABLE 1
SCOPE AND BUDGET UPDATE, JULY 2001
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

TASK No.	Task Description	TOTAL Authorized Budget (adjusted 8/00)	Total Expenditures (Thru 6/30/01)	Total Budget Remaining	JULY 2001 SCOPE AND BUDGET UPDATE: Proposed Transfers Between Tasks	Proposed New Authorization	TOTAL Authorized Budget (proposed 7/01)	Total Budget Remaining After Proposed Adjustments
10	**STRATEGY/NEGOT'N MTG**	**$17,621**	**$17,621**	**$0**			$17,621	$0
20	**SOIL STOCKPILE**	**$111,078**	**$111,078**	**$0**			**$111,078**	$0
30	**PHASE I/II RI**	**$956,503**	**$956,503**	**$0**			**$956,503**	$0
40	**PHASE I/II EA/CLEANUP LVLS**	**$130,155**	**$136,700**	**-$6,545**	**$6,545**	**$0**	$136,700	$0
50	**PHASE I/II FS**	**$34,262**	**$34,261**	**$1**	**$0**	**$0**	**$34,262**	**$1**
60	**EAST PROPERTY**	**$123,944**	**$123,944**	**$0**	**$0**	**$0**	**$123,944**	**$0**
70	**LITIGATION SUPPORT**	**$628**	**$628**	**$0**	**$0**	**$0**	**$628**	**$0**
80	**TPH CLEANUP**	**$3,323**	**$3,323**	**$0**	**$0**	**$0**	**$3,323**	**$0**
110	GROUNDWATER INTERIM ACTION							
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	$23,275	$35,625	-$15,000		$43,900	$20,625
116	Interim Action O&M	$5,300	$51	$5,249			$5,300	$5,249
117	Interim Action Progress Reports	$6,100	$3,793	$2,307			$6,100	$2,307
110	**GROUNDWATER INTERIM ACTION (Subtotal)**	**$166,351**	**$117,795**	**$48,556**	**-$20,376**	**$0**	**$145,975**	**$28,180**
130	REMEDIAL INVESTIGATION							
131	Quarterly Groundwater Events	$58,200	$53,609	$4,591		$27,000	$85,200	$31,591
132	Addt'l Sampling Events	$22,800	$2,613	$20,187			$22,800	$20,187
133	GIS	$5,000	$5,025	-$25			$5,000	-$25
134	Phase II RI Report	$5,000	$9,470	-$4,470	$4,470		$9,470	$0
135	Project Management	$48,400	$33,842	$14,558		$5,000	$53,400	$19,558
139	Out of Scope (Contingency)	$25,600	$15,591	$10,009	-$10,009	$3,200	$18,791	$3,200
130	**REMEDIAL INVESTIGATION (Subtotal)**	**$165,000**	**$120,149**	**$44,851**	**-$5,539**	**$35,200**	**$194,661**	**$74,512**
140	RISK ASSESSMENT							
141	Sensitivity Analyses	$15,400	$3,832	$11,568	-$11,568		$3,832	$0
142	General Risk Support	$5,000	$0	$5,000	-$2,500		$2,500	$2,500
140	**RISK ASSESSMENT (Subtotal)**	**$20,400**	**$3,832**	**$16,568**	**-$14,068**	**$0**	**$6,332**	**$2,500**
150	FEASIBILITY STUDY	$0	$0	$0				$0
151	Pilot Testing/Soil Stockpile Characterization	$15,100	$36,887	-$21,787	$34,938		$50,038	$13,151
152	General FS Support	$5,000	$440	$4,560	-$1,500		$3,500	$3,060
150	**FEASIBILITY STUDY (Subtotal)**	**$20,100**	**$37,327**	**-$17,227**	**$33,438**	**$0**	**$53,538**	**$16,211**
	TOTAL ALL TASKS	**$1,749,365**	**$1,663,162**	**$86,203**	**$0**	**$35,200**	**$1,784,565**	**$121,403**

BZTO104(e)016227

TABLE 2
NEW SCOPE ITEMS COMPLETED UNDER VERBAL AUTHORIZATION
JULY 2000 THROUGH JUNE 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.

Task 130:

- Revision of 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.

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- 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 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

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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.

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.

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- 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.

- Began preparation of the Soil Stockpile Characterization and Remedial Action Alternatives Evaluation Report.

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TABLE 3
JULY 2001 BUDGET UPDATE ASSUMPTIONS
PHASES I/II RI/FS
TIME OIL NORTHWEST TERMINAL

General

1. Billing rates are those agreed upon between Time Oil and Landau Associates, as documented in our January 8, 2001 letter. All other underlying rates (equipment rental, etc.) are in year 2001 dollars.

2. A 10 percent contingency is provided to cover relatively small, incidental additional tasks 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 personnel required to conduct task), travel rates are reduced, per Time Oil's contract requirements, and are limited to two hours per round trip per person to the Northwest Terminal, Portland.

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

5. Time Oil will subcontract directly with the analytical laboratory, driller, and surveyor, except for the analytical laboratories that conduct dioxin/furan analyses, biological tests, and physical soil tests.

6. Costs do not include activities beyond December 31, 2001 for the Phase I/II RI/FS.

Project Management

1. Project Management costs include preparing monthly status reports to DEQ, routine invoicing and preparing detailed backup invoice documentation (as requested by Time Oil), preparing budget updates and contracts, planning and scheduling for various tasks, and meetings with Time Oil and DEQ.

2. Costs cover activities for an approximate 6 month schedule. If the actual schedule exceeds this amount of time or initiation of project work is significantly delayed, costs may increase.

Groundwater Sampling Events

1. Third and fourth quarter 2001 groundwater sampling events will consist of the same number of wells as conducted for the second quarter 2001 sampling event.

2. The analytical laboratory will be Analytical Resources, Inc. (Seattle, WA). Time Oil will contract directly with the laboratory.

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3. 10- to 12-hour work days for Landau personnel.

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

5. Level D health and safety protection is adequate during field activities.

6. Work can progress from task to task without delays due to Time Oil facility operations or third parties (i.e., no extra mobilization or demobilization costs).

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 Time Oil, 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.

2. A draft report will be submitted to client. After incorporation of client's comments, a final report will be submitted to DEQ. The report will not require revision after submittal to DEQ.

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JUL 12 2001

Landau Associates
Environmental and Geotechnical Services

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July 9, 2001

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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By: Rhonda Moon
For Rebekah Brooks
Project Manager

7/9/01 S:\WPROC\231\001\038\DEQ-apr01.ltr.doc
Enclosure

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

130 2nd AVENUE SOUTH • EDMONDS, WA 98020
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BZTO104(e)016234

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
June 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the May 2001 monthly report to DEQ.
- Conducted the second quarter 2001 groundwater sampling event, June 4-7.
- Submitted the *First Quarter 2001 Interim Action Status Report* to DEQ.
- Conducted client review of the *First Quarter 2001 Groundwater Report.*
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 3.3 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.
- Continued evaluation of expansion of interim action system operation in the lower zone by increasing the pumping rate at RW-2 and in the upper zone by pumping of HRW-1 and/or RW-1, possibly using an enhanced vacuum pump. Pumping tests in the upper zone are tentatively scheduled for late July. A letter providing a plan for the pumping tests will be provided in advance to DEQ.
- Received, processed, and began validation and evaluation of the analytical results from the soil stockpile characterization sampling, including evaluation of options for possible offsite disposal. Began preparation of the *Soil Stockpile Characterization – 2001 Report.*
- Received, processed, and began validation of the second quarter, 2001 groundwater results.
- 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. To evaluate further, the aviation gasoline pipeline was tested for 4 hours at 150 psi. The test confirmed that the pipeline is tight and the "product loss" that was reported to DEQ was attributable to inventory error. Evaluation of the inventory error is ongoing.
- Met with DEQ on June 12, 2001 on the *EPPI Results Report.*
- Received DEQ's comments on the *EPPI Results Report* approving application of the OAR-340-122-045 numerical soil cleanup levels for future action on the east property.
- Incorporated client comments on the *Phase III RI Work Plan* and submitted to DEQ, including a preliminary schedule for Phase III activities.
- Submitted the work plan for conducting supplemental soil sampling in the Phase II areas and stormwater sampling from the east-west trending storm drain at the terminal to DEQ.

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RESULTS COLLECTED

- Soil stockpile characterization results. Validated data tables, data validation report, and laboratory reports will be provided to DEQ with the *Soil Stockpile Characterization – 2001 Report.*

- Second quarter 2001 groundwater results. Validated data tables will be provided to DEQ with the next monthly report. The data validation report and laboratory reports will be provided to DEQ with the *Second Quarter 2001 Groundwater Report.*

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.

- Submit *First Quarter 2001 Groundwater 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.

- Conduct internal and client reviews of the *Soil Stockpile Characterization – 2001 Report* and submit to DEQ.

- Prepare the *Second Quarter 2001 Groundwater Report* and provide to client.

- Prepare *Stockpile Management Plan Annual Report* for submittal to DEQ.

- Submit a letter to DEQ providing a plan for conducting pumping tests in the upper zone at HRW-1 and RW-1, possibly using an enhanced vacuum pump. Conduct the tests.

- Prepare a response letter to DEQ comments on the *EPPI Results Report*, including a summary of the proposed additional soil sampling on the east property.

- Review and provide comments to DEQ on the public notice for the east property remedial action.

- Conduct additional soil sampling on the east property, currently planned for July 16-20.

- Receive comments from DEQ on the *Phase III RI Work Plan and Supplemental Sampling Plan Memorandum.*

- Remove a diesel underground storage tank at the Bell Terminal and collect associated soil samples, currently planned for late July – early August.

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REC'D AUG 0 6 2001

WASHINGTON
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FAX (206) 283-8036

86-102

August 2, 2001

Mr. Rod Struck
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

RE: VACUUM-ENHANCED PUMPING TEST WORK PLAN
TIME OIL NORTHWEST TERMINAL
PORTLAND, OREGON

Dear Mr. Struck,

This letter provides a brief work plan for the proposed groundwater interim action vacuum-enhanced pumping test at the Time Oil Northwest Terminal. The objective of the pumping test is to determine the maximum sustainable yield from upper zone recovery wells RW-1 and HRW-1 under the current upper zone groundwater conditions.

As reported in the Interim Action Status Report – First Quarter 2001 (Landau Associates, June 11, 2001), current water levels at the terminal are significantly lower than historical water levels due to below normal precipitation in the region over the past year. This depression in groundwater levels at the terminal has precluded the use of the horizontal recovery well, HRW-1, since its construction in 2000. The apparent hydraulic communication between the upper and lower zones in the area of the groundwater interim action suggests that upper zone groundwater near the vertical recovery well, RW-1, is likely captured by pumping from RW-2. However, to supplement capture obtained by RW-2, Time Oil Co. (Time Oil) has proposed conducting a pumping test to determine whether vacuum-enhanced upper zone pumping is feasible when groundwater levels in the upper zone are not high enough to allow normal groundwater recovery from HRW-1. The proposed pumping test is described below.

PUMPING TEST PLAN

Separate pumping tests will be performed on recovery wells RW-1 and HRW-1. Each pumping test will involve the connection of a 10-horsepower liquid ring pump to the well and extracting groundwater mixed with air. Groundwater flow toward the well will be enhanced by the application of a vacuum to the surrounding water-bearing formation. If the upper zone can sustain a measurable groundwater yield, groundwater recovery rates will be gradually increased until the maximum sustainable yield is identified. Extracted groundwater will be temporarily stored in a 5,000-gallon trailer-mounted water storage tank, sampled for pentachlorophenol (PCP) analysis, and transferred to onsite storage tank

number 16804 prior to discharge to the onsite water treatment system. The water levels in storage tank 16804 will be monitored daily to confirm that the tank's storage capacity is not exceeded prior to transfer of the recovered water. The pumping tests are expected to last two to three days each, or until the maximum sustainable yield has been identified.

As mentioned above, groundwater quality will be determined by sampling water from the 5,000-gallon trailer-mounted storage tank prior to transferal to storage tank number 16804. PCP in groundwater will be analyzed using EPA method 8270 – selected ion monitoring (SIM). PCP concentrations are expected to be on the order of 2,000 µg/L based on analytical results from the second quarter 2001 groundwater sampling event. Off-gas flow rates will be monitored for each groundwater extraction rate and one off-gas sample will be collected at the maximum sustainable groundwater extraction rate for each well (RW-1 and HRW-1). Each off-gas sample will be collected from the separator chamber on the liquid ring pump into a Summa canister and analyzed for volatile organic compounds using EPA method TO-14.

The objective of the vacuum-enhanced pumping test is to determine sustainable yield rather than a specific capture zone; therefore, groundwater elevations will not be monitored during the pumping test. The test will be considered successful if a sustainable yield can be identified for one or both of the upper zone recovery wells identified above. If a sustainable yield from either well is identified using this method, it is anticipated that the procedures described in the Startup Plan, Groundwater Interim Action (Landau Associates, July 14, 2000) will be followed to implement the interim action in the upper zone.

We anticipate that the vacuum-enhanced pumping test will be completed within one to two weeks of receiving approval from DEQ. Results of the pumping test and recommendations for implementation of the groundwater interim action in the upper zone (if the pumping test is successful) will be reported to DEQ following completion of the pumping test and receipt and review of analytical data from the groundwater quality samples.

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* * * * * * *

Please call me at (206) 286-6443 or Chip Halbert at Landau Associates if you have any questions regarding this vacuum-enhanced pumping test work plan.

Sincerely,

Kevin M. Murphy
Remediation Program Manager

cc: Tom Roick, Oregon Dept. of Environmental Quality
Don Butler, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tischuk, Beazer East, Inc.
Rebekah Brooks, Landau Associates, Inc.

BZTO104(e)016239

TABLE 1
SUMMARY OF PUMPING TEST SAMPLING
GROUNDWATER INTERIM ACTION
TIME OIL NORTHWEST TERMINAL

Sample Type	Quantity	Sample Location	Analysis
Groundwater	1	5,000-gallon storage tank	PCP (8270-SIM)
Off-Gas	2	Liquid ring pump separator chamber	VOCs (TO-14)

BZTO104(e)016240

Landau Associates
Environmental and Geotechnical Services

REC'D AUG 1 3 2001

August 9, 2001

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 2001 monthly report for Time Oil Northwest Terminal RI/FS. Also attached are the analytical results for the second quarter 2001 groundwater sampling event.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

8/9/01 S:\WPROC\231\001\135\DEQ-June01.ltr.doc
Enclosures

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

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BZTO104(e)016241

MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
July 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the June 2001 monthly report to DEQ.
- Submitted the *First Quarter 2001 Groundwater Report* to DEQ.
- Prepared the *Second Quarter 2001 Groundwater Report.*
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately 3.7 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.
- Prepared and conducted client review of a work plan for conducting a vacuum-enhanced pumping test in upper zone wells RW-1 and HRW-1.
- Completed preparation of the *Soil Stockpile Characterization – 2001 Report,* including evaluation of options for possible offsite disposal.
- Received comments from DEQ on the *Groundwater Interim Action Status Report – 1st quarter, 2001, Supplemental Sampling and Analysis Plan, Phase II RI,* and the *Phase III RI Work Plan.*
- Submitted the *2001 Annual Report for Soil Stockpile Management* to DEQ.
- Prepared a plan for additional soil sampling on the east property in advance of the remedial action, in response to DEQ's comments on the *EPPI Results Report.*
- Participated in a conference call with DEQ to discuss their comments on the plan for additional soil sampling on the east property.
- Conducted the first round of additional soil sampling on the east property to define the extent of the remedial action areas, evaluated preliminary results, and made plans for conducting a second round of soil samples in areas where the numerical soil cleanup levels were exceeded.
- Received DEQ's comments on the *Phase III RI Work Plan*; began preparation of response to comments.
- Began preparation and scheduling of field work for the Phase II supplemental sampling and the Phase III preliminary evaluation.
- Completed cleaning and closure activities at the Bell Terminal.

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RESULTS COLLECTED

- Validated data tables for the second quarter 2001 groundwater results are attached. The data validation report and laboratory reports will be provided to DEQ with the *Second Quarter 2001 Groundwater Report*.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- No problems were encountered.

WORK TO BE PERFORMED NEXT MONTH

- Prepare and submit monthly report to DEQ.
- Submit *First Quarter 2001 Groundwater 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.
- Conduct reviews of the *Soil Stockpile Characterization – 2001 Report* and submit to DEQ.
- Conduct internal review of the *Second Quarter 2001 Groundwater Report* and provide to Time Oil.
- Receive approval from DEQ on the *Vacuum-Enhanced Pumping Test Work Plan*; conduct the tests at wells HRW-1 and RW-1, currently scheduled for August 14-17, 2001.
- Conduct the third quarter 2001 groundwater sampling event, currently scheduled for August 13-17, 2001.
- Conduct statistical evaluations of the first round of additional soil samples on the east property, determine locations for the second round of soil samples, conduct the sampling, and evaluate the data.
- Begin preparation of the *Remedial Action Plan* for the east property.
- Complete preparation of a response to DEQ's comments on the *Phase III RI Work Plan*, conduct client review, and submit to DEQ.
- Begin conducting field work for the Phase II supplemental sampling and the Phase III preliminary evaluation, tentatively scheduled for August 20 through September 7, 2001.
- Remove underground diesel storage tank at the Bell Terminal and collect associated soil samples.
- Conduct cleaning and closure activities for the main terminal, expected to be complete in September, 2001.

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040								
Pentachlorophenol	0.25 U	0.25 U	0.36	NA	0.25 U	NA	0.25 U	0.25 U
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Bis-(2-Chloroethyl) Ether	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
2-Chlorophenol	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Methylphenol	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Methylphenol	130 J	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.7	1.0 U
N-Nitroso-Di-N-Propylamine	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Hexachloroethane	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Nitrobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Isophorone	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Nitrophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	150 UJ	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.1	3.0 U
Benzoic Acid	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy) Methane	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dichlorophenol	150 UJ	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.0 U	3.0 U
1,2,4-Trichlorobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	50 UJ	1.0 U	1.3	NA	1.0 U	21	19	2.0
4-Chloroaniline	150 UJ	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.0 U	3.0 U
Hexachlorobutadiene	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
4-Chloro-3-methylphenol	100 UJ	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
2-Methylnaphthalene	50 UJ	1.0 U	1.5	NA	1.0 U	1.0 U	9.5	1.0 U
Hexachlorocyclopentadiene	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2,4,6-Trichlorophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2,4,5-Trichlorophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Nitroaniline	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Dimethylphthalate	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Acenaphthylene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
3-Nitroaniline	300 UJ	6.0 U	6.0 U	NA	6.0 U	6.0 U	6.0 U	6.0 U
Acenaphthene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U
4-Nitrophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
CHLORINATED PHENOLS (µg/L)					
EPA Method SW8040					
Pentachlorophenol	0.25 U	NA	4.4	NA	NA
SEMIVOLATILES (µg/L)					
EPA Method SW8270					
Phenol	2.0 U	2.6	NA	12	12
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	NA	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Methylphenol	1.0 U	2.3	NA	1.7	1.8
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	NA	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	NA	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	NA	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	NA	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	NA	3.0 U	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Naphthalene	22	3.1	NA	9.3	9.8
4-Chloroaniline	3.0 U	3.0 U	NA	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	NA	2.0 U	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	NA	2.0 U	2.0 U
2-Methylnaphthalene	14	2.0	NA	3.7	4.0
Hexachlorocyclopentadiene	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U	NA	13	13
2-Chloronaphthalene	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	NA	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	NA	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	NA	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	NA	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	NA	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	NA	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01
Dibenzofuran	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dinitrotoluene	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Diethylphthalate	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorophenyl-phenylether	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Fluorene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Nitroaniline	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	500 UJ	10 U	10 U	NA	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobenzene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	250 UJ	5.0 U	5.0 U	NA	5.0 U	1300	5.0 U	5.0 U
Phenanthrene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Carbazole	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Anthracene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Fluoranthene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Pyrene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 UJ	1.0 U
Butylbenzylphthalate	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	250 UJ	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	50 UJ	1.0 U	25	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chrysene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Dibenz(a,h)anthracene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	50 UJ	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
Dibenzofuran	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	NA	5.0 U	5.0 U
2,4-Dinitrotoluene	5.0 U	5.0 U	NA	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	NA	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	NA	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	NA	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Pentachlorophenol	5.0 U	560	NA	1900	2000
Phenanthrene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	NA	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	NA	4.0	1.0 U
Fluoranthene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	NA	1.0 UJ	1.0 UJ
Butylbenzylphthalate	1.0 U	1.0 U	NA	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	NA	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	NA	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.5	1.0 U	NA	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(a)pyrene	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	NA	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	NA	1.0 U	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	40 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Acetone	1100	5.0 U	12 U	NA	5.0 U	33	5.0 U	5.0 U
Carbon Disulfide	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.9
1,2-Dichloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	100 U	5.0 U	5.0 U	NA	5.0 U	34 U	5.0 U	5.0 U
1,1,1-Trichloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Acetate	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	560	1.0 U	1.0 U	NA	1.0 U	1.0 U	80	1.0 U
trans-1,3-Dichloropropene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	3400	1.0 U	1.0 U	NA	1.0 U	1.1	41	1.0 U
Chlorobenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	220	1.0 U	1.2	NA	1.0 U	26	190	4.6
Styrene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	40 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	830	1.0 U	1.0 U	NA	1.0 U	36	600	5.4
o-Xylene	370	1.0 U	1.0 U	NA	1.0 U	87	240	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
VOLATILES (µg/L)					
EPA Method SW8260					
Chloromethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	NA	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	NA	2.0 U	2.0 U
Acetone	5.0 U	17	NA	13	13
Carbon Disulfide	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	NA	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	NA	5.7	6.4
1,1,1-Trichloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	NA	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	NA	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Benzene	9.0	1.7	NA	3.4	3.4
trans-1,3-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	NA	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	NA	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Toluene	1.0 U	5.3	NA	14.0	15
Chlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Ethylbenzene	61	33	NA	71	72
Styrene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	NA	2.0 U	2.0 U
m,p-Xylene	17	57	NA	140	140
o-Xylene	1.0 U	50	NA	100	100

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01
1,2-Dichlorobenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Acrolein	1000 U	50 U	50 U	NA	50 U	50 U	50 U	50 U
Methyl Iodide	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromoethane	40 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloropropene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	60 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	37	1.0 U	1.0 U	NA	1.0 U	94	130	1.0 U
1,2,4-Trimethylbenzene	160	1.0 U	1.0 U	NA	1.0 U	490	350	1.0 U
Hexachlorobutadiene	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	20 U	1.0 U	4.7	NA	1.0 U	32	62	1.3
n-Propylbenzene	33	1.0 U	8.3	NA	1.0 U	67	79	1.3
Bromobenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U
sec-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	30	1.0 U	1.0 U
4-Isopropyltoluene	20 U	1.0 U	1.0 U	NA	1.0 U	25	9.9	1.0 U
n-Butylbenzene	20 U	1.0 U	1.0 U	NA	1.0 U	21	10 U	1.0 U
1,2,4-Trichlorobenzene	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	100 U	5.0 U	5.0 U	NA	5.0 U	60	48	5.0 U
1,2,3-Trichlorobenzene	100 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Acrolein	50 U	50 U	NA	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	NA	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,1-Dichloropropene	1.0 U	1.0 U	NA	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	NA	5.0 U	5.0 U
1,2,3-Trichloropropane	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	NA	5.0 U	5.0 U
1,3,5-Trimethylbenzene	15	32	NA	37	38
1,2,4-Trimethylbenzene	23	120	NA	160	160
Hexachlorobutadiene	5.0 U	5.0 U	NA	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	NA	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	NA	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	NA	1.0 U	1.0 U
Isopropylbenzene	130	12	NA	28	28
n-Propylbenzene	110	21	NA	34	36
Bromobenzene	1.0 U	1.0 U	NA	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	NA	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	NA	1.0 U	1.0 U
tert-Butylbenzene	6.0	1.3 M	NA	1.0 U	1.0 U
sec-Butylbenzene	16	7.3	NA	7.7	7.8
4-Isopropyltoluene	1.0 U	6.6	NA	4.1	4.2
n-Butylbenzene	8.0 U	7.6 U	NA	6.0 U	6.2 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	NA	5.0 U	5.0 U
Naphthalene	35	11	NA	25	28
1,2,3-Trichlorobenzene	5.0 U	5.0 U	NA	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S
Laboratory Identification:	DE68L	DE68G	DE68I	DE68D	DE68F	DE68C	DE87J	DE68A
Date Collected:	6/5/01	6/4/01	6/5/01	6/4/01	6/4/01	6/5/01	6/6/01	6/4/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	47	NA	NA	NA	NA	9.4	7.9	20
TPH-Motor Oil Range	5.0 U	NA	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	25	NA	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.010	0.016	0.011	0.001 U	0.009	0.018	0.008	0.016
Chromium (6010)	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.05 U	0.005 U	0.005 U
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
Lead (7421)	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001
Nickel (6010)	0.12	0.01 U	0.01 U	0.02	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.054	0.006 U	0.006 U	0.006	0.006 U	0.006 U	0.006 U	0.009
CONVENTIONALS								
Calcium (mg/L)	88.1	43.4	20.5	65.3	28.4	42.2	149	37.4
Magnesium (mg/L)	40.8	14.9	7.38	16.0	10.6	10.1	48.2	13.4
Potassium (mg/L)	5.1	2.2	2.4	6.9	2.4	3.4	5.9	3.1
Sodium (mg/L)	13.3	7.64	6.15	11.2	7.87	5.23	9.35	15.6
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	1400	240	160	NA	180	300	720 J	250
Chloride (mg/L) (EPA 325.2)	2.8	2.4	2.6	NA	3.1	38	5.3	3.3
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 354.1)	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS								
pH (avg)	4.70	6.65	6.64	6.22	6.75	6.33	6.80	6.70
Temperature (° C) (avg)	14.0	14.4	13.6	13.6	14.6	12.7	14.2	14.1
Conductivity (mS/cm) (avg)	1883	344	226	531	250	427	1400	419
Dissolved oxygen (mg/L) (avg)	1.42	1.29	1.51	1.80	1.99	1.32	0.00	1.37
Turbidity (NTU)	42	7	6	8	4	93	0	8

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS				
Sample Identification:	LW8S	LW11S	LW13S	RW1	Dup of RW1 W
Laboratory Identification:	DE68N	DE68M	DE87F	DE87Q	DE87M
Date Collected:	6/4/01	6/4/01	6/6/01	6/6/01	6/6/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)					
Method OR-DEQ					
TPH-Diesel Range	4.4	1.7	NA	4.9	4.5
TPH-Motor Oil Range	0.50 U	0.50 U	NA	0.50 U	0.50 U
TPH-Gasoline Range	4.7	2.9	NA	5.4	5.3
PRIORITY POLLUTANT					
METALS (mg/L)					
Arsenic (7060)	0.024	0.007	NA	0.007	0.007
Chromium (6010)	0.005 U	0.005 U	NA	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	NA	0.002 U	0.002 U
Lead (7421)	0.001 U	0.001 U	NA	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01 U	NA	0.01 U	0.01 U
Zinc (6010)	0.007	0.006 U	NA	0.006 U	0.006 U
CONVENTIONALS					
Calcium (mg/L)	31.1	28.6	NA	36.1	37.3
Magnesium (mg/L)	8.18	9.34	NA	11.9	12.2
Potassium (mg/L)	2.8	2.7	NA	2.8	3.4
Sodium (mg/L)	6.47	6.10	NA	6.01	5.59
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	250	190	NA	220 J	220 J
Chloride (mg/L) (EPA 325.2)	2.8	3.2	NA	4.7	5.1
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 354.1)	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA
FIELD PARAMETERS					
pH (avg)	6.49	6.50	6.54	6.62	6.61
Temperature (° C) (avg)	14.4	14.1	12.8	14.4	14.4
Conductivity (mS/cm) (avg)	402	270	336	377	377
Dissolved oxygen (mg/L) (avg)	1.58	0.96	2.62	0.97	0.94
Turbidity (NTU)	25	65	0	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8040									
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	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	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	3.6	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	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	DE87H	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D
Date Collected:	6/5/01	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8040								
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.25 U	1.7	0.25 U	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	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	10 U	10 U	10 U	10 U	10 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	10 U	10 U	10 U	10 U	10 U	NA	NA	NA
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	NA

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 X
Laboratory Identification:	DE87P	DE87O
Date Collected:	6/6/01	6/6/01
CHLORINATED PHENOLS (µg/L)		
EPA Method SW8040		
Pentachlorophenol	0.25 U	0.68
SEMIVOLATILES (µg/L)		
EPA Method SW8270		
Phenol	2.0 U	2.0 U
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	1.0 U	1.0 U
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	10 U	10 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	1.0 U	1.0 U
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	2.0	2.0
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	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01
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
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	1.6	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	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	5.0 U	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 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 UJ	1.0 UJ
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	1.0 U	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 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	1.0 U	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(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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	DE87H	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D
Date Collected:	6/5/01	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01
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
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	10 U	10 U	10 U	10 U	10 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 UJ	1.0 UJ	1.0 U	1.0 UJ	1.0 UJ	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	1.0 U	1.0 U	1.0 U	1.0	1.0 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	1.0 U	1.0 U	1.0 U	1.0 U	1.0 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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS		
Sample Identification:	RW2	Dup of RW2	
Laboratory Identification:	DE87P	X DE87O	
Date Collected:	6/6/01	6/6/01	
Dibenzofuran	1.0 U	1.0 U	
2,6-Dinitrotoluene	5.0 U	5.0 U	
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	10 U	10 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	5.0 U	5.0 U	
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 UJ	1.0 UJ	
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	1.0 U	1.0 U	
Chrysene	1.0 U	1.0 U	
Di-n-Octyl phthalate	1.0 U	1.0 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	

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01
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	8.7	5.0 U	5.0 U	5.0 U	23	22	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	6.2	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	3.1	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	1.6	2.9	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	1.9	4.1	1.0 U	1.0 U	1.0 U	1.4	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

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	DE87H	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D
Date Collected:	6/5/01	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01
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	6.1	5.0 U	35	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	5.0 U	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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 X
Laboratory Identification:	DE87P	DE87O
Date Collected:	6/6/01	6/6/01
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	1.0 U	1.0 U
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	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U
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	1.0 U	1.0 U
o-Xylene	1.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01
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
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
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	2.0 U	2.0 U
Acrylonitrile	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-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
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-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
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	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
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	1.4	1.1	1.0 U	1.0 U	1.0 U	13	1.0 U
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	84	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	37	26	150	1.0 U	1.0 U	31	10
n-Propylbenzene	1.0 U	1.0 U	22	9.1	140	1.0 U	1.0 U	39	1.1
Bromobenzene	1.0 U	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-Chlorotoluene	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	4.5	1.0 U	1.0 U	1.7	3.4
sec-Butylbenzene	1.0 U	1.0 U	5.7	4.7	20	1.0 U	1.0 U	7.4	4.7
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.3	1.0 U
n-Butylbenzene	1.0 U	1.0 U	2.2	1.4 U	14 U	1.0 U	1.0 U	6.2	1.3 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
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
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	DE87H	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D
Date Collected:	6/5/01	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01
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
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	5.0 U	5.0 U	5.0 U	5.0 U	5.0 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	3.4	1.9	1.0 U	NA	NA	NA
1,2,4-Trimethylbenzene	1.0 U	1.0 U	5.7	13	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	1.6	1.0 U	NA	NA	NA
n-Propylbenzene	1.0 U	1.0 U	1.2	2.0	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	1.2	1.3	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	1.5	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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 X
Laboratory Identification:	DE87P	DE87O
Date Collected:	6/6/01	6/6/01
1,2-Dichlorobenzene	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U
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	5.0 U	5.0 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	1.0 U	1.0 U
1,2,4-Trimethylbenzene	3.6	3.8
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	11	11
n-Propylbenzene	12	12
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	1.0 U	1.0 U
sec-Butylbenzene	1.6	1.7
4-Isopropyltoluene	1.0 U	1.0 U
n-Butylbenzene	1.2 U	1.2 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0 U	5.0 U

TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DE68K	DE68J	DE87A	DE87B	DE87L	DE68E	DE68H	DE87K	DE87G
Date Collected:	6/5/01	6/5/01	6/5/01	6/5/01	6/6/01	6/4/01	6/5/01	6/6/01	6/5/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	NA	NA	NA	NA	2.3	NA	NA	3.5	1.4
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)	0.005	0.010	NA	NA	0.036	0.005	0.016	0.028	0.017
Chromium (6010)	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	NA	NA	0.003	0.002 U	0.002 U	0.003	0.003
Lead (7421)	0.001 U	0.001 U	NA	NA	0.001	0.001 U	0.001 U	0.001 U	0.002
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)	0.009	0.006 U	NA	NA	0.009	0.006 U	0.006 U	0.011	0.008
CONVENTIONALS									
Calcium (mg/L)	48.0	57.1	NA	NA	60.3	53.8	62.1	74.5	44.2
Magnesium (mg/L)	23.8	33.2	NA	NA	20.2	33.0	28.4	31.0	18.4
Potassium (mg/L)	3.4	2.1	NA	NA	3.4	1.3	3.5	1.4	3.2
Sodium (mg/L)	12.1	15.2	NA	NA	12.1	12.9	13.4	14.5	11.5
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	260	370	NA	NA	340 J	360	370	460 J	240 J
Chloride (mg/L) (EPA 325.2)	3.2	4.2	NA	NA	8.2	3.2	6.2	18	2.2
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS									
pH (avg)	6.80	6.72	6.43	6.88	6.83	6.96	6.56	6.91	6.58
Temperature (° C) (avg)	14.0	13.7	14.5	14.5	14.4	15.6	13.6	14.7	14.1
Conductivity (mS/cm) (avg)	611	619	510	694	651	484	655	778	428
Dissolved oxygen (mg/L) (avg)	1.59	1.12	2.40	1.49	1.84	1.99	0.92	0.48	2.06
Turbidity (NTU)	10	5	39	191	0	26	33	24	23

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	DE87H	DE87I	DE68B	DE87M	DE87R	DE87E	DE87C	DE87D
Date Collected:	6/5/01	6/6/01	6/5/01	6/6/01	6/6/01	6/6/01	6/5/01	6/5/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0.25	0.25 U	1.0	0.77	NA	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)	0.033	0.023	0.007	0.020	0.022	NA	NA	NA
Chromium (6010)	0.005 U	0.008	0.005 U	0.012	0.005 U	NA	NA	NA
Copper (6010)	0.009	0.009	0.002	0.015	0.002 U	NA	NA	NA
Lead (7421)	0.001 U	0.003	0.002	0.013	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)	0.012	0.018	0.018	0.029	0.006 U	NA	NA	NA
CONVENTIONALS								
Calcium (mg/L)	37.0	20.4	61.5	60.5	38.3	NA	NA	NA
Magnesium (mg/L)	13.2	10.3	31.0	29.5	17.3	NA	NA	NA
Potassium (mg/L)	1.9	1.2	1.9	1.8	2.4	NA	NA	NA
Sodium (mg/L)	5.47	9.80	16.6	12.3	17.6	NA	NA	NA
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	210 J	150 J	370	340 J	280 J	NA	NA	NA
Chloride (mg/L) (EPA 325.2)	2.1	1.9	8.8	3.7	3.2	NA	NA	NA
N-Nitrate (mg-N/L) (Calculated)	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrite (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS								
pH (avg)	6.81	6.88	6.75	7.15	6.89	6.65	6.53	6.38
Temperature (° C) (avg)	14.3	13.7	13.3	14.0	13.9	13.5	14.0	14.7
Conductivity (mS/cm) (avg)	330	228	493	481	473	371	488	486
Dissolved oxygen (mg/L) (avg)	1.67	2.70	1.45	2.10	0.50	1.17	2.27	0.69
Turbidity (NTU)	41	15	30	198	0	999	27	53

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 X
Laboratory Identification:	DE87P	DE87O
Date Collected:	6/6/01	6/6/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)		
Method OR-DEQ		
TPH-Diesel Range	0.86	0.88
TPH-Motor Oil Range	0.50 U	0.50 U
TPH-Gasoline Range	0.60	0.66
PRIORITY POLLUTANT		
METALS (mg/L)		
Arsenic (7060)	0.017	0.016
Chromium (6010)	0.005 U	0.005 U
Copper (6010)	0.003	0.002 U
Lead (7421)	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01 U
Zinc (6010)	0.058 J	0.189 J
CONVENTIONALS		
Calcium (mg/L)	36.5	40.7
Magnesium (mg/L)	17.2	19.1
Potassium (mg/L)	3.1	3.0
Sodium (mg/L)	12.6	13.6
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA
Total Dissolved Solids (mg/L) (EPA 160.1)	300 J	290 J
Chloride (mg/L) (EPA 325.2)	7.7	7.4
N-Nitrate (mg-N/L) (Calculated)	NA	NA
N-Nitrite (mg-N/L) (EPA 353.2)	NA	NA
Nitrate + Nitrite (NO2+NO3) (mg-N/L) (EPA 353.2)	NA	NA
Sulfate (mg/L) (EPA 375.2)	NA	NA
FIELD PARAMETERS		
pH (avg)	6.66	6.65
Temperature (° C) (avg)	13.6	13.6
Conductivity (mS/cm) (avg)	573	573
Dissolved oxygen (mg/L) (avg)	0.83	0.82
Turbidity (NTU)	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-5
KEY TO FOOTNOTES AND ANALYTICAL DATA QUALIFIERS FOR TABLES A-3 AND A-4

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.

Landau Associates
Environmental and Geotechnical Services

REC'D JAN 2 2 2002

TRANSMITTAL

To: SEE DISTRIBUTION Date: January 18, 2002

Attn: Project No.: 231001.117

RE: Time Oil Northwest Terminal

Copies	Description
1	Memorandum RE: Groundwater Interim Action Status Report - Third Quarter 2001, Time Oil Northwest Terminal, Portland, Oregon (1/18/02)

Message:

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

LANDAU ASSOCIATES, INC.

By:

Terry A. McDonald for Rebekah Brooks
Senior Hydrogeologist

RB/tam
1/18/02 S:\WPROC\231\TRANSMIT.FAX\Qrly DIASRpt_trn.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

TECHNICAL MEMORANDUM

TO: Kevin Murphy, Time Oil Co.

FROM: Chip Halbert and Rebekah Brooks

DATE January 18, 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).

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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	11/09/2000	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	5.89	
						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*	*905,891*			

(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.

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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)].

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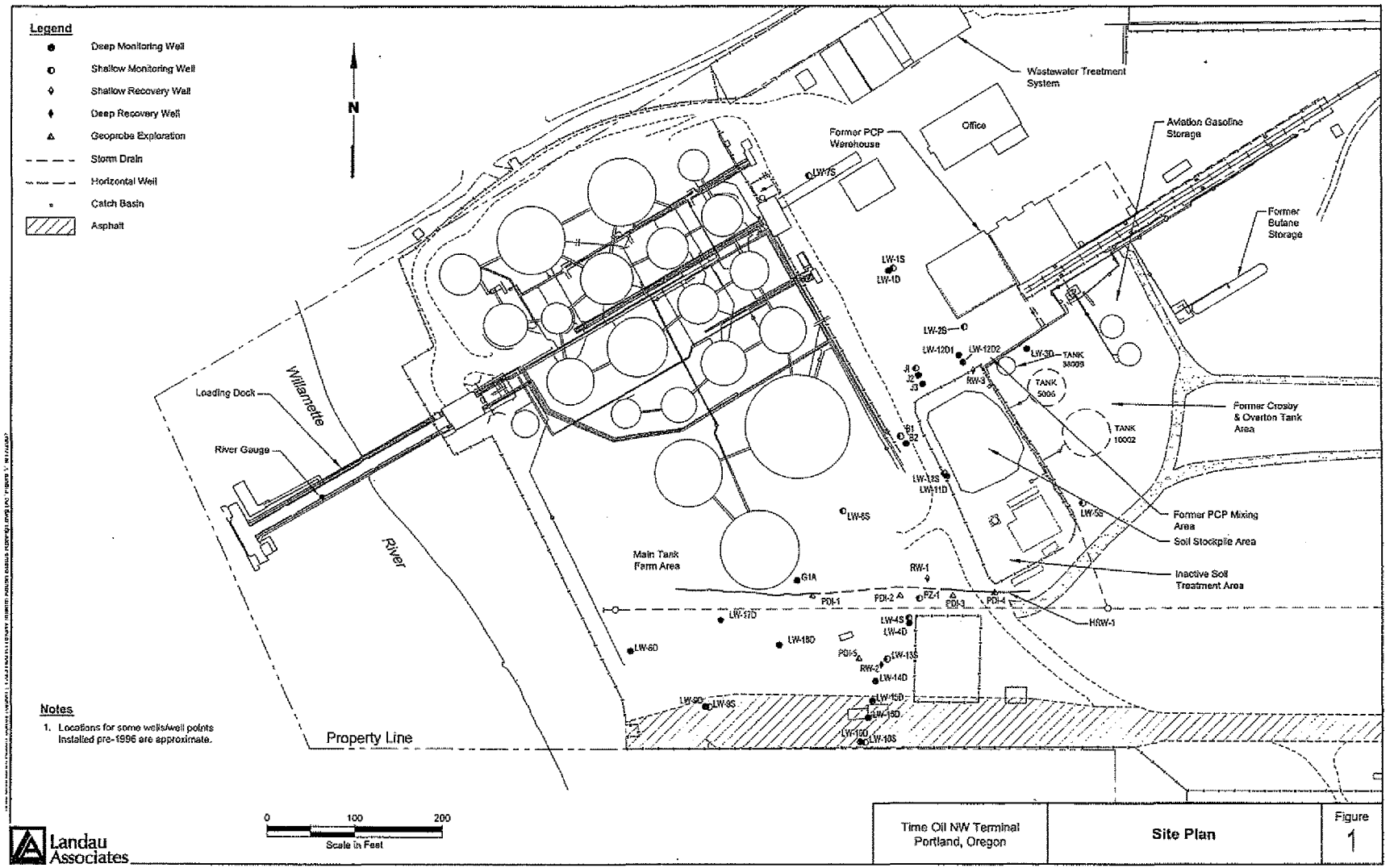

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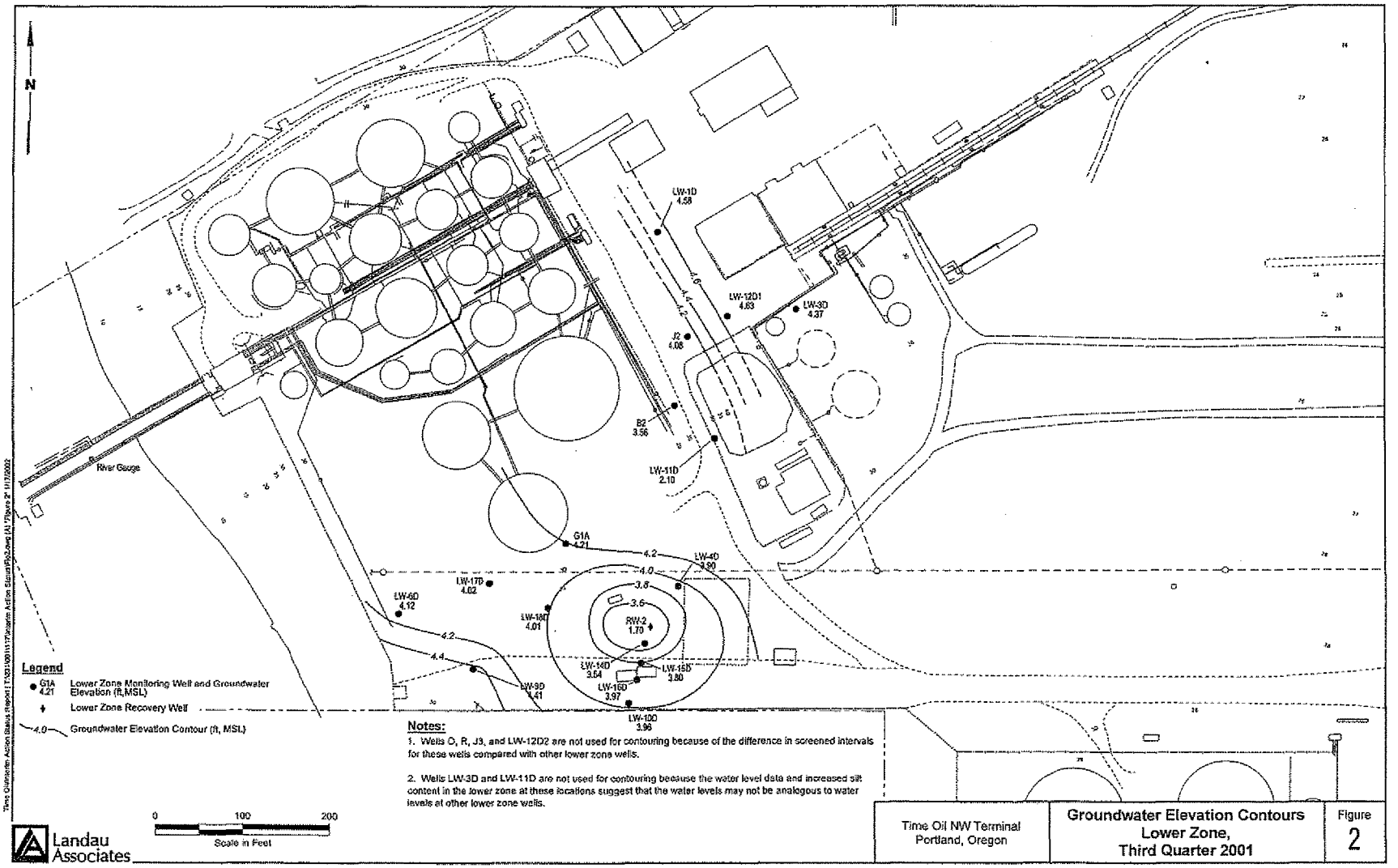

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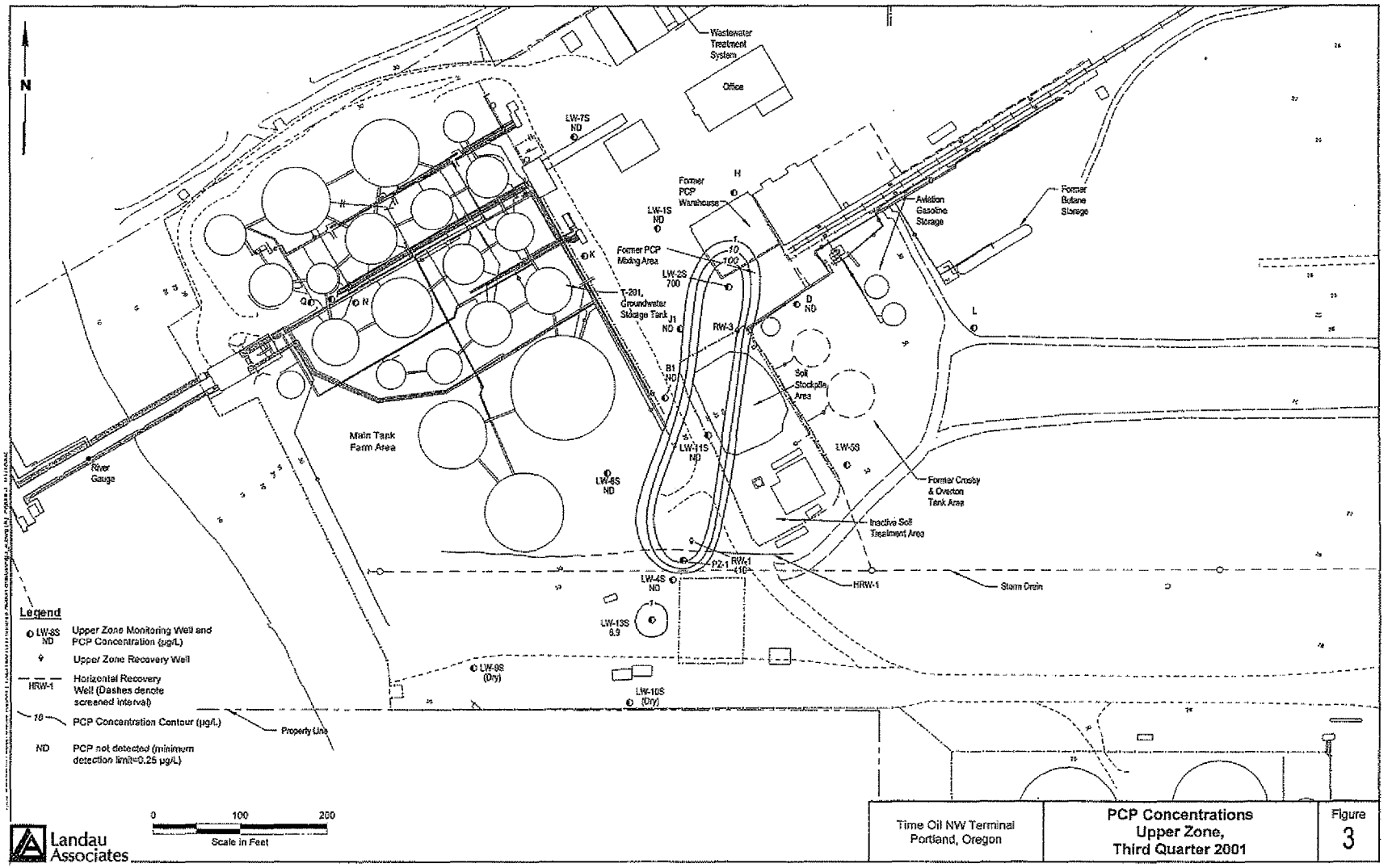

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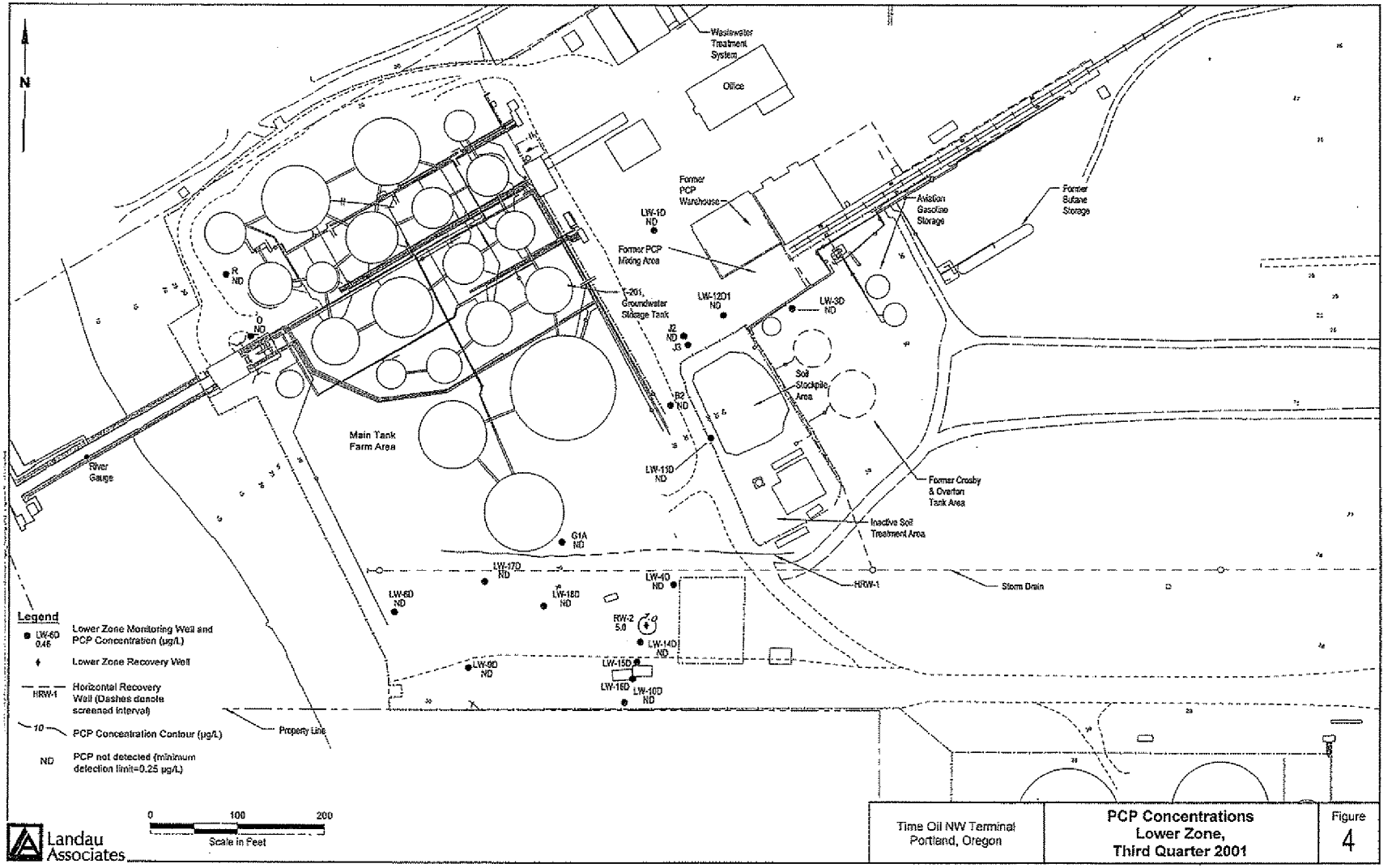

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B.C. agrees to take tonnes of dioxin-laced U.S. waste

By MARTIN MITTELSTAEDT
ENVIRONMENT REPORTERThursday, January 24, 2002 – Page A1

Environment Canada and the B.C. government have approved a controversial shipment of dioxin-laced soil from the United States that a U.S. industry group says is being sent to Canada to avoid tougher disposal rules south of the border.

A spokeswoman for Environment Canada said the agency will allow the import -- 8,600 tonnes of soil containing dioxin and pentachlorophenol, a carcinogen used as a wood preserver -- from a waste site in Portland, Ore. The approval was granted by both governments in December, but the shipment has not been made.

"In this case, both the province and Environment Canada carefully reviewed the notice, and the province consented" to the import, said Suzanne Leppinen, a federal environment official who reviews toxic-waste imports.

Previously, almost all hazardous waste from the United States went to Ontario and Quebec.

But those provinces recently announced tighter disposal controls by matching U.S. standards. B.C. did not, so shipping hazardous material there could become a trend.

The main contaminant is pentachlorophenol, to be destroyed by treatment in British Columbia.

But the dioxin, one of the most feared industrial chemicals, will not be treated because its concentration is viewed as safe under B.C. disposal standards, although the dirt would be considered so contaminated it would require remediation under tougher U.S. hazardous-waste rules.

Rob Dalrymple, an official in the special-wastes unit at the B.C. Ministry of Water, Land and Air Protection, said the government is aware that the dioxin concentration exceeds U.S. landfill standards, but it approved the shipment because it meets British Columbia's rules.
The Environmental Technology Council, a Washington trade group for hazardous-waste-treatment companies, last year tried to persuade the U.S. Environmental Protection Agency to block the shipment. It said U.S. companies with toxic waste were trying to move dangerous material to provinces with lax disposal standards, such as British Columbia and Alberta, rather than pay for costly cleanups in the United States.

The council said the dioxin-laced soil has levels of the chemical four to five times higher than permitted in the United States for landfills without treatment.

But Mr. Dalrymple said the dioxin is less than one-20th the level that British Columbia considers dangerous and therefore doesn't need to be treated. "I'm not going to comment on others' comments on standards and so forth. We have standards, and this particular import and the treatment it will be getting here meets our requirements."

Ms. Leppinen at Environment Canada also defended importing the waste, saying dioxin levels are "quite low" and that B.C. disposal standards are "quite stringent."

The waste is being sought by Hazco Environmental Services Ltd., a Calgary company that wants to treat the material with pentachlorophenol-eating microbes. The process doesn't destroy dioxin,

however.

A company official said that from a Canadian regulatory standpoint, the soil is laced only with pentachlorophenol. "But from an American point of view, they would say . . . [dioxin] is there," said Gregory Campbell, a Hazco vice-president.

After the pentachlorophenol is removed, the soil will be used as cover material at a landfill site near Richmond, B.C., he said.

TO

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Project No.: 231001.131

RE: Time Oil Northwest Terminal

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Please find enclosed 1 copy of the above-referenced document for your review and comment. Please call me if you have any questions.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

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

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Third Quarter 2001 Groundwater Report
Time Oil Northwest Terminal
Portland, Oregon

January 31, 2002

Prepared for

Time Oil Co.
2737 West Commodore Way
Seattle, WA 98100-1233

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1.0 INTRODUCTION

This report provides the results of the third quarter 2001 groundwater sampling event, conducted in August 2001 as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report. The third quarter 2001 event was conducted during implementation of a groundwater interim action in the lower water-bearing zone at recovery well RW-2. The status and performance summary of the interim action during this period is summarized in the *Groundwater Interim Action Status Report, Third Quarter 2001* (Landau Associates 2001a).

The Time Oil Northwest Terminal is an active bulk petroleum storage and transfer facility currently owned and operated by Time Oil Co. (Time Oil). At the time of the third quarter 2001 event, Time Oil was beginning procedures for closure of the terminal in early September 2001. The facility is located in the industrialized Rivergate area of north Portland, Oregon (Figure 1). Quarterly groundwater sampling has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of the groundwater monitoring locations at the terminal are shown on Figure 2.

Modifications to the groundwater quality sampling and analysis requirements (Landau Associates 1998a, 1999a, 2000a,b, 2001b,c) were approved by the Oregon Department of Environmental Quality (DEQ) in letters dated May 15, 1998, May 18, 2000, and February 21, 2001 (DEQ 1998, 2000a, 2001a); by verbal authorization to Rebekah Brooks of Landau Associates on February 12, 1999 (Landau Associates 1999b); and by e-mail on August 15, 2000 and May 30, 2001 (DEQ 2000b, 2001b). Previous modifications were documented in the first quarter 2001 groundwater report (Landau Associates 2001d) and second quarter 2001 groundwater report (Landau Associates 2001e), and will be reiterated in the first quarter report each year hereafter, and at the time of the modification.

Groundwater level measurements conducted at the terminal for the third quarter 2001 event and for the previous quarterly events since March 1997 are provided in Appendix A, Table A-1. Analyses conducted during this sampling event for each sampling location are summarized in Table A-2. Groundwater quality data for the third quarter 2001 event are provided in Tables A-3 and A-4 for the shallow and deep wells, respectively. The data validation report for this data is provided in Appendix B. Laboratory data packages are provided in Appendix C.

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).

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These tables will continue to be updated for each quarterly event and provided either electronically or on computer diskette.

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2.0 THIRD QUARTER 2001 GROUNDWATER SAMPLING EVENT

The third quarter 2001 groundwater sampling event was conducted from August 13 through August 16, 2001. 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 third quarter event included sampling of all monitoring wells routinely included in the quarterly sampling program, as well as the monitoring wells that are sampled as part of the groundwater interim action (LW-13S, LW-14D, LW-17D, and LW-18D). 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.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the third quarter 2001 event on August 16, 2001. The presence of product was also checked in each well. 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 A-1. Historical (pre-Phase II RI) groundwater level measurements conducted from 1993 through 1996 were provided in the Phase II RI report (Landau Associates 2000d).

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). The groundwater elevations for the upper zone were then contoured using SURFER for Windows. Groundwater elevation contours interpreted using SURFER kriging techniques are considered approximate, and were modified by hand where the contours did not appear to represent hydrogeologic conditions based on the current conceptual model at the terminal. Groundwater elevations for the lower zone were contoured manually in conjunction with the evaluations conducted for determination of the capture zone for the groundwater interim action. Groundwater elevation contour maps for the upper and lower water-bearing 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 A-1.

Water level measurements for the third quarter 2001 event were obtained beginning at about 2.5 hours after a predicted mean river stage over about a 2-hr period, 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 1998b), aquifer test report (Landau Associates 1999c), and previous quarterly measurements.

2.1.2 PRODUCT MEASUREMENTS AND PRODUCT RECOVERY

During the third quarter 2001 event, a trace amount of product was noted in wells Q and N, and 0.28 ft of product was observed in well LW-11S. Product was first observed in well LW-11S during the fourth quarter 2000 event. As reported in the *Fourth Quarter 2000 Groundwater Report* (Landau Associates 2000c), a total of about 8.5 L (2.2 gallons) of product was removed from the well in November and December 2000. During the third quarter 2001 sampling event, 0.25 L of product was removed from the well during the 3-day sampling event. The presence of product in well LW-11S and wells located within the main tank farm area will continue to be monitored quarterly.

2.1.3 UPPER WATER-BEARING ZONE

Groundwater elevations measured in the shallow wells were used to estimate groundwater flow conditions in the upper water-bearing zone. Groundwater elevation contours for the upper zone are presented on Figure 3. During collection of water levels for the third quarter event, a pumping test was being performed at recovery well RW-1 using a vacuum-enhanced pump and, therefore, access for a groundwater measurement was not possible at this well. The results of this test are provided in the Vacuum Enhanced Pumping Test technical memorandum (Landau Associates 2001f).

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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, with a localized shift to the south in an area south of the former PCP mixing area. A change in the groundwater flow pattern in the upper zone also appears to occur on the east property, such that the groundwater flow direction in this area appears to be radial away from an area at the north property boundary near LW-103S. Groundwater flow patterns and direction in the upper zone do not appear to be impacted by the pumping test at RW-1 or the pumping in the lower zone at RW-2 as part of the groundwater interim action, and vary little between the quarterly events.

2.1.4 LOWER WATER-BEARING ZONE

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower water-bearing zone. Groundwater elevation contours for the lower zone are presented on Figure 4. The contours indicate that pumping of recovery well RW-2 for 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.

2.2 GROUNDWATER QUALITY

Groundwater quality samples were collected for the third quarter 2001 event on August 13 through 15, 2001. During this sampling event, thirteen upper zone wells, seventeen lower zone wells, and one deep sand unit well were sampled. Monitoring wells LW-9S and LW-10S were dry and not sampled as part of this event. In addition, well LW-11S was not sampled due to the product observed in this well (see Section 2.1.2). Except as shown in Table A-2, all groundwater samples were analyzed for the following 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 (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, diesel-range total petroleum hydrocarbon (TPH; NWTPH-D) was analyzed at twelve monitoring wells. In addition, TPH for gasoline and motor oil ranges (NWTPH-G and NWTPH-D extended) were analyzed in samples from wells B1, LW-8S, RW-1, and RW-2. Laboratory analyses were conducted by Analytical Resources, Inc.

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(ARI; Seattle, Washington). A summary of analyses conducted for each sampling location is provided in Table A-2.

Analytical results for the third quarter 2001 event are provided in Table A-3 for the upper zone wells and Table A-4 for the deep zone wells and deep sand unit well. 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. Data qualifier definitions are included in Table A-5.

2.2.1 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected in the shallow wells using a peristaltic pump attached to dedicated polyethylene tubing immediately following purging. The deep wells were sampled with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2). Well LW-12D2 was purged and sampled with a Grundfos® pump. The sample from RW-2 was collected using the in-line sampling port from the groundwater interim action system. Wells were purged using a centrifugal purge pump. Purging continued until at least three 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 during sampling for VOCs, a 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 2001g). A more detailed description of groundwater sampling procedures is provided in the Phase II RI report (Landau Associates 2000d).

2.2.2 UPPER WATER-BEARING ZONE

The groundwater quality results from the upper water-bearing zone indicate the following:

- Except for low level arsenic concentrations, analytical results for wells D and LW-1S were nondetect. Also, except for a low level detection of arsenic and n-propylbenzene, analytical results for well J1 were nondetect.

- PCP was detected at wells LW-2S and RW-1 using EPA Method 8270 with concentrations of 700 µg/L and 410 µg/L, respectively. Using EPA Method 8270 SIM (for those wells containing nondetect concentrations using Method 8270 only), PCP was also detected at LW-13S at a concentration of 6.9 µg/L.

- Naphthalene, a noncarcinogenic polycyclic aromatic hydrocarbon (PAH), was detected in samples from six wells (B1, LW-2S, LW-4S, LW-7S, LW-8S, and RW-1) at concentrations

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ranging from 1.8 to 19 µg/L, using Method 8270. Naphthalene was detected in four of these wells at concentrations ranging from 7.0 to 28 µg/L using Method 8260.

- All other semivolatile results were reported as nondetect with the following exceptions: phenol (detected at wells LW-4S and RW-1 at 3.3 and 32 µg/L, respectively); 4-methylphenol (detected at wells B1 and RW-1 with concentrations of 54 µg/L and 2.1µg/L, respectively); benzoic acid (detected in well LW-4S at 5.9 µg/L); 2-methylnaphthalene (detected at three wells at concentrations ranging from 2.6 to 12 µg/L); 2,4,5-trichlorophenol (6.9 µg/L at RW-1).

- Several volatile compounds were detected in the upper zone wells including:

  - Acetone (detected at three wells at concentrations ranging from 7.2M to 280 µg/L; see Table A-5 for definition of qualifiers)
  - 2-Butanone (detected at four wells at concentrations from 5.6 to 160 µg/L)
  - Benzene (detected at four wells with concentrations from 2.0 to 230 µg/L)
  - 1,1,2,2-Tetrachloroethane (1.0 µg/L at LW-2S)
  - Toluene (detected at three wells at concentrations ranging from 6.9 to 1,900 µg/L)
  - Chlorobenzene (10 µg/L at well LW-2S)
  - Ethylbenzene (detected at five wells at concentrations ranging from 11 to 150 µg/L)
  - m-, p-, and o-Xylene (detected at five wells at total xylene concentrations ranging from 10 to 780 µg/L)
  - 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected at six wells at individual concentrations ranging from 1.6 to 280 µg/L)
  - Isopropylbenzene and n-propylbenzene (detected at seven wells at individual concentrations ranging from 1.1 to 67 µg/L)
  - tert-Butylbenzene (4.7 µg/L at LW-8S)
  - sec-Butylbenzene (detected at four wells at concentrations ranging from 2.2 to 15 µg/L)
  - 4-Isopropyltoluene (detected at three wells at concentrations ranging from 3.8 µg/L to 13 µg/L)
  - n-Butylbenzene (detected at three wells at concentrations from 2.8M to 12M µg/L).

- TPH gasoline range was detected at each well where analyzed (B1, LW-8S, and RW-1) at concentrations ranging from 3.9 to 19 mg/L.

- TPH diesel-range concentrations were detected at all of the six upper zone wells where analyzed. Concentrations ranged from 0.26 to 8.7 mg/L.

- TPH motor oil range was reported at nondetect concentrations at the locations where analyzed (wells B1, LW-8S, and RW-1).

- At least one priority pollutant metal was detected in each upper zone well as follows:

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- Arsenic (detected at all wells where analyzed), at concentrations ranging from 0.001 to 0.028 mg/L)
- Copper (detected at well K at 0.002 mg/L and well LW-2S at 0.004 mg/L)
- Lead (detected at well LW-2S at 0.001 mg/L)
- Nickel (detected at well K at 0.03 mg/L)
- Zinc (detected at three wells at concentrations ranging from 0.007 to 0.012 mg/L).

In summary, the analytical results from the upper zone wells indicate that only three wells (LW-2S, LW-13S, and RW-1) contained concentrations of PCP during the third quarter 2001 event. The highest concentration was observed in well LW-2S (700 µg/L by Method 8270) located within the former PCP mixing area. The other two wells with PCP detections are located closer to the leading edge of the PCP plume in the upper zone. Other semivolatile compounds were detected at low concentrations, with most detections at less than 19 µg/L and none exceeding 54 µg/L (4-methylphenol at well B1). The most elevated concentrations of volatile compounds (acetone; benzene; toluene; m-, p-, and o-xylene; and 1,2,4-trimethylbenzene) were generally observed at wells B1, LW-2S, LW-4S, and RW-1. No TPH fraction concentration exceeded 19 mg/L. The most elevated concentrations of metal constituents were generally detected in wells K (nickel) and LW-8S (arsenic).

2.2.3 LOWER WATER-BEARING ZONE

The groundwater quality results from the lower water-bearing zone indicate the following:

- Except for low level metal concentrations, analytical results at wells B2, J2, LW-1D, and LW-9D were nondetect. LW-3D analytical results were nondetect except for low level arsenic and acetone concentrations. Well LW-10D contained only low level chrysene and metal concentrations.

- PCP was detected at one lower zone well, RW-2, at a concentration of 5.0 µg/L using EPA Method 8270 SIM.

- Naphthalene, a noncarcinogenic PAH, was detected in well RW-2 at 1.8 µg/L with EPA Method 8270 and 5.0 µg/L with EPA Method 8260.

- Other semivolatile results were reported as nondetect for lower zone wells with the following exceptions:

  - 2-Methylnaphthalene (detected at well LW-4D at 3.3 µg/L and well RW-2 at 6.5 µg/L)
  - Acenaphthene (detected at well O at 1.3 µg/L)
  - Fluorene (detected at well O at 1.6 µg/L)
  - bis(2-ethylhexyl)phthalate (detected at three wells with concentrations ranging from 2.0 to 5.4 µg/L).

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- Several volatile compounds were detected at low concentrations, including:
  - Acetone (detected at five wells with concentrations ranging from 5.6 µg/L to 42 µg/L)
  - 2-Butanone (detected at three wells with concentrations from 5.2 to 13 µg/L)
  - Benzene (detected at well R at 13 µg/L)
  - Toluene (detected at wells O and R at 1.1 and 2.8 µg/L, respectively)
  - Ethylbenzene (detected at well RW-2 at 3.4 µg/L)
  - m-, p-, and o-Xylene (detected at four wells, at total concentrations ranging from 1.1 to 9.4 µg/L)
  - 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (both compounds were detected at four wells at individual concentrations ranging from 1.5 to 49 µg/L)
  - Isopropylbenzene and n-propylbenzene (at least one of the compounds was detected at seven wells at individual concentrations ranging from 1.2 to 130 µg/L)
  - tert-Butylbenzene (detected at four wells at concentrations ranging from 1.1M to 3.2 µg/L)
  - sec-Butylbenzene (detected at seven wells at concentrations ranging from 1.4 to 17 µg/L)
  - n-Butylbenzene (detected at five wells at concentrations ranging from 1.5 to 11 µg/L).
- TPH diesel-range concentrations were detected at six lower zone wells at concentrations ranging from 0.81 to 3.4 mg/L.
- TPH gasoline-range and motor-oil range analyses were conducted only at RW-2. Only TPH gasoline-range was detected at a concentration of 1.3 mg/L.
- At least one priority pollutant metal was detected in each lower zone well tested, as follows:
  - Arsenic (detected at all lower zone wells tested, ranging at concentrations from 0.006 to 0.040 mg/L)
  - Chromium (detected at four wells at concentrations from 0.013 to 0.032 mg/L)
  - Copper (detected at seven lower zone wells with concentrations ranging from 0.002 to 0.038 mg/L)
  - Lead (detected at six wells at concentrations ranging from 0.001 to 0.012 mg/L)
  - Nickel (detected at four lower zone wells at concentrations ranging from 0.01 to 0.03 mg/L).
  - Zinc (detected at seven lower zone wells at concentrations ranging from 0.009 to 0.074 mg/L).

In summary, the analytical results from the lower zone wells indicate that PCP was detected only in well RW-2 (5.0 µg/L by EPA Method 8270 SIM) during the third quarter 2001 event. Naphthalene

was also only detected in well RW-2 at a concentration of 1.8 µg/L with EPA Method 8270 and 5.0 µg/L with EPA Method 8260. Concentrations of all other detected semivolatile compounds did not exceed 6.5 µg/L. Elevated concentrations of most detected volatile compounds were observed in wells G1A and LW-4D, with none exceeding 130 µg/L. No TPH fraction concentration exceeded 3.4 mg/L. The most elevated concentrations of metals were detected in wells G1A, LW-4D, LW-9D, LW-10D, LW-11D and LW-12D1.

2.2.4 Deep Sand Unit

Well LW-12D2 is the only well currently installed in the deep sand unit underlying the lower water-bearing zone. Arsenic at 0.024 mg/L was the only detection for LW-12D2 during the third quarter groundwater sampling event.

2.2.5 Water Level and Contaminant Trends

Water levels and concentrations of selected constituents were evaluated by generating time versus groundwater elevation and time versus concentration plots for the period of time covered by the Phase II RI quarterly events (March 1997 through the current quarterly event). Plots of PCP concentrations (maximum concentration of EPA Methods 8270 and 8040) versus time for selected upper zone wells (LW-2S, -4S, -11S, -13S, and RW-1), selected lower zone wells (LW-4D, -11D, and RW-2), and nested wells (LW-4S and -4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-2S, LW-4S, and LW-11S are shown on Figures 8 through 10. Figure 11 shows groundwater elevations and PCP concentrations at lower zone well LW-4D plotted with Willamette River stage.

As shown on Figure 5, PCP concentrations in the selected upper zone wells show variable concentration patterns over time (note the logarithmic scale), as discussed in previous quarterly reports. However, except for well LW-13S, PCP concentration trends approximately over the last year continue to be downward. At well LW-13S, located at the downgradient edge of the PCP plume in the upper zone, PCP concentrations have risen slightly since its installation in May 2000. This increase could be related to the slight downgradient migration of the upper zone PCP plume, or variability within the analytical method.

As shown on Figure 6 (note the logarithmic scale), PCP concentrations in the lower zone have also generally decreased over time, particularly over the last year since startup of the groundwater interim action at recovery well RW-2. The slight increase at well LW-2S for the last quarter is probably within the range of analytical variability. As in previous quarters, current PCP concentrations at selected lower

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zone well locations where PCP has historically been detected are generally less than those concentrations in the upper zone at the same location or in proximity to that location. The PCP concentration patterns at nested wells LW-4S and -4D (Figure 7) indicate that contamination observed in the lower zone at this location does not appear to have originated from the upper zone at the same location. The shift in maximum concentration at these locations from LW-4D between April 1997 and May 1999 to LW-4S since then may be a reflection of the shift in containment migration patterns between the upper and lower zone.

Figures 8, 9, and 10 show that 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 historically low groundwater levels, which began in about September 2000, continued for a fourth quarter, with groundwater elevations at the lowest levels since monitoring began. Figures 8 and 10 show PCP concentrations in the upper zone moderately following the water levels in that zone over time in wells LW-2S and LW-11S; however, Figure 9 indicates that no correlation is apparent between the two in the upper zone at well LW-4S. Additionally, the presence of product at well LW-11S in November-December 2000 and this quarter, appears to be related to the historically low water levels at these times and the consequent release of residual product from soil previously under saturated conditions. In the lower zone, groundwater levels trend similarly with seasonal fluctuations in the Willamette River, as shown by the plot of groundwater elevations at LW-4D with river stage on Figure 11; however, there appears to be no correlation between PCP concentrations and groundwater elevations at this location.

Contaminant and groundwater level trends will continue to be evaluated and updated for future quarterly events.

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3.0 FUTURE GROUNDWATER TASKS

The fourth quarter 2001 groundwater sampling event was conducted November 27-29, 2001. The groundwater analytical program for the fourth quarter 2001 included continuation of monitoring at wells LW-13S, LW-14D, LW-17D, and LW-18D during implementation of the groundwater interim action at RW-2. The results of the fourth quarter 2001 event will be provided in the *Fourth Quarter 2001 Groundwater Report.*

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4.0 USE OF THIS REPORT

This quarterly 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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DRAFT

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BZTO104(e)016298

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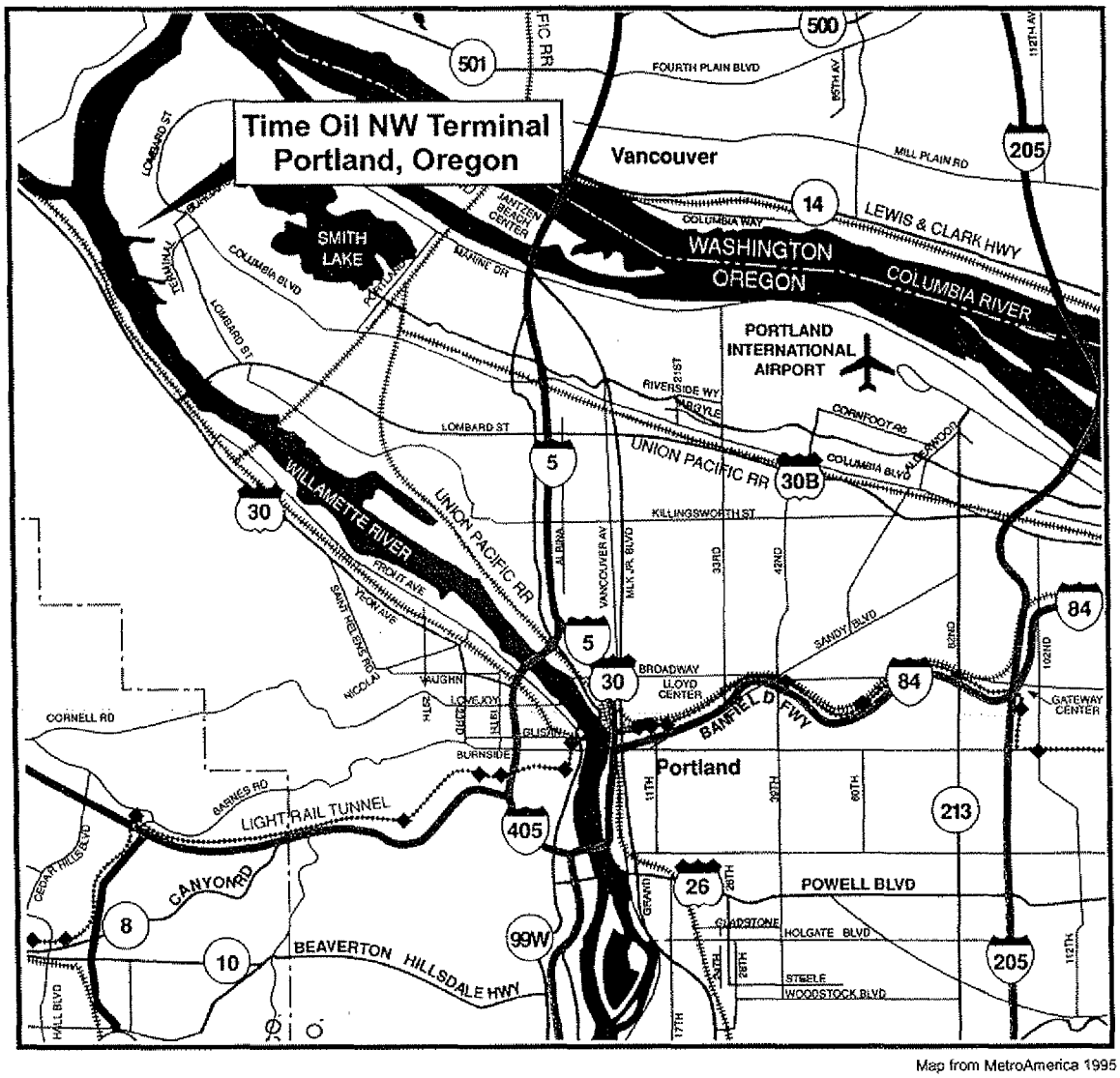
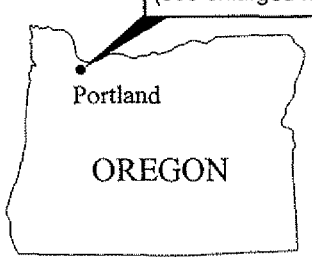


Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)

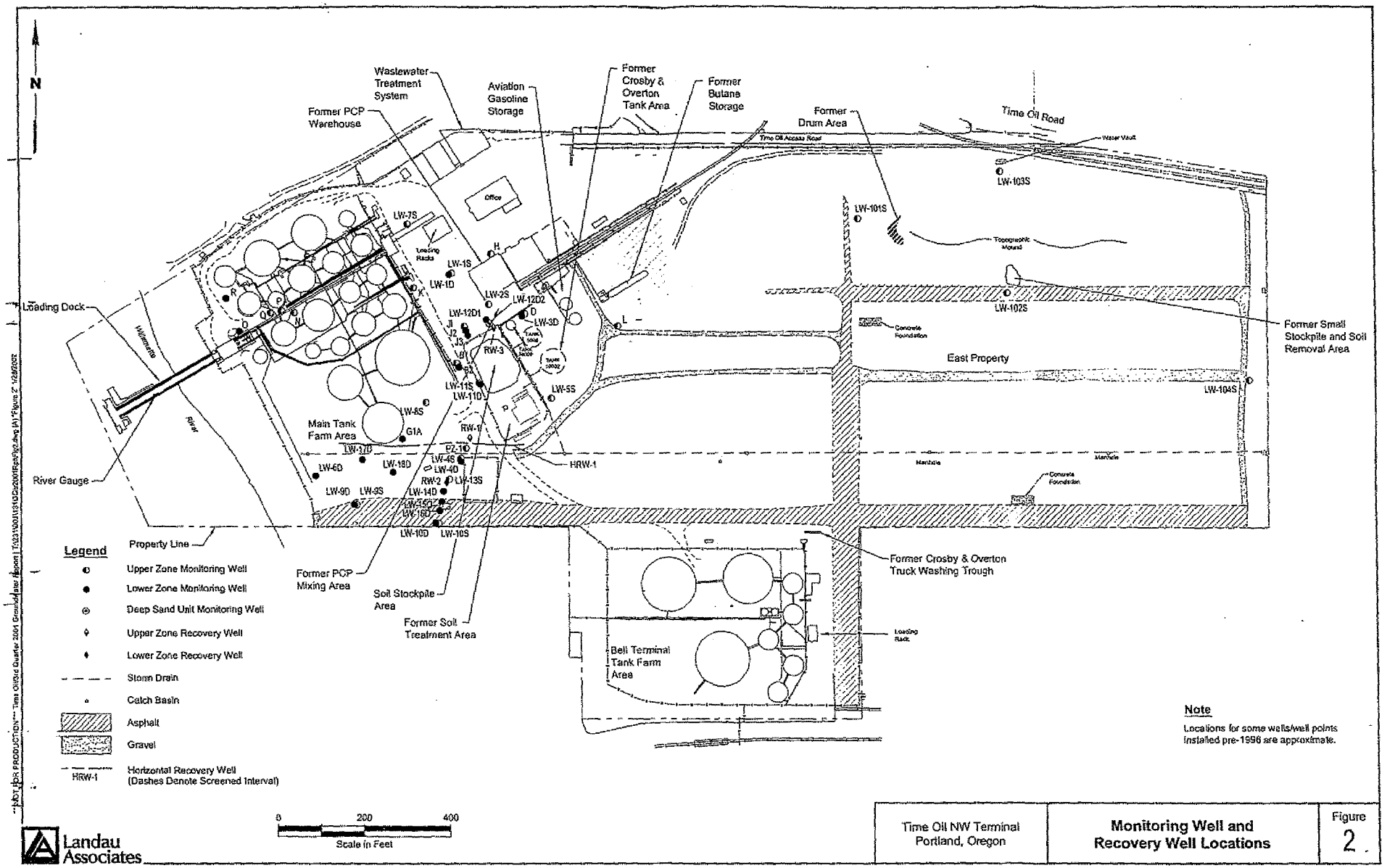


0 2 4
Approximate Scale in Miles

Time Qtr2nd Quarter 2001 Groundwater Report | T:\231\00\11\13\3Qtr2001Rpt\Fig.1.cdr (C) 01/16/2002

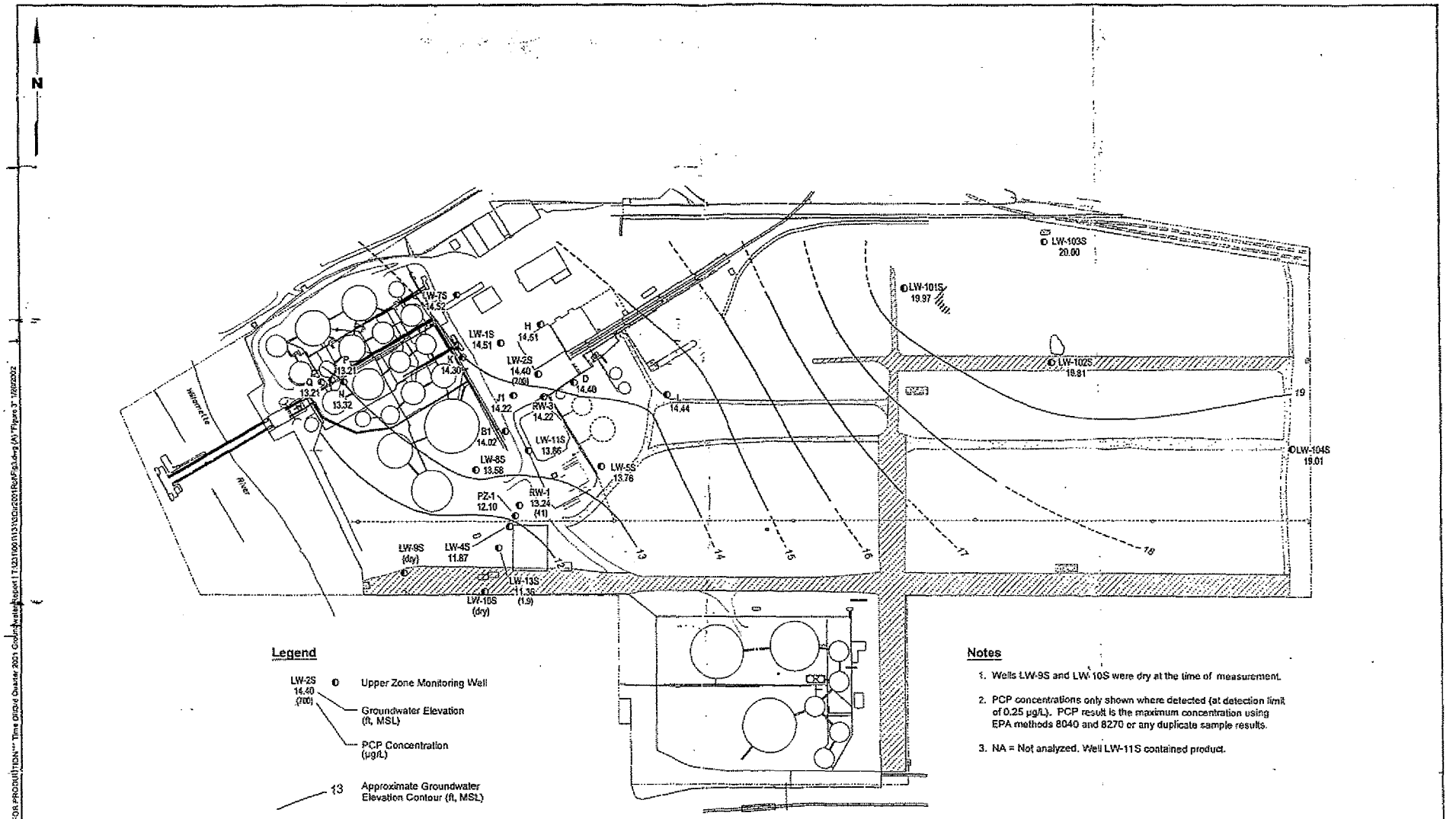
Landau Associates	Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1

BZTO104(e)016300



Time Oil NW Terminal Portland, Oregon	**Monitoring Well and Recovery Well Locations**	Figure 2

BZTO104(e)016301



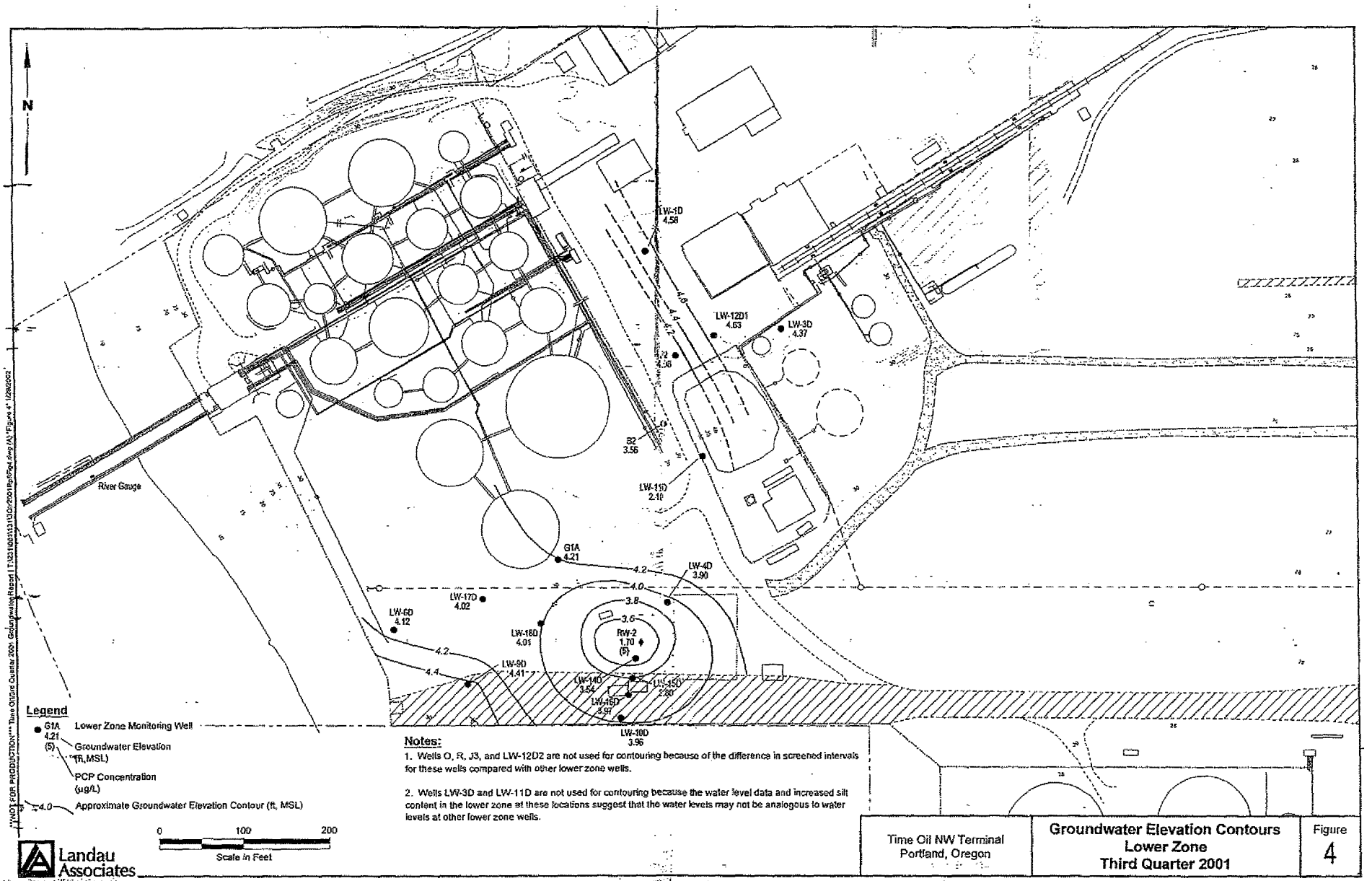
Notes

1. Wells LW-9S and LW-10S were dry at the time of measurement.
2. PCP concentrations only shown where detected (at detection limit of 0.25 µg/L). PCP result is the maximum concentration using EPA methods 8040 and 8270 or any duplicate sample results.
3. NA = Not analyzed. Well LW-11S contained product.

Landau Associates

Time Oil NW Terminal Portland, Oregon	Groundwater Elevation Contours Upper Zone Third Quarter 2001	Figure 3

BZTO104(e)016302



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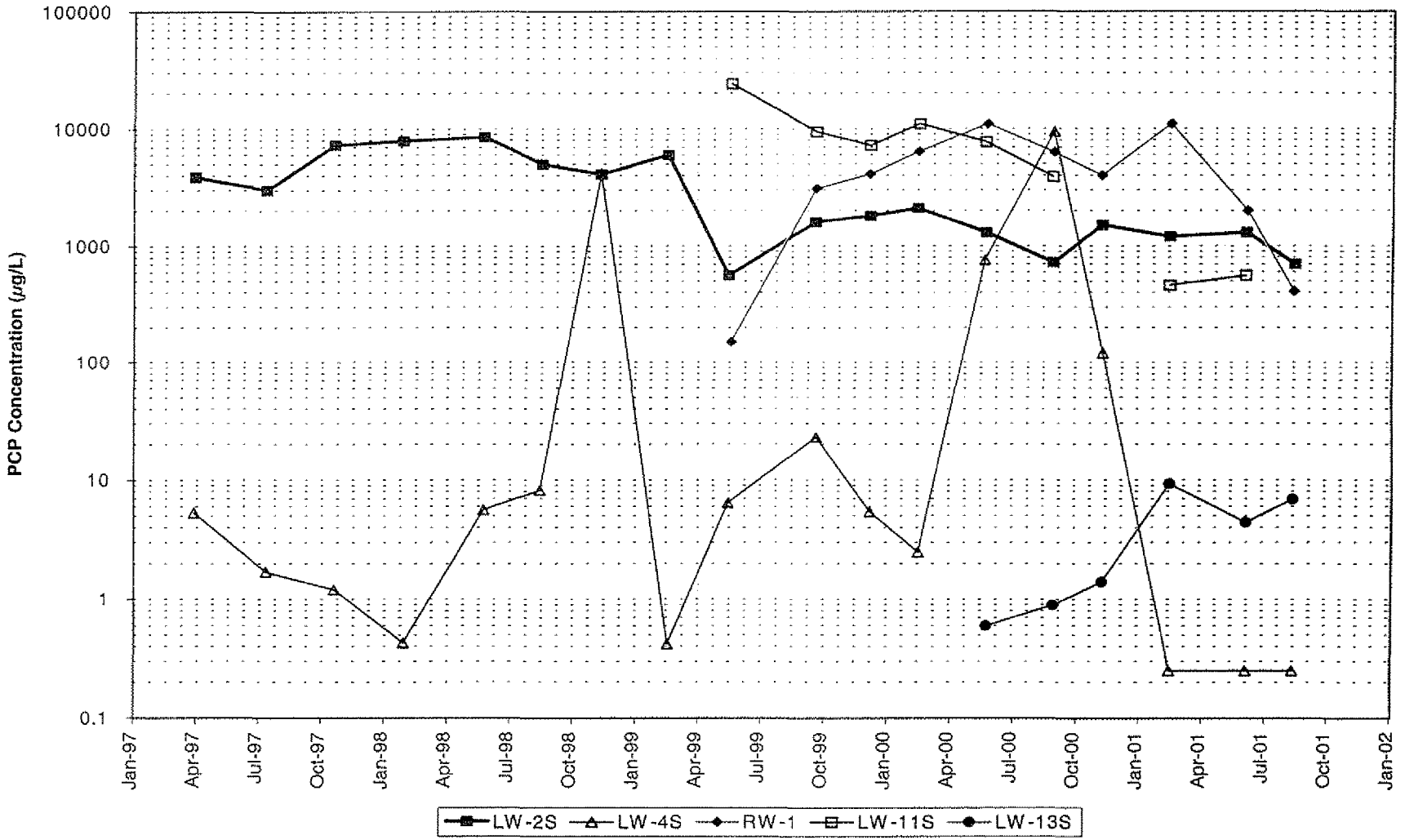

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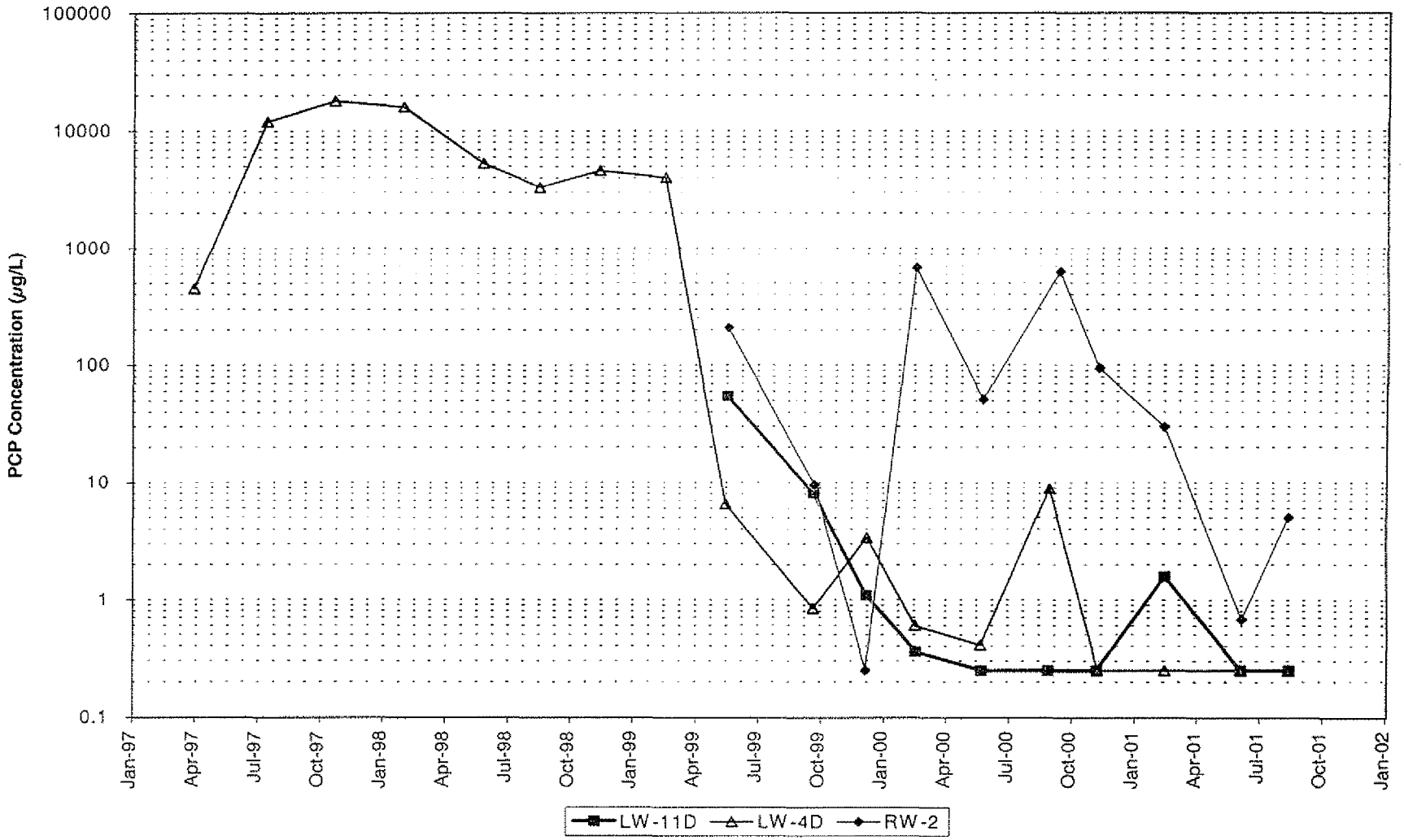
Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Selected Upper Zone Wells April 1997 – August 2001**	Figure 5

BZTO104(e)016304



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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Selected Lower Zone Wells April 1997 – August 2001**	Figure 6

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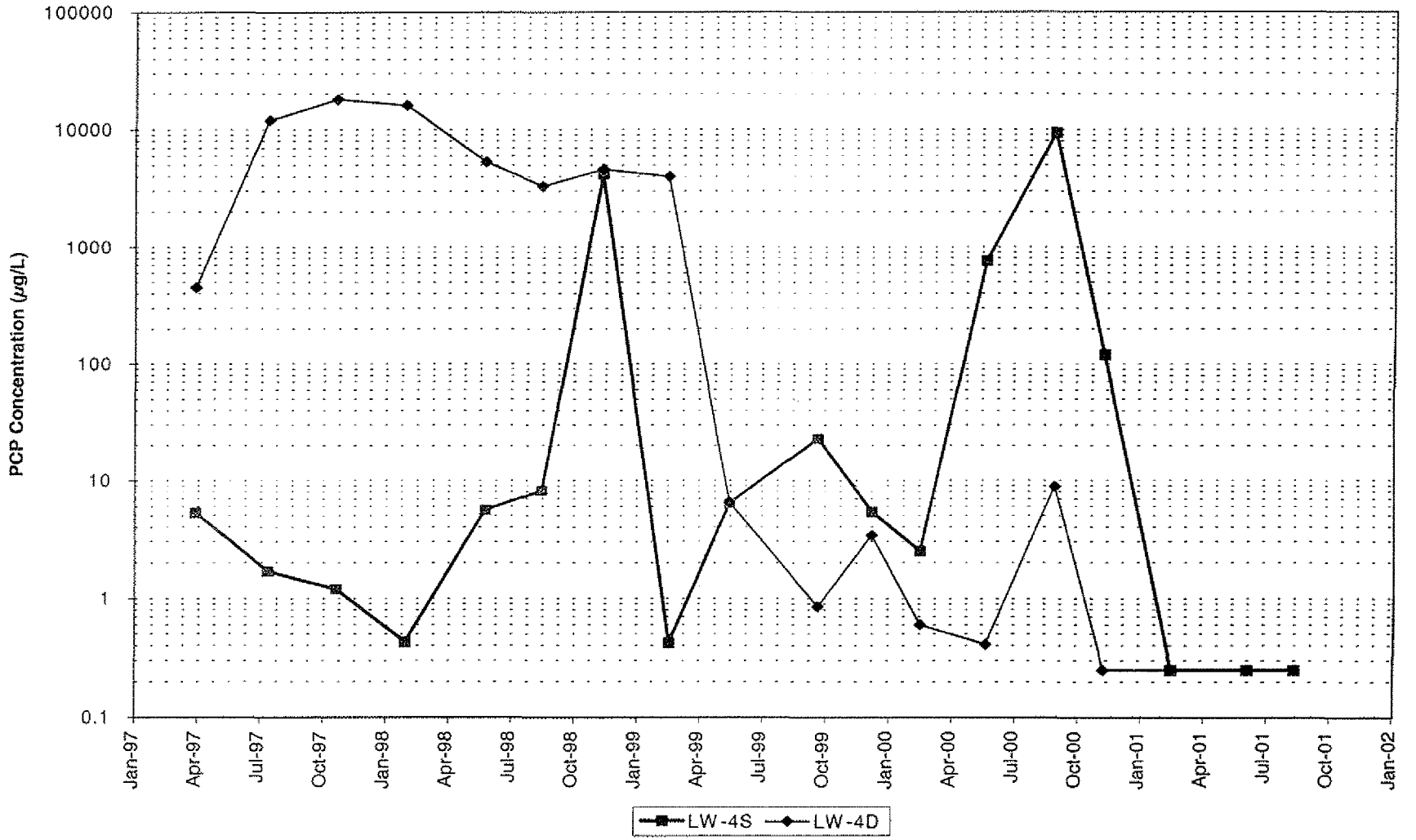

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Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Wells LW-4S and LW-4D April 1997 – August 2001**	Figure 7

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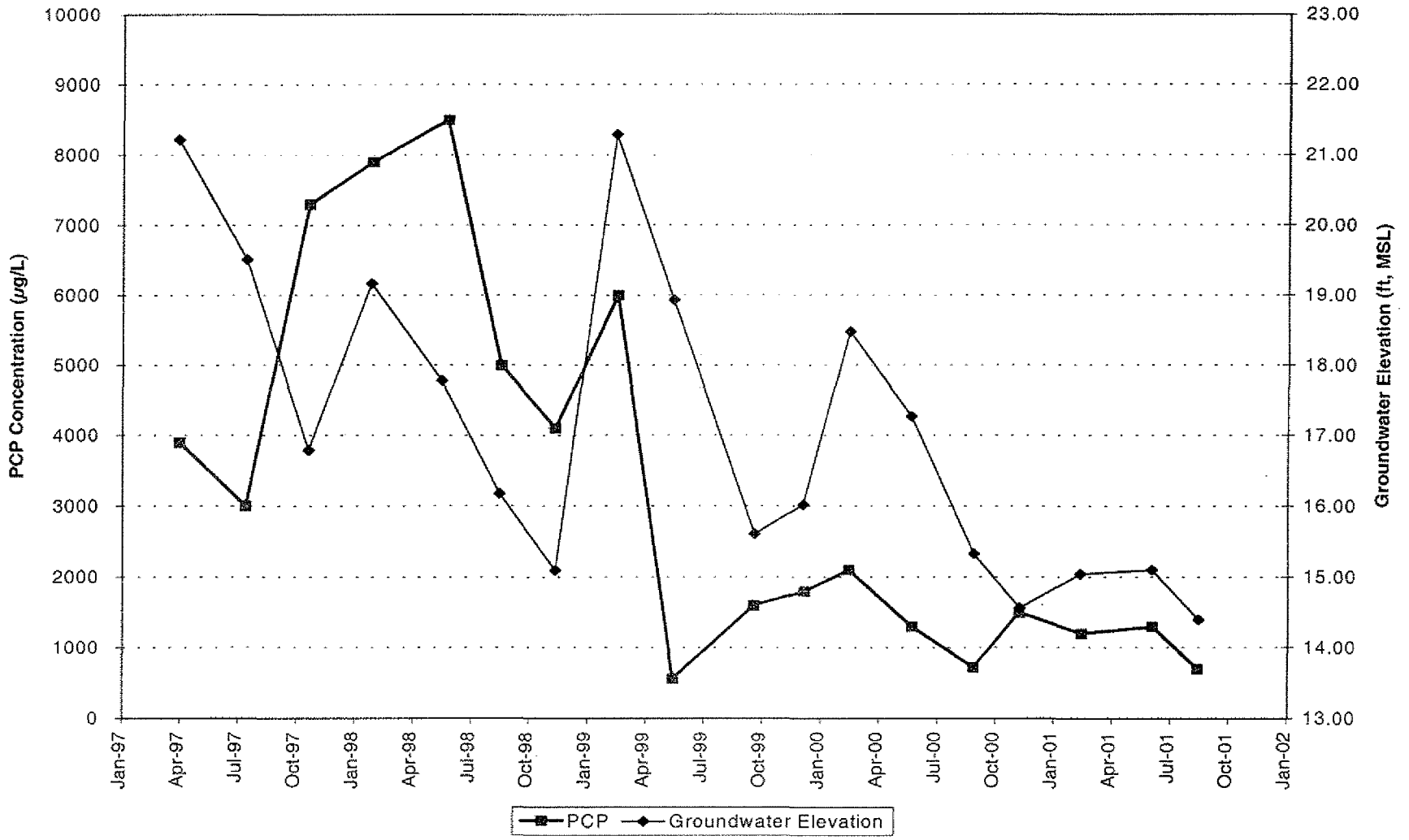

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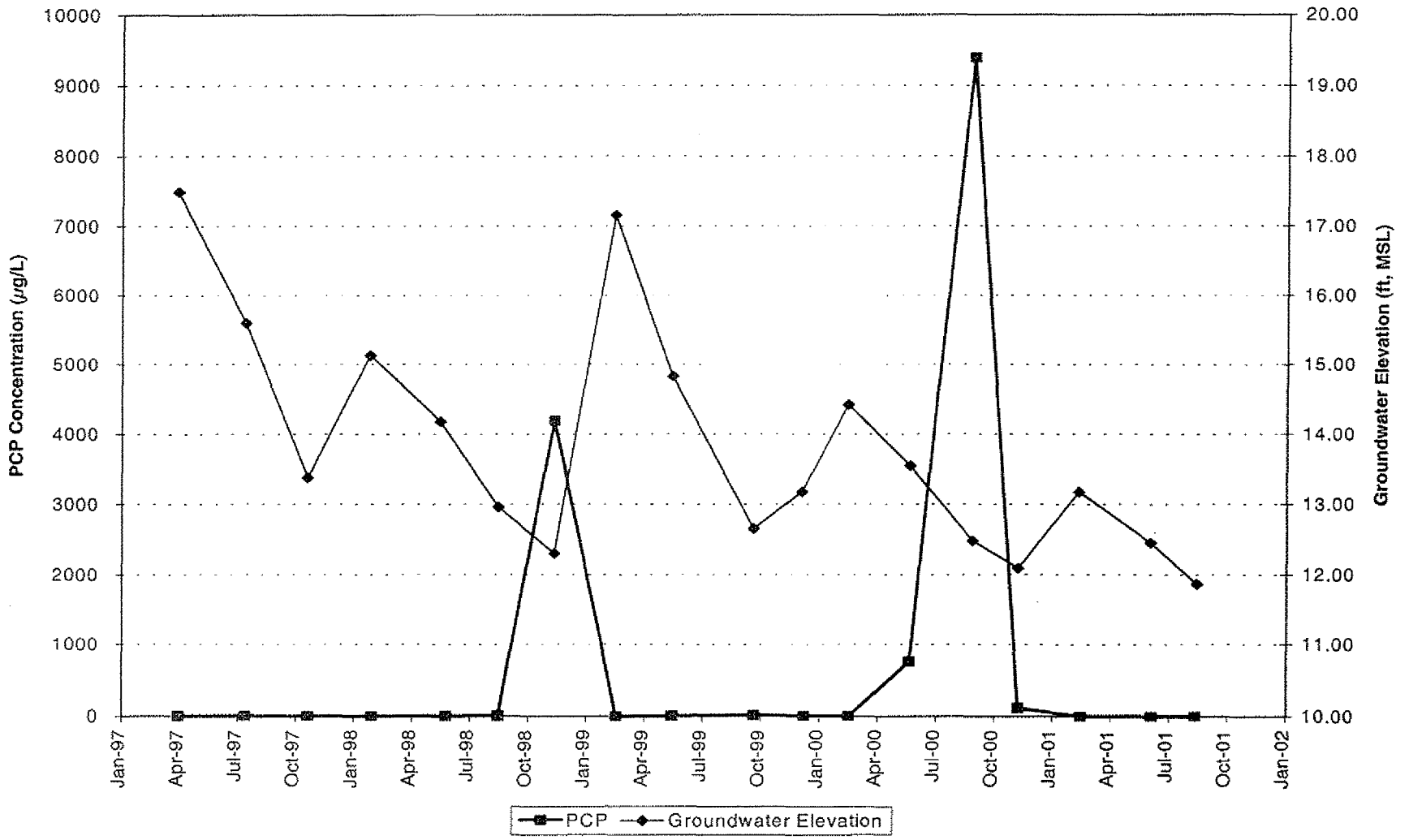
Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Groundwater Elevations, LW-2S April 1997 – August 2001**	Figure **8**

BZTO104(e)016307



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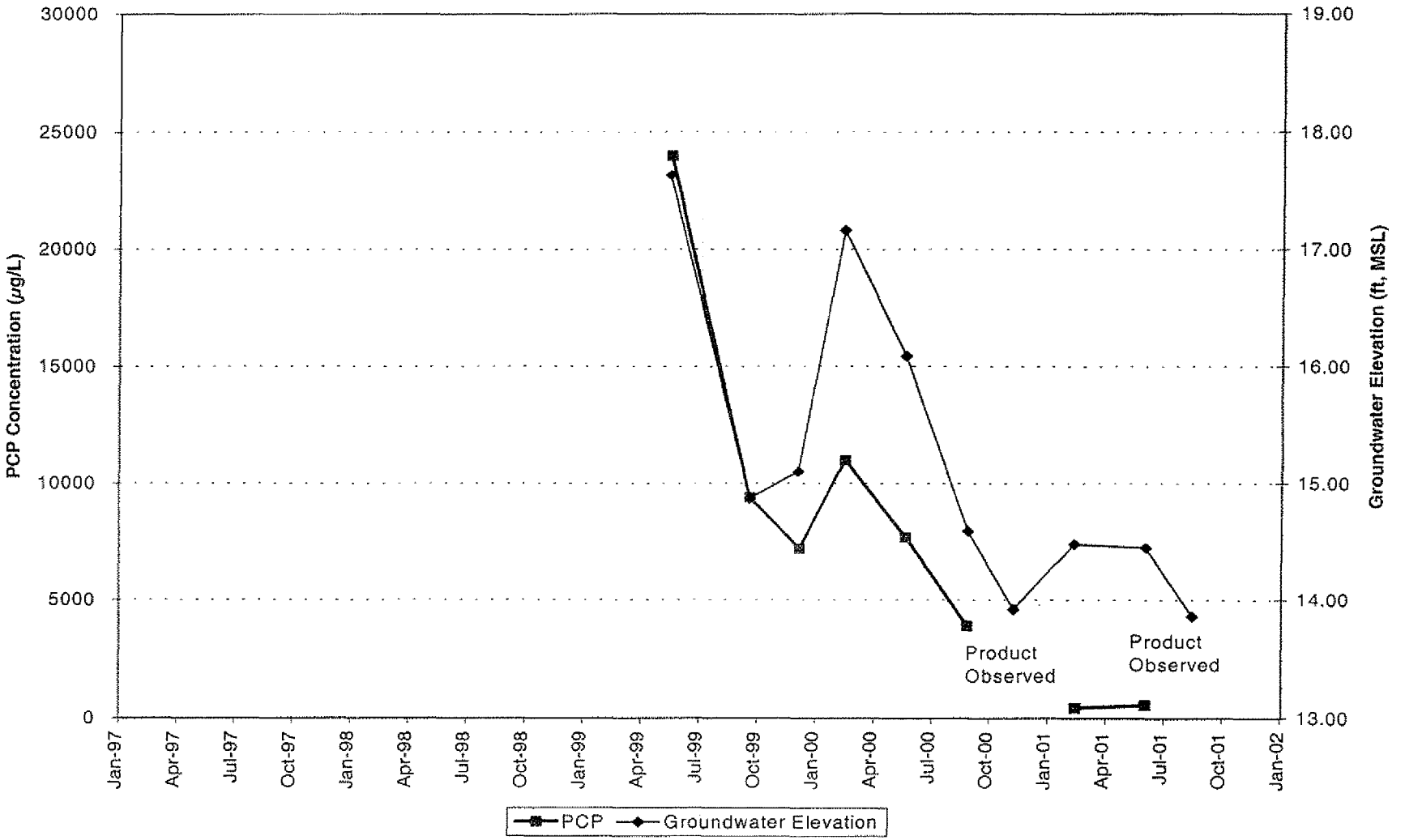
Time Oil NW Terminal Portland, Oregon	**PCP Concentrations Groundwater Elevations, LW-4S April 1997 – August 2001**	Figure 9

BZTO104(e)016308



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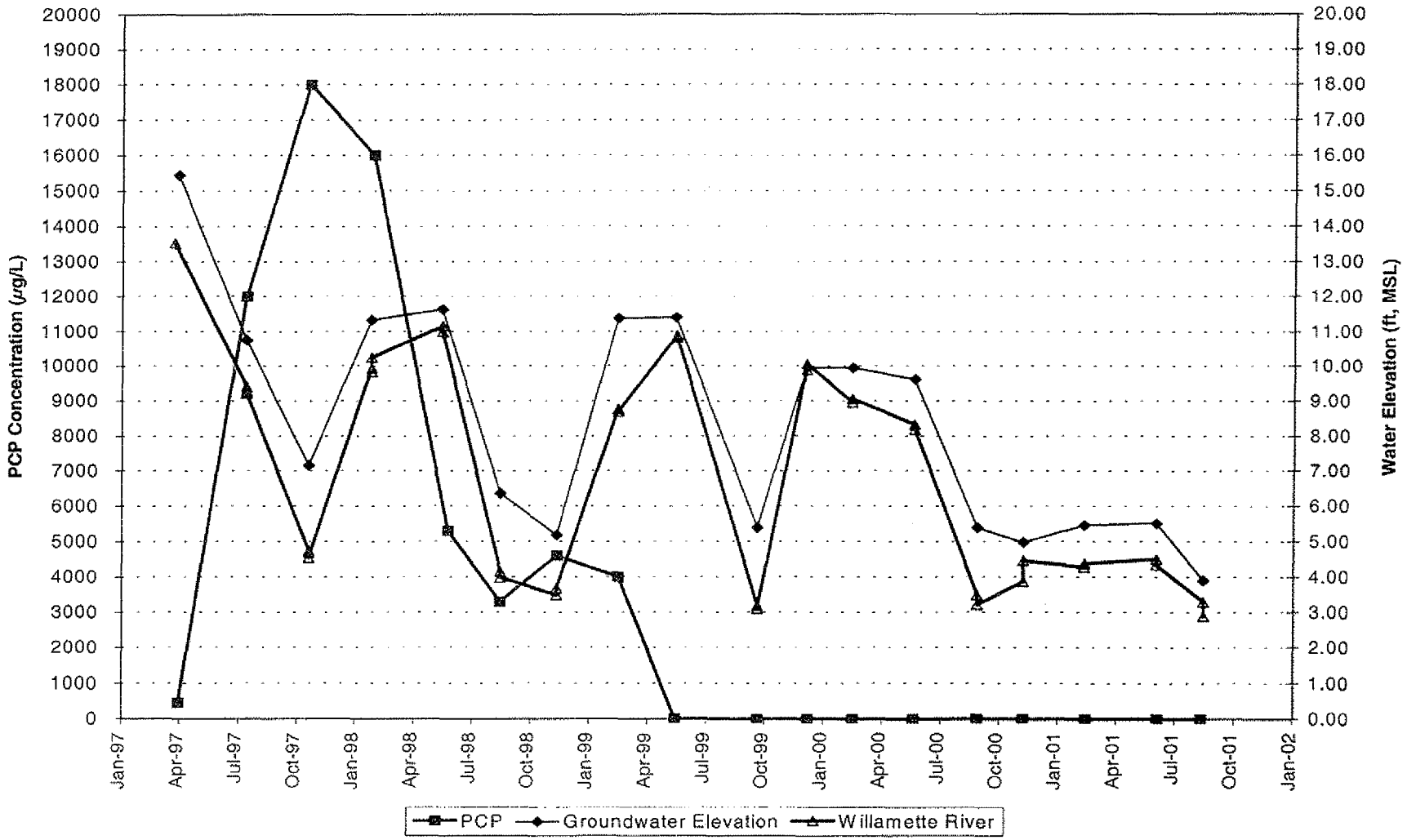
Time Oil NW Terminal Portland, Oregon	**PCP Concentrations and Groundwater Elelvations, LW-11S April 1997 – August 2001**	Figure 10

BZTO104(e)016309



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Time Oil NW Terminal Portland, Oregon	**River Stage PCP Concentrations and Groundwater Elevations LW-4D April 1997 – August 2001**	Figure 11

BZTO104(e)016310

APPENDIX A

Groundwater Level Measurements and Quality Data

TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
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	----	
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	----	
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	16:08	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	----	----	
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	----	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
F*	08/18/98	08:10	NA	14.77	NA		
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	---	---	
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	---	---	
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	---	
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	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	
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

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
N	05/18/99	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	---	No product
N	08/16/01	10:29	31.40	18.08	13.32	---	Trace product
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	---	No product
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	---	No product
Q	08/16/01	10:26	30.36	17.15	13.21	---	Trace product
LW1S	03/31/97	11:12	27.96	6.65	21.31		
LW1S	07/16/97	08:15	27.96	8.34	19.62	---	
LW1S	10/21/97	16:53	27.96	11.02	16.94	---	
LW1S	01/27/98	13:00	27.96	8.75	19.21	---	
LW1S	05/18/98	17:40	27.96	9.15	18.81	---	
LW1S	08/17/98	10:54	27.96	11.67	16.29	---	
LW1S	11/13/98	10:02	27.96	12.76	15.20	---	
LW1S	02/16/99	13:24	27.96	6.60	21.36	---	
LW1S	05/18/99	15:38	27.96	8.92	19.04	---	
LW1S	09/21/99	12:10	27.96	12.20	15.76	---	
LW1S	12/06/99	14:33	27.96	11.86	16.10	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW1S	02/16/00	10:50	27.96	9.42	18.54	----	
LW1S	05/23/00	17:18	27.96	10.52	17.44	----	
LW1S	08/29/00	13:58	27.96	12.51	15.45	----	
LW1S	11/09/00	13:17	27.96	13.26	14.70	----	
LW1S	02/12/01	15:33	27.96	12.82	15.14	----	
LW1S	06/04/01	12:24	27.96	12.77	15.19	----	
LW1S	08/16/01	11:37	27.96	13.45	14.51	----	
LW2S	03/25/97	12:22	29.56	8.06	21.50	----	
LW2S	03/31/97	11:27	29.56	8.34	21.22	----	
LW2S	07/16/97	08:33	29.56	10.05	19.51	----	
LW2S	10/21/97	17:04	29.56	12.77	16.79	----	
LW2S	01/27/98	13:25	29.56	10.39	19.17	----	
LW2S	05/18/98	18:02	29.56	11.78	17.78	----	
LW2S	08/17/98	10:56	29.56	13.38	16.18	----	
LW2S	11/13/98	10:32	29.56	14.47	15.09	----	
LW2S	02/16/99	13:42	29.56	8.27	21.29	----	
LW2S	05/18/99	15:45	29.56	10.63	18.93	----	
LW2S	09/21/99	12:34	29.56	13.95	15.61	----	
LW2S	12/06/99	15:11	29.56	13.54	16.02	----	
LW2S	02/16/00	10:38	29.56	11.08	18.48	----	
LW2S	05/23/00	17:24	29.56	12.29	17.27	----	
LW2S	08/29/00	14:12	29.56	14.23	15.33	----	
LW2S	11/09/00	13:04	29.56	15.00	14.56	----	
LW2S	02/12/01	15:30	29.56	14.52	15.04	----	
LW2S	06/04/01	12:34	29.56	14.46	15.10	----	
LW2S	08/16/01	11:45	29.56	15.16	14.40	----	
LW4S	03/31/97	09:20	30.26	12.77	17.49	----	
LW4S	07/16/97	07:40	30.26	14.66	15.60	----	
LW4S	10/21/97	16:25	30.26	16.88	13.38	----	
LW4S	01/27/98	12:00	30.26	15.13	15.13	----	
LW4S	05/18/98	17:32	30.26	16.08	14.18	----	
LW4S	08/17/98	11:07	30.26	17.30	12.96	----	
LW4S	11/13/98	09:56	30.26	17.96	12.30	----	
LW4S	02/16/99	13:16	30.26	13.10	17.16	----	
LW4S	05/18/99	15:03	30.26	15.43	14.83	----	
LW4S	09/21/99	11:44	30.26	17.61	12.65	----	
LW4S	12/06/99	14:19	30.26	17.08	13.18	----	
LW4S	02/16/00	10:31	30.26	15.84	14.42	----	
LW4S	05/23/00	16:55	30.26	16.71	13.55	----	
LW4S	08/29/00	13:39	30.26	17.78	12.48	----	
LW4S	11/09/00	12:53	30.26	18.17	12.09	----	
LW4S	02/12/01	16:38	30.26	17.08	13.18	----	
LW4S	06/04/01	12:08	30.26	17.81	12.45	----	
LW4S	08/16/01	11:14	30.26	18.39	11.87	----	
LW5S	03/25/97	12:29	30.79	10.57	20.22	----	
LW5S	03/31/97	11:35	30.79	10.84	19.95	----	
LW5S	07/16/97	08:53	30.79	12.29	18.50	----	
LW5S	10/21/97	15:16	30.79	15.00	15.79	----	
LW5S	01/27/98	13:36	30.79	12.90	17.89	----	
LW5S	05/18/98	18:05	30.79	14.19	16.60	----	
LW5S	08/17/98	11:09	30.79	15.54	15.25	----	
LW5S	11/13/98	10:38	30.79	16.55	14.24	----	
LW5S	02/16/99	13:16	30.79	10.59	20.20	----	
LW5S	05/18/99	16:01	30.79	13.12	17.67	----	
LW5S	09/21/99	12:40	30.79	16.00	14.79	----	
LW5S	12/06/99	14:47	30.79	15.64	15.15	----	
LW5S	02/16/00	09:56	30.79	13.54	17.25	----	
LW5S	05/23/00	17:51	30.79	14.80	15.99	----	
LW5S	08/29/00	14:37	30.79	16.35	14.44	----	
LW5S	11/09/00	13:45	30.79	16.98	13.81	----	
LW5S	02/12/01	15:13	30.79	16.51	14.28	----	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW5S	06/04/01	13:23	30.79	16.43	14.36	---	
LW5S	08/16/01	12:07	30.79	17.03	13.76	---	
LW7S	03/31/97	11:05	28.10	6.75	21.35	---	
LW7S	07/16/97	08:05	28.10	8.62	19.48	---	
LW7S	10/21/97	16:45	28.10	11.26	16.84	---	
LW7S	01/27/98	12:47	28.10	8.85	19.25	---	
LW7S	05/18/98	17:48	28.10	10.34	17.76	---	
LW7S	08/17/98	10:48	28.10	11.85	16.25	---	
LW7S	11/13/98	10:12	28.10	12.90	15.20	---	Strong gasoline odor
LW7S	02/16/99	13:53	28.10	6.81	21.29	---	
LW7S	05/18/99	15:23	28.10	9.14	18.96	---	
LW7S	09/21/99	12:03	28.10	12.37	15.73	---	
LW7S	12/06/99	14:27	28.10	12.00	16.10	---	
LW7S	02/16/00	10:46	28.10	9.60	18.50	---	
LW7S	05/23/00	17:09	28.10	10.70	17.40	---	
LW7S	08/29/00	13:53	28.10	12.64	15.46	---	
LW7S	11/09/00	13:14	28.10	13.36	14.74	---	
LW7S	02/12/01	15:39	28.10	12.94	15.16	---	
LW7S	06/04/01	12:17	28.10	12.87	15.23	---	
LW7S	08/16/01	11:33	28.10	13.58	14.52	---	
LW8S	05/18/99	14:55	31.28	14.84	16.44	---	
LW8S	09/21/99	12:24	31.28	16.94	14.34	---	
LW8S	12/06/99	14:40	31.28	16.63	14.65	---	
LW8S	02/16/00	10:16	31.28	15.18	16.10	---	
LW8S	05/23/00	17:42	31.28	15.88	15.40	---	
LW8S	08/29/00	14:26	31.28	17.06	14.22	---	
LW8S	11/09/00	13:32	31.28	17.55	13.73	---	
LW8S	02/12/01	15:58	31.28	17.24	14.04	---	
LW8S	06/04/01	13:05	31.28	17.14	14.14	---	
LW8S	08/16/01	12:00	31.28	17.70	13.58	---	
LW9S	05/18/99	14:57	31.04	19.58	11.46	---	Water level appears to be more representative of lower zone
LW9S	09/21/99	11:36	31.04	dry	---	---	
LW9S	12/06/99	14:13	31.04	19.64	---	---	Water in endcap
LW9S	02/16/00	10:24	31.04	19.59	---	---	Water in endcap
LW9S	05/23/00	16:39	31.04	dry	---	---	
LW9S	08/29/00	13:28	31.04	dry	---	---	
LW9S	11/09/00	12:42	31.04	dry	---	---	
LW9S	02/12/01	16:12	31.04	dry	---	---	
LW9S	06/04/01	11:50	31.04	dry	---	---	
LW9S	08/16/01	11:01	31.04	dry	---	---	
LW10S	05/18/99	14:59	30.75	17.24	13.51	---	
LW10S	09/21/99	11:38	30.75	19.13	11.62	---	
LW10S	12/06/99	14:14	30.75	18.54	12.21	---	
LW10S	02/16/00	10:26	30.75	17.62	13.13	---	
LW10S	05/23/00	16:41	30.75	18.25	12.50	---	
LW10S	08/29/00	13:30	30.75	dry	---	---	
LW10S	11/09/00	12:45	30.75	dry	---	---	
LW10S	02/12/01	16:14	30.75	dry	---	---	
LW10S	06/04/01	11:53	30.75	dry	---	---	
LW10S	08/16/01	11:03	30.75	dry	---	---	
LW11S	05/18/99	15:10	29.10	11.47	17.63	---	
LW11S	09/21/99	11:51	29.10	14.23	14.87	---	
LW11S	12/06/99	15:05	29.10	14.00	15.10	---	
LW11S	02/16/00	11:01	29.10	11.94	17.16	---	
LW11S	05/23/00	11:01	29.10	13.01	16.09	---	
LW11S	08/29/00	14:55	29.10	14.51	14.59	---	
LW11S	11/09/00	13:36	29.10	15.48	13.92	0.37	First occurrence of product in well
LW11S	02/12/01	15:18	29.10	14.62	14.48	---	No product
LW11S	06/04/01	13:12	29.10	14.65	14.45	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW11S	08/16/01	11:24	29.10	15.46	13.86	0.28	
LW13S	05/23/00	16:51	30.17	17.23	12.94	----	
LW13S	08/29/00	13:37	30.17	18.27	11.90	----	
LW13S	11/09/00	12:51	30.17	18.75	11.42	----	
LW13S	02/12/01	16:30	30.17	18.26	11.91	----	
LW13S	06/04/01	12:06	30.17	18.30	11.87	----	
LW13S	08/16/01	11:13	30.17	18.81	11.36	----	
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	----	
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	----	
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	----	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW103S	08/16/01	12:23	29.07	9.07	20.00	---	
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	---	
LW104S	06/04/01	13:30	26.57	6.64	19.93	---	
LW104S	08/16/01	12:15	26.57	7.56	19.01	---	
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
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	---	
PZ-1	05/23/00	17:47	28.04	14.21	13.83	---	
PZ-1	08/29/00	14:30	28.04	15.33	12.71	---	
PZ-1	11/09/00	12:55	28.04	15.68	12.36	---	
PZ-1	02/12/01	16:42	28.04	15.30	12.74	---	
PZ-1	06/04/01	13:20	28.04	15.29	12.75	---	
PZ-1	08/16/01	11:17	28.04	15.94	12.10	---	
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	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	
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	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	
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	----	
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	----	
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	----	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
R	11/13/96	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	---	
LW1D	03/31/97	11:11	28.31	12.71	15.60	---	
LW1D	07/16/97	08:12	28.31	17.65	10.66	---	
LW1D	10/21/97	16:55	28.31	21.29	7.02	---	
LW1D	01/27/98	13:07	28.31	17.06	11.25	---	
LW1D	05/18/98	17:39	28.31	16.53	11.78	---	
LW1D	08/17/98	10:30	28.31	21.82	6.49	---	
LW1D	11/13/98	10:01	28.31	22.77	5.54	---	
LW1D	02/16/99	13:21	28.31	17.30	11.01	---	
LW1D	05/18/99	15:36	28.31	16.76	11.55	---	
LW1D	09/21/99	12:12	28.31	22.91	5.40	---	
LW1D	12/06/99	14:34	28.31	18.00	10.31	---	
LW1D	02/16/00	10:49	28.31	18.16	10.15	---	
LW1D	05/23/00	17:19	28.31	18.62	9.69	---	
LW1D	08/29/00	13:59	28.31	22.81	5.50	---	
LW1D	11/09/00	13:20	28.31	22.98	5.33	---	
LW1D	02/12/01	15:35	28.31	22.23	6.08	---	
LW1D	06/04/01	12:23	28.31	22.36	5.95	---	
LW1D	08/16/01	11:38	28.31	23.73	4.58	---	
LW3D	03/31/97	11:45	30.80	19.38	11.42	---	Time estimated
LW3D	07/16/97	08:38	30.80	28.09	2.71	---	
LW3D	10/21/97	17:07	30.80	23.36	7.44	---	
LW3D	01/27/98	13:30	30.80	21.66	9.14	---	
LW3D	05/18/98	17:35	30.80	19.21	11.59	---	
LW3D	08/17/98	10:24	30.80	24.62	6.18	---	
LW3D	11/13/98	09:03	30.80	25.56	5.24	---	
LW3D	02/16/99	13:44	30.80	20.00	10.80	---	
LW3D	05/18/99	15:58	30.80	19.42	11.38	---	Purged dry at 11:00
LW3D	09/21/99	10:40	30.80	25.76	5.04	---	
LW3D	12/06/99	14:45	30.80	20.69	10.11	---	
LW3D	02/16/00	09:54	30.80	20.98	9.82	---	
LW3D	05/23/00	14:40	30.80	21.16	9.64	---	Purged dry at 13:10
LW3D	08/29/00	14:36	30.80	---	---	---	Well purged dry 8/28; sampled a.m. on 8/29
LW3D	11/09/00		30.80	---	---	---	Well sampled 11/8/00 - water level not representative
LW3D	02/12/01	15:11	30.80	24.85	5.95	---	
LW3D	06/04/01	12:35	30.80	25.09	5.71	---	
LW3D	08/16/01	11:47	30.80	26.43	4.37	---	
LW4D	03/31/97	09:18	30.17	14.73	15.44	---	
LW4D	07/16/97	07:42	30.17	19.43	10.74	---	
LW4D	10/21/97	16:27	30.17	23.02	7.15	---	
LW4D	01/27/98	11:56	30.17	18.84	11.33	---	
LW4D	05/18/98	17:33	30.17	18.54	11.63	---	
LW4D	08/17/98	10:18	30.17	23.81	6.36	---	
LW4D	11/13/98	09:57	30.17	24.99	5.18	---	
LW4D	02/16/99	13:17	30.17	18.79	11.38	---	
LW4D	05/18/99	15:04	30.17	18.77	11.40	---	Completed sampling at 13:40
LW4D	09/21/99	11:41	30.17	24.78	5.39	---	
LW4D	12/06/99	14:18	30.17	20.21	9.96	---	
LW4D	02/16/00	10:30	30.17	20.23	9.94	---	
LW4D	05/23/00	16:54	30.17	20.55	9.62	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW4D	08/29/00	13:38	30.17	24.78	5.39	----	
LW4D	11/09/00	12:52	30.17	25.19	4.98	----	
LW4D	02/12/01	16:39	30.17	24.71	5.46	----	
LW4D	06/04/01	12:07	30.17	24.66	5.51	----	
LW4D	08/16/01	11:15	30.17	26.27	3.90	----	
LW6D	03/25/97	11:52	30.84	16.51	14.33	----	
LW6D	03/31/97	09:05	30.84	15.53	15.31	----	Faint odor
LW6D	07/16/97	07:30	30.84	20.74	10.10	----	
LW6D	10/21/97	16:16	30.84	24.05	6.79	----	
LW6D	01/27/98	11:38	30.84	19.94	10.90	----	
LW6D	05/18/98	17:28	30.84	19.36	11.48	----	
LW6D	08/17/98	10:05	30.84	24.92	5.92	----	
LW6D	11/13/98	09:50	30.84	25.94	4.90	----	
LW6D	02/16/99	13:11	30.84	20.40	10.44	----	
LW6D	05/18/99	14:53	30.84	19.81	11.03	----	
LW6D	09/21/99	11:32	30.84	25.92	4.92	----	
LW6D	12/06/99	14:09	30.84	20.86	9.98	----	
LW6D	02/16/00	10:20	30.84	21.27	9.57	----	
LW6D	05/23/00	16:35	30.84	21.64	9.20	----	
LW6D	08/29/00	13:20	30.84	25.93	4.91	----	
LW6D	11/09/00	12:35	30.84	26.21	4.63	----	
LW6D	02/12/01	16:03	30.84	25.37	5.47	----	
LW6D	06/04/01	11:42	30.84	25.30	5.54	----	
LW6D	08/16/01	10:54	30.84	26.72	4.12	----	
LW9D	05/18/99	14:56	30.98	20.02	10.96	----	
LW9D	09/21/99	11:34	30.98	25.23	5.75	----	
LW9D	12/06/99	14:11	30.98	21.04	9.94	----	
LW9D	02/16/00	10:23	30.98	21.17	9.81	----	
LW9D	05/23/00	16:39	30.98	21.15	9.83	----	
LW9D	08/29/00	13:27	30.98	25.36	5.62	----	
LW9D	11/09/00	12:43	30.98	25.96	5.02	----	
LW9D	02/12/01	16:11	30.98	25.13	5.85	----	
LW9D	06/04/01	11:49	30.98	25.15	5.83	----	
LW9D	08/16/01	11:02	30.98	26.57	4.41	----	
LW10D	05/18/99	15:00	31.12	19.82	11.30	----	
LW10D	09/21/99	11:37	31.12	25.81	5.31	----	
LW10D	12/06/99	14:15	31.12	21.18	9.94	----	
LW10D	02/16/00	10:27	31.12	21.20	9.92	----	
LW10D	05/23/00	16:42	31.12	21.51	9.61	----	
LW10D	08/29/00	13:29	31.12	25.86	5.26	----	
LW10D	11/09/00	12:46	31.12	26.26	4.86	----	
LW10D	02/12/01	16:15	31.12	25.63	5.49	----	
LW10D	06/04/01	11:52	31.12	25.62	5.50	----	
LW10D	08/16/01	11:04	31.12	27.16	3.96	----	
LW11D	05/18/99	15:09	29.04	18.59	10.45	----	
LW11D	09/21/99	11:50	29.04	20.76	8.28	----	
LW11D	12/06/99	15:06	29.04	21.81	7.23	----	
LW11D	02/16/00	11:02	29.04	20.35	8.69	----	
LW11D	05/23/00	17:37	29.04	19.50	9.54	----	
LW11D	08/29/00	14:54	29.04	----	----	----	Well purged dry 8/28; sampled a.m. on 8/29
LW11D	11/09/00		29.04	----	----	----	Well sampled 11/8/00 - water level not representative
LW11D	02/12/01	15:16	29.04	23.14	5.90	----	
LW11D	06/04/01	13:11	29.04	23.35	5.69	----	
LW11D	08/16/01	11:25	29.04	26.94	2.10	----	
LW12D1	05/18/99	15:13	30.02	18.45	11.57	----	
LW12D1	09/21/99	11:54	30.02	24.44	5.58	----	
LW12D1	12/06/99	14:21	30.02	19.72	10.30	----	
LW12D1	02/16/00	10:35	30.02	19.89	10.13	----	
LW12D1	05/23/00	17:00	30.02	20.23	9.79	----	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW12D1	08/29/00	13:45	30.02	24.38	5.64	---	
LW12D1	11/09/00	13:00	30.02	24.66	5.36	---	
LW12D1	02/12/01	15:57	30.02	23.92	6.10	---	
LW12D1	06/04/01	12:32	30.02	23.99	6.03	---	
LW12D1	08/16/01	11:42	30.02	25.39	4.63	---	
LW12D2	05/18/99	15:14	29.24	18.23	11.01	---	
LW12D2	09/21/99	11:53	29.24	24.69	4.55	---	
LW12D2	12/06/99	14:22	29.24	19.40	9.84	---	
LW12D2	02/16/00	10:36	29.24	19.90	9.34	---	
LW12D2	05/23/00	16:59	29.24	20.38	8.86	---	
LW12D2	08/29/00	13:44	29.24	24.68	4.56	---	
LW12D2	11/09/00	13:01	29.24	24.56	4.68	---	
LW12D2	02/12/01	15:56	29.24	23.88	5.36	---	
LW12D2	06/04/01	12:31	29.24	24.10	5.14	---	
LW12D2	08/16/01	11:43	29.24	25.43	3.81	---	
LW14D	05/23/00	16:50	30.54	21.26	9.28	---	
LW14D	08/29/00	13:35	30.54	25.68	4.86	---	
LW14D	11/09/00	12:49	30.54	25.90	4.64	---	
LW14D	02/12/01	16:20	30.54	25.33	5.21	---	
LW14D	06/04/01	12:00	30.54	25.37	5.17	---	
LW14D	08/16/01	11:08	30.54	27.00	3.54	---	
LW15D	05/23/00	16:49	30.85	21.26	9.59	---	
LW15D	08/29/00	13:34	30.85	25.54	5.31	---	
LW15D	11/09/00	12:48	30.85	25.98	4.87	---	
LW15D	02/12/01	16:18	30.85	25.43	5.42	---	
LW15D	06/04/01	11:59	30.85	25.41	5.44	---	
LW15D	08/16/01	11:07	30.85	27.05	3.80	---	
LW16D	05/23/00	16:48	28.4	18.79	9.61	---	
LW16D	08/29/00	13:32	28.4	23.07	5.33	---	
LW16D	11/09/00	12:47	28.4	23.59	4.81	---	
LW16D	02/12/01	16:17	28.4	22.94	5.46	---	
LW16D	06/04/01	11:57	28.4	23.00	5.40	---	
LW16D	08/16/01	11:05	28.4	24.43	3.97	---	
LW17D	08/29/00	13:21	27.82	22.96	4.86	---	
LW17D	11/09/00	12:36	27.82	23.17	4.65	---	
LW17D	02/12/01	16:04	27.82	22.44	5.38	---	
LW17D	06/04/01	11:44	27.82	22.42	5.40	---	
LW17D	08/16/01	10:55	27.82	23.80	4.02	---	
LW18D	08/29/00	13:25	27.82	22.79	5.03	---	
LW18D	11/09/00	12:40	27.82	22.91	4.91	---	
LW18D	02/12/01	16:10	27.82	22.56	5.26	---	
LW18D	06/04/01	11:47	27.82	22.28	5.54	---	
LW18D	08/16/01	11:00	27.82	23.81	4.01	---	
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	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
River Gauge	08/11/93	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
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	---	

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	

NM = Not measured.
N/A = 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 ZTec 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].

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TABLE A-1
SUMMARY OF WATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - AUGUST 2001
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	

NM = Not measured.
N/A = 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 ZTec 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 footnote (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].

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TABLE A-2
GROUNDWATER ANALYTICAL METHODS
THIRD QUARTER SAMPLING EVENT, AUGUST 2000
TIME OIL NORTHWEST TERMINAL

Well	Semivolatiles (8270)	Pentachlorophenol (8270 SIM)	Volatiles (8260)	TPH-D (extended)	TPH-D (extended)	TPH-G	PP Metals (6010/7000)	TDS (160.1)	Chloride (325.2)
B1	X	X	X	X	X	X	X	X	X
B2	X	X	X	X			X	X	X
D	X	X	X	X			X	X	X
G1A	X	X	X	X			X	X	X
J1	X	X	X	X			X	X	X
J2	X	X	X	X			X	X	X
K							X		
O	X		X						
R	X		X						
LW1S	X	X	X	X			X	X	X
LW1D	X	X	X	X			X	X	X
LW2S	X	X	X	X			X	X	X
LW3D	X	X	X	X			X	X	X
LW4S	X	X	X	X			X	X	X
LW4D	X	X	X	X			X	X	X
LW6D	X	X	X	X			X	X	X
LW7S	X	X	X	X			X	X	X
LW8S	X	X	X	X	X	X	X	X	X
LW9S									
LW9D	X	X	X	X			X	X	X
LW10S									
LW10D	X	X	X	X			X	X	X
LW11D	X	X	X	X			X	X	X
LW12D1	X	X	X	X			X	X	X
LW12D2	X	X	X	X			X	X	X
LW13S		X							
LW14D		X							
LW15D		X							
LW17D		X							
LW18D		X							
RW1	X	X	X	X	X	X	X	X	X
RW2	X	X	X	X	X	X	X	X	X

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	Dup of B1 X	D	J1	K	LW1S	LW2S	LW4S
Laboratory Identification:	DM30L	DM30K	DM30M	DM52B	DM52K	DM52E	DM52I	DM30C
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/15/01	8/15/01	8/15/01	8/13/01
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8270SIM								
Pentachlorophenol	0.25 U	0.25 U	0.25 U	0.25 U	N/A	0.25 U	NA	0.25 U
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	3.3
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	N/A	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	N/A	1.0 U	1.0 U	1.0 U
4-Methylphenol	50	54	1.0 U	1.0 U	N/A	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	N/A	2.0 U	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	N/A	3.0 U	3.0 U	5.9
Benzoic Acid	10 U	10 U	10 U	10 U	N/A	10 U	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	N/A	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	N/A	1.0 U	1.0 U	1.0 U
Naphthalene	13	14	1.0 U	1.0 U	N/A	1.0 U	6.8	19
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	N/A	3.0 U	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	N/A	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	N/A	2.0 U	2.0 U	2.0 U
2-Methylnaphthalene	6.8	7.4	1.0 U	1.0 U	N/A	1.0 U	1.0 U	12
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	N/A	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	N/A	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	N/A	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	N/A	6.0 U	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	N/A	10 U	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW7S	LW8S	LW13S	RW1
Laboratory Identification:	DM52J	DM30J	DM30R	DM30G
Date Collected:	8/15/01	8/14/01	8/13/01	8/13/01
CHLORINATED PHENOLS (µg/L)				
EPA Method SW8270SIM				
Pentachlorophenol	0.25 U	0.25 U	6.9	N/A
SEMIVOLATILES (µg/L)				
EPA Method SW8270				
Phenol	2.0 U	2.0 U	N/A	32
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	N/A	2.0 U
2-Chlorophenol	1.0 U	1.0 U	N/A	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	N/A	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
2-Methylphenol	1.0 U	1.0 U	N/A	1.0 U
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	N/A	1.0 U
4-Methylphenol	1.0 U	1.0 U	N/A	2.1
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	N/A	2.0 U
Hexachloroethane	2.0 U	2.0 U	N/A	2.0 U
Nitrobenzene	1.0 U	1.0 U	N/A	1.0 U
Isophorone	1.0 U	1.0 U	N/A	1.0 U
2-Nitrophenol	5.0 U	5.0 U	N/A	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	N/A	3.0 U
Benzoic Acid	10 U	10 U	N/A	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	N/A	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	N/A	3.0 U
1,2,4-Trichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
Naphthalene	1.8	2.3	N/A	2.7
4-Chloroaniline	3.0 U	3.0 U	N/A	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	N/A	2.0 U
4-Chloro-3-methylphenol	2.0 U	2.0 U	N/A	2.0 U
2-Methylnaphthalene	1.0 U	2.6	N/A	1.0 U
Hexachlorocyclopentadiene	5.0 U	5.0 U	N/A	5.0 U
2,4,6-Trichlorophenol	5.0 U	5.0 U	N/A	5.0 U
2,4,5-Trichlorophenol	5.0 U	5.0 U	N/A	6.9
2-Chloronaphthalene	1.0 U	1.0 U	N/A	1.0 U
2-Nitroaniline	5.0 U	5.0 U	N/A	5.0 U
Dimethylphthalate	1.0 U	1.0 U	N/A	1.0 U
Acenaphthylene	1.0 U	1.0 U	N/A	1.0 U
3-Nitroaniline	6.0 U	6.0 U	N/A	6.0 U
Acenaphthene	1.0 U	1.0 U	N/A	1.0 U
2,4-Dinitrophenol	10 U	10 U	N/A	10 U
4-Nitrophenol	5.0 U	5.0 U	N/A	5.0 U
Dibenzofuran	1.0 U	1.0 U	N/A	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	N/A	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	Dup of B1 X	D	J1	K	LW1S	LW2S	LW4S
Laboratory Identification:	DM30L	DM30K	DM30M	DM52B	DM52K	DM52E	DM52I	DM30C
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/15/01	8/15/01	8/15/01	8/13/01
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 UJ	N/A	5.0 UJ	5.0 UJ	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	N/A	10 U	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	700	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	N/A	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	N/A	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	N/A	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	N/A	1.0 U	1.0 U	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW7S	LW8S	LW13S	RW1
Laboratory Identification:	DM52J	DM30J	DM30R	DM30G
Date Collected:	8/15/01	8/14/01	8/13/01	8/13/01
2,4-Dinitrotoluene	5.0 UJ	5.0 U	N/A	5.0 U
Diethylphthalate	1.0 U	1.0 U	N/A	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	N/A	1.0 U
Fluorene	1.0 U	1.0 U	N/A	1.0 U
4-Nitroaniline	5.0 U	5.0 U	N/A	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	N/A	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	N/A	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	N/A	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	N/A	1.0 U
Pentachlorophenol	5.0 U	5.0 U	N/A	410
Phenanthrene	1.0 U	1.0 U	N/A	1.0 U
Carbazole	1.0 U	1.0 U	N/A	1.0 U
Anthracene	1.0 U	1.0 U	N/A	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	N/A	1.0 U
Fluoranthene	1.0 U	1.0 U	N/A	1.0 U
Pyrene	1.0 U	1.0 U	N/A	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	N/A	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	N/A	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	N/A	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	N/A	1.0 U
Chrysene	1.0 U	1.0 U	N/A	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	N/A	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	N/A	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	N/A	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	N/A	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	N/A	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	N/A	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	N/A	1.0 U

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BZTO104(e)016332

TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	Dup of B1 X	D	J1	K	LW1S	LW2S	LW4S
Laboratory Identification:	DM30L	DM30K	DM30M	DM52B	DM52K	DM52E	DM52I	DM30C
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/15/01	8/15/01	8/15/01	8/13/01
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Bromomethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Vinyl Chloride	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Chloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Methylene Chloride	40 U	40 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	6.0 U
Acetone	230	280	5.0 U	5.0 U	N/A	5.0 U	20	15 U
Carbon Disulfide	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1-Dichloroethene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1-Dichloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
trans-1,2-Dichloroethene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
cis-1,2-Dichloroethene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Chloroform	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,2-Dichloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
2-Butanone	100 U	160	5.0 U	5.0 U	N/A	5.0 U	32	15 U
1,1,1-Trichloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Carbon Tetrachloride	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Vinyl Acetate	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
Bromodichloromethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,2-Dichloropropane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
cis-1,3-Dichloropropene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Trichloroethene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Dibromochloromethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1,2-Trichloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Benzene	180 J	230 J	1.0 U	1.0 U	N/A	1.0 U	1.0 U	78
trans-1,3-Dichloropropene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Bromoform	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
4-Methyl-2-Pentanone (MIBK)	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
2-Hexanone	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
Tetrachloroethene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1,2,2-Tetrachloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0	3.0 U
Toluene	1400 J	1900 J	1.0 U	1.0 U	N/A	1.0 U	1.0 U	6.9
Chlorobenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	10	3.0 U
Ethylbenzene	130	150	1.0 U	1.0 U	N/A	1.0 U	1.0 U	140
Styrene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Trichlorofluoromethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1,2-Trichlorotrifluoroethane	40 U	40 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	6.0 U
m,p-Xylene	450	530	1.0 U	1.0 U	N/A	1.0 U	14	460
o-Xylene	210	250	1.0 U	1.0 U	N/A	1.0 U	36	180
1,2-Dichlorobenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,3-Dichlorobenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW7S	LW8S	LW13S	RW1
Laboratory Identification:	DM52J	DM30J	DM30R	DM30G
Date Collected:	8/15/01	8/14/01	8/13/01	8/13/01
VOLATILES (µg/L)				
EPA Method SW8260				
Chloromethane	1.0 U	1.0 U	N/A	1.0 U
Bromomethane	1.0 U	1.0 U	N/A	1.0 U
Vinyl Chloride	1.0 U	1.0 U	N/A	1.0 U
Chloroethane	1.0 U	1.0 U	N/A	1.0 U
Methylene Chloride	2.0 U	2.0 U	N/A	2.0 U
Acetone	5.0 U	8.2 U	N/A	7.2 M
Carbon Disulfide	1.0 U	1.0 U	N/A	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	N/A	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	N/A	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	N/A	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	N/A	1.0 U
Chloroform	1.0 U	1.0 U	N/A	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	N/A	1.0 U
2-Butanone	7.7	5.3 U	N/A	5.6
1,1,1-Trichloroethane	1.0 U	1.0 U	N/A	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	N/A	1.0 U
Vinyl Acetate	5.0 U	5.0 U	N/A	5.0 U
Bromodichloromethane	1.0 U	1.0 U	N/A	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	N/A	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	N/A	1.0 U
Trichloroethene	1.0 U	1.0 U	N/A	1.0 U
Dibromochloromethane	1.0 U	1.0 U	N/A	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	N/A	1.0 U
Benzene	1.0 U	2.0	N/A	11
trans-1,3-Dichloropropene	1.0 U	1.0 U	N/A	1.0 U
Bromoform	1.0 U	1.0 U	N/A	1.0 U
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	N/A	5.0 U
2-Hexanone	5.0 U	5.0 U	N/A	5.0 U
Tetrachloroethene	1.0 U	1.0 U	N/A	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	2.6 U	N/A	1.0 U
Toluene	1.0 U	1.0 U	N/A	18
Chlorobenzene	1.0 U	1.0 U	N/A	1.0 U
Ethylbenzene	18	11	N/A	82
Styrene	1.0 U	1.0 U	N/A	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	N/A	1.0 U
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	N/A	2.0 U
m,p-Xylene	10	1.0 U	N/A	200
o-Xylene	1.0 U	1.0 U	N/A	120
1,2-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	Dup of B1 X	D	J1	K	LW1S	LW2S	LW4S
Laboratory Identification:	DM30L	DM30K	DM30M	DM52B	DM52K	DM52E	DM52I	DM30C
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/15/01	8/15/01	8/15/01	8/13/01
1,4-Dichlorobenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Acrolein	1000 U	1000 U	50 U	50 U	N/A	50 U	50 U	150 U
Methyl Iodide	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Bromoethane	40 U	40 U	2.0 U	2.0 U	N/A	2.0 U	2.0 U	6.0 U
Acrylonitrile	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1-Dichloropropene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Dibromomethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,1,1,2-Tetrachloroethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,2-Dibromo-3-chloropropane	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
1,2,3-Trichloropropane	60 U	60 U	3.0 U	3.0 U	N/A	3.0 U	3.0 U	9.0 U
trans-1,4-Dichloro-2-butene	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
1,3,5-Trimethylbenzene	33	37	1.0 U	1.0 U	N/A	1.0 U	34	94
1,2,4-Trimethylbenzene	110	130	1.0 U	1.0 U	N/A	1.0 U	200	280
Hexachlorobutadiene	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
Ethylene Dibromide	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Bromochloromethane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
2,2-Dichloropropane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
1,3-Dichloropropane	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
Isopropylbenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	13	37
n-Propylbenzene	22	24	1.0 U	1.1	N/A	1.0 U	28	48
Bromobenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
2-Chlorotoluene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
4-Chlorotoluene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
tert-Butylbenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	1.0 U	3.0 U
sec-Butylbenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	15	3.0 U
4-Isopropyltoluene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	13	6.7
n-Butylbenzene	20 U	20 U	1.0 U	1.0 U	N/A	1.0 U	12 M	7.5 U
1,2,4-Trichlorobenzene	100 U	100 U	5.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U
Naphthalene	100 U	100 U	7.5 U	5.0 U	N/A	5.0 U	28	27
1,2,3-Trichlorobenzene	100 U	100 U	6.0 U	5.0 U	N/A	5.0 U	5.0 U	15 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW7S	LW8S	LW13S	RW1
Laboratory Identification:	DM52J	DM30J	DM30R	DM30G
Date Collected:	8/15/01	8/14/01	8/13/01	8/13/01
1,4-Dichlorobenzene	1.0 U	1.0 U	N/A	1.0 U
Acrolein	50 U	50 U	N/A	50 U
Methyl Iodide	1.0 U	1.0 U	N/A	1.0 U
Bromoethane	2.0 U	2.0 U	N/A	2.0 U
Acrylonitrile	1.0 U	2.5 U	N/A	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U	N/A	1.0 U
Dibromomethane	1.0 U	1.0 U	N/A	1.0 U
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	N/A	1.0 U
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	N/A	5.0 U
1,2,3-Trichloropropane	3.0 U	3.0 U	N/A	3.0 U
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	N/A	5.0 U
1,3,5-Trimethylbenzene	1.6	1.7	N/A	40
1,2,4-Trimethylbenzene	2.3	1.8	N/A	150
Hexachlorobutadiene	5.0 U	5.0 U	N/A	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	N/A	1.0 U
Bromochloromethane	1.0 U	1.0 U	N/A	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	N/A	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	N/A	1.0 U
Isopropylbenzene	21	67	N/A	29
n-Propylbenzene	27	40	N/A	36
Bromobenzene	1.0 U	1.0 U	N/A	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	N/A	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	N/A	1.0 U
tert-Butylbenzene	1.0 U	4.7	N/A	1.0 U
sec-Butylbenzene	2.2	8.7	N/A	6.8
4-Isopropyltoluene	1.0 U	1.0 U	N/A	3.8
n-Butylbenzene	2.8 M	3.2 M	N/A	4.8 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	N/A	5.0 U
Naphthalene	7.0	5.0 U	N/A	14
1,2,3-Trichlorobenzene	5.0 U	5.0 U	N/A	5.0 U

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	B1	Dup of B1 X	D	J1	K	LW1S	LW2S	LW4S
Laboratory Identification:	DM30L	DM30K	DM30M	DM52B	DM52K	DM52E	DM52I	DM30C
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/15/01	8/15/01	8/15/01	8/13/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method NWTPH								
TPH-Diesel Range	8.7 J	6.9 J	N/A	N/A	N/A	N/A	5.4	4.1
TPH-Motor Oil Range	5.0 U	5.0 U	N/A	N/A	N/A	N/A	N/A	N/A
TPH-Gasoline Range	19	19	N/A	N/A	N/A	N/A	N/A	N/A
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0.009	0.009	0.018	0.014	0.001	0.011	0.019	0.010
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
Copper (6010)	0.002 U	0.002 U	0.002 U	0.002 U	0.002	0.002 U	0.004	0.002 U
Lead (7421)	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	0.001 U
Nickel (6010)	0.01 U	0.01 U	0.01 U	0.01 U	0.03	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.006 U	0.006 U	0.006 U	0.007	0.006 U	0.012	0.007
CONVENTIONALS (mg/L)								
Calcium (6010)	15.2	16.4	34.3	22.7	40.3	25.8	24.3	144
Magnesium (6010)	6.11	6.64	12.0	8.65	13.7	10.2	7.63	43.6
Potassium (6010)	2.1	2.5	1.9	2.6	4.4	2.2	3.1	6.4
Sodium (6010)	6.43	6.89	6.73	6.58	8.24	7.24	5.84	11.5
Total Dissolved Solids (EPA 160.1)	140	130	180	150	NA	160	210	580 J
Chloride (EPA 325.2)	8.0 J	6.0 J	4.5	6.2	NA	3.7	26	7.1
FIELD PARAMETERS								
pH (avg)	6.43	6.49	6.94	6.85	6.92	6.94	6.54	6.75
Temperature (° C) (avg)	15.1	15.2	14.5	15.8	15.4	15.8	15.5	16.2
Conductivity (mS/cm) (avg)	259	248	331	278	350	245	299	973
Dissolved oxygen (mg/L) (avg)	1.59	1.61	1.54	1.44	3.01	1.09	3.04	0.84
Turbidity (NTU)	8	7	1	4	5	4	280	4

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TABLE A-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS			
Sample Identification:	LW7S	LW8S	LW13S	RW1
Laboratory Identification:	DM52J	DM30J	DM30R	DM30G
Date Collected:	8/15/01	8/14/01	8/13/01	8/13/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)				
Method NWTPH				
TPH-Diesel Range	0.26	4.0	N/A	4.3
TPH-Motor Oil Range	N/A	2.5 U	N/A	2.5 U
TPH-Gasoline Range	N/A	3.9	N/A	7.7
PRIORITY POLLUTANT				
METALS (mg/L)				
Arsenic (7060)	0.019	0.028	NA	0.008
Chromium (6010)	0.005 U	0.005 U	NA	0.005 U
Copper (6010)	0.002 U	0.002 U	NA	0.002 U
Lead (7421)	0.001 U	0.001 U	NA	0.001 U
Nickel (6010)	0.01 U	0.01 U	NA	0.01 U
Zinc (6010)	0.006 U	0.006 U	NA	0.006 U
CONVENTIONALS (mg/L)				
Calcium (6010)	41.0	27.5	NA	45.3
Magnesium (6010)	15.3	7.58	NA	15.2
Potassium (6010)	3.2	2.8	NA	3.5
Sodium (6010)	18.8	7.86	NA	6.62
Total Dissolved Solids (EPA 160.1)	250	200	NA	220 J
Chloride (EPA 325.2)	5.3	5.3	NA	7.6
FIELD PARAMETERS				
pH (avg)	6.93	6.61	6.82	6.54
Temperature (° C) (avg)	15.2	15.0	15.2	16.4
Conductivity (mS/cm) (avg)	433	467	383	389
Dissolved oxygen (mg/L) (avg)	1.06	1.85	1.49	1.10
Turbidity (NTU)	10	18	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DM30N	DM52A	DM30S	DM30T	DM30A	DM52D	DM52C	DM30D	DM30B
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/13/01	8/15/01	8/15/01	8/13/01	8/13/01
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	0.25 U	0.25 U	N/A	N/A	0.25 U	0.25 U	0.25 U	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	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	3.3	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	1.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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

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1/30/02 s:\sheets\timeoil\ph2ri\Gwevnt16 deep

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								DEEP WELLS	
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 W
Laboratory Identification:	DM30F	DM30E	DM52G	DM52H	DM52F	DM30Q	DM30P	DM30O	DM30I	DM30H
Date Collected:	8/14/01	8/13/01	8/15/01	8/15/01	8/15/01	8/13/01	8/13/01	8/13/01	8/13/01	8/13/01
CHLORINATED PHENOLS (µg/L)										
EPA Method SW8270SIM										
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	5.0	5.0
SEMIVOLATILES (µg/L)										
EPA Method SW8270										
Phenol	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	2.0 U	2.0 U
2-Chlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	2.0 U	2.0 U
Hexachloroethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	N/A	N/A	N/A	2.0 U	2.0 U
Nitrobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Isophorone	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
2,4-Dimethylphenol	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	N/A	N/A	N/A	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	N/A	N/A	N/A	10 U	10 U
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2,4-Dichlorophenol	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.6	1.8
4-Chloroaniline	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	N/A	N/A	N/A	3.0 U	3.0 U
Hexachlorobutadiene	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	2.0 U	2.0 U
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	6.5	6.4
Hexachlorocyclopentadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	5.0 U	5.0 U
2-Chloronaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
3-Nitroaniline	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	N/A	N/A	N/A	6.0 U	6.0 U
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	N/A	N/A	N/A	10 U	10 U
4-Nitrophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2,6-Dinitrotoluene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DM30N	DM52A	DM30S	DM30T	DM30A	DM52D	DM52C	DM30D	DM30B
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/13/01	8/15/01	8/15/01	8/13/01	8/13/01
2,4-Dinitrotoluene	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	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	1.6	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	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 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	5.0 U	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	1.0 U	1.0 U	2.0	5.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 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	1.0 U	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(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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								DEEP WELLS	
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 W
Laboratory Identification:	DM30F	DM30E	DM52G	DM52H	DM52F	DM30Q	DM30P	DM30O	DM30I	DM30H
Date Collected:	8/14/01	8/13/01	8/15/01	8/15/01	8/15/01	8/13/01	8/13/01	8/13/01	8/13/01	8/13/01
2,4-Dinitrotoluene	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ	N/A	N/A	N/A	5.0 U	5.0 U
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
4-Chlorophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
4-Nitroaniline	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	N/A	N/A	N/A	10 U	10 U
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
4-Bromophenyl-phenylether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Carbazole	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
3,3'-Dichlorobenzidine	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	2.0	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DM30N	DM52A	DM30S	DM30T	DM30A	DM52D	DM52C	DM30D	DM30B
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/13/01	8/15/01	8/15/01	8/13/01	8/13/01
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	10	5.6	5.0 U	38	42	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	13	5.0 U	5.0 U	5.0 U	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	13	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	1.1	2.8	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	1.1	3.4	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

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								DEEP WELLS	
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 W
Laboratory Identification:	DM30F	DM30E	DM52G	DM52H	DM52F	DM30Q	DM30P	DM30O	DM30I	DM30H
Date Collected:	8/14/01	8/13/01	8/15/01	8/15/01	8/15/01	8/13/01	8/13/01	8/13/01	8/13/01	8/13/01
VOLATILES (µg/L)										
EPA Method SW8260										
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Methylene Chloride	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	N/A	N/A	N/A	2.0 U	2.0 U
Acetone	5.0 U	5.0 U	10	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 U	5.0 U	5.7	5.0 U	N/A	N/A	N/A	5.2	5.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Vinyl Acetate	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	5.0 U	5.0 U
2-Hexanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	3.1	3.4
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Trichlorofluoromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	2.0 U	2.0 U
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	6.8	7.8
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.6
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DM30N	DM52A	DM30S	DM30T	DM30A	DM52D	DM52C	DM30D	DM30B
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/13/01	8/15/01	8/15/01	8/13/01	8/13/01
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
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U	1.2 U	5.1 U	1.0 U	1.0 U	1.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	5.0 U	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	3.0 U	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	5.0 U	5.0 U	5.0 U
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	3.4	1.0 U
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	49	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	32	30	130	1.0 U	1.0 U	14	8.8
n-Propylbenzene	1.0 U	1.0 U	13	16	120	1.0 U	1.0 U	16	1.4
Bromobenzene	1.0 U	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-Chlorotoluene	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	3.2	1.0 U	1.0 U	1.3 M	2.8
sec-Butylbenzene	1.0 U	1.0 U	5.0	3.8	17	1.0 U	1.0 U	4.1	4.3
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
n-Butylbenzene	1.0 U	1.0 U	2.0	1.0 U	11	1.0 U	1.0 U	3.4 M	1.4 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
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
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								DEEP WELLS	
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 W
Laboratory Identification:	DM30F	DM30E	DM52G	DM52H	DM52F	DM30Q	DM30P	DM30O	DM30I	DM30H
Date Collected:	8/14/01	8/13/01	8/15/01	8/15/01	8/15/01	8/13/01	8/13/01	8/13/01	8/13/01	8/13/01
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Acrolein	50 U	50 U	50 U	50 U	50 U	N/A	N/A	N/A	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Bromoethane	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	N/A	N/A	N/A	2.0 U	2.0 U
Acrylonitrile	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,1-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	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	N/A	N/A	N/A	5.0 U	5.0 U
1,3,5-Trimethylbenzene	1.0 U	1.0 U	2.2	1.5	1.0 U	N/A	N/A	N/A	6.5	6.7
1,2,4-Trimethylbenzene	1.0 U	1.0 U	3.6	7.5	1.0 U	N/A	N/A	N/A	23	26
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Ethylene Dibromide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
1,3-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	24	25
n-Propylbenzene	1.0 U	1.0 U	1.2	1.0 U	1.0 U	N/A	N/A	N/A	28	29
Bromobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
2-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
4-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.1 M	1.0
sec-Butylbenzene	1.0 U	1.0 U	1.4	1.0 U	1.0 U	N/A	N/A	N/A	3.9	4.1
4-Isopropyltoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	N/A	N/A	N/A	1.0 U	1.0 U
n-Butylbenzene	1.0 U	1.0 U	1.5	1.0 U	1.0 U	N/A	N/A	N/A	3.0 M	3.3
1,2,4-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U
Naphthalene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	N/A	N/A	N/A	5.0 U	5.0 U

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	DM30N	DM52A	DM30S	DM30T	DM30A	DM52D	DM52C	DM30D	DM30B
Date Collected:	8/14/01	8/14/01	8/14/01	8/14/01	8/13/01	8/15/01	8/15/01	8/13/01	8/13/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method NWTPH									
TPH-Diesel Range	N/A	N/A	N/A	N/A	3.3	N/A	N/A	3.4	1.7
TPH-Motor Oil Range	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TPH-Gasoline Range	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PRIORITY POLLUTANT									
METALS (mg/L)									
Arsenic (7060)	0.010	0.010	N/A	N/A	0.040	0.006	0.018	0.032	0.020
Chromium (6010)	0.005 U	0.005 U	N/A	N/A	0.013	0.005 U	0.005 U	0.005 U	0.005 U
Copper (6010)	0.002 U	0.002 U	N/A	N/A	0.017	0.002 U	0.002 U	0.004	0.003
Lead (7421)	0.001 U	0.001 U	N/A	N/A	0.008	0.001 U	0.001 U	0.001	0.002
Nickel (6010)	0.01 U	0.01 U	N/A	N/A	0.01	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.006 U	N/A	N/A	0.033	0.006 U	0.012	0.012	0.009
CONVENTIONALS (mg/L)									
Calcium (6010)	42.0	49.5	N/A	N/A	67.9	50.2	55.1	81.3	40.8
Magnesium (6010)	18.3	30.0	N/A	N/A	24.9	32.0	25.4	35.2	16.8
Potassium (6010)	3.9	2.1	N/A	N/A	2.4	1.4	3.4	1.5	2.6
Sodium (6010)	11.4	14.8	N/A	N/A	13.5	13.3	12.6	16.5	10.4
Total Dissolved Solids (EPA 160.1)	270	350	N/A	N/A	330 J	360	310	430 J	220 J
Chloride (EPA 325.2)	6.1	5.9	N/A	N/A	10	3.1	4.5	18	3.8
FIELD PARAMETERS									
pH (avg)	6.96	6.91	6.80	7.00	6.79	7.11	6.54	6.94	6.72
Temperature (° C) (avg)	16.3	15.7	15.9	15.1	15.5	16.3	14.4	15.4	15.7
Conductivity (mS/cm) (avg)	608	594	563	628	614	503	628	757	413
Dissolved oxygen (mg/L) (avg)	1.98	1.30	1.89	1.26	1.41	1.34	11.14	0.98	1.50
Turbidity (NTU)	16	4	34	89	63	148	40	1	0

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TABLE A-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
THIRD QUARTERLY SAMPLING EVENT, AUGUST 2001
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								DEEP WELLS	
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D	RW2	Dup of RW2 W
Laboratory Identification:	DM30F	DM30E	DM52G	DM52H	DM52F	DM30Q	DM30P	DM30O	DM30I	DM30H
Date Collected:	8/14/01	8/13/01	8/15/01	8/15/01	8/15/01	8/13/01	8/13/01	8/13/01	8/13/01	8/13/01
TOTAL PETROLEUM HYDROCARBONS (mg/L)										
Method NWTPH										
TPH-Diesel Range	0.25 U	0.25 U	0.88	0.81	N/A	N/A	N/A	N/A	1.4	1.2
TPH-Motor Oil Range	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.50 U	0.50 U
TPH-Gasoline Range	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.3	1.3
PRIORITY POLLUTANT										
METALS (mg/L)										
Arsenic (7060)	0.044	0.027	0.009	0.017	0.024	N/A	N/A	N/A	0.019	0.020
Chromium (6010)	0.005 U	0.019	0.024	0.032	0.005 U	N/A	N/A	N/A	0.005 U	0.005 U
Copper (6010)	0.002	0.024	0.024	0.038	0.002 U	N/A	N/A	N/A	0.002 U	0.002 U
Lead (7421)	0.001 U	0.008	0.008	0.012	0.001 U	N/A	N/A	N/A	0.001 U	0.001 U
Nickel (6010)	0.01 U	0.01	0.02	0.03	0.01 U	N/A	N/A	N/A	0.01 U	0.01 U
Zinc (6010)	0.006 U	0.039	0.064	0.074	0.006 U	N/A	N/A	N/A	0.020 J	0.028 J
CONVENTIONALS (mg/L)										
Calcium (6010)	39.8	22.5	55.9	53.1	29.4	N/A	N/A	N/A	39.0	41.0
Magnesium (6010)	13.8	12.1	27.6	29.0	13.7	N/A	N/A	N/A	17.1	17.8
Potassium (6010)	1.8	1.5	2.9	1.9	2.4	N/A	N/A	N/A	2.8	2.8
Sodium (6010)	5.76	9.09	17.5	11.5	13.5	N/A	N/A	N/A	12.3	12.9
Total Dissolved Solids (EPA 160.1)	200	160 J	300	320	210	N/A	N/A	N/A	270 J	290 J
Chloride (EPA 325.2)	3.3	4.1	8.3	7.8	7.9	N/A	N/A	N/A	8.9	8.2
FIELD PARAMETERS										
pH (avg)	6.97	7.03	7.80	7.20	6.96	6.81	6.67	6.60	6.70	6.68
Temperature (° C) (avg)	14.6	16.2	14.7	14.4	14.0	14.1	15.3	15.2	15.7	15.6
Conductivity (mS/cm) (avg)	324	216	488	469	356	296	544	623	455	454
Dissolved oxygen (mg/L) (avg)	1.80	0.63	1.43	1.96	0.34	0.83	1.69	1.82	0.52	0.37
Turbidity (NTU)	107	855	45	267	0	999	0	144	0	0

Note: See Table A-5 for key to footnotes and analytical data qualifiers.

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APPENDIX B

Data Validation Report

To be provided with final document.

APPENDIX C

Laboratory Data

To be provided with final document.

Be Yourself
Next
LADIES FITNESS

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The Review

HOT SPOTS

JOE JUMPS
Readers' responses
Joe Peschisolido's web site
E-mail Joe
Liberal Party of Canada
Canadian Alliance

SPORTS
Richmond Kajaks
West Richmond Boys Soccer
Richmond Girls Softball
Richmond Rugby Club
Richmond Senior Soccer
Richmond Sockeyes

COMMUNITY LINKS
Richmond Public Library
City of Richmond
Chamber of Commerce
Richmond School District
Tourism Richmond
Richmond Block Watch
Richmond Health Services
SUCCESS
Richmond Museum

ARTS
Gateway Theatre
Richmond Community Orchestra and Chorus
Richmond Art Gallery

SERVICE GROUPS
Richmond Youth Services
RADAT
Volunteer Richmond
Heart of Richmond AIDS Society

LOCAL WEBSITES
The Review Archives
Vancouver Int'l Airport
Kwantlen University College
Gulf of Georgia Cannery

TALL SHIPS
American Sail Training Assoc.
Tall Ships archives
Richmond Tall Ships 2002
Richmond Maritime Society

SISTER PAPERS
Abbotsford News

BACK SEND TO A FRIEND FEED BACK

01/31/2002

Experts warn of toxic soil risk

By Martin van den Hemel

A proposed shipment of 8,600 tonnes of dioxin-laced soil earmarked for a Richmond landfill should be handled with extreme caution, two United States experts warn.

Dr. Peter Defur, a dioxin toxicology expert at Virginia Commonwealth University in Richmond, Virginia, told The Richmond Review that dioxin levels in the contaminated soil from Portland, Oregon would trigger an expensive site clean-up in the United States under Environmental Protection Agency laws.

Dioxins are a toxic class of chemical compounds containing chlorine that scientists have linked to cancer and other ailments.

The fact that the dioxins will not be removed, that Richmond is a lowland area in the midst of an earthquake zone, and that the dioxins will be stored in a landfill not specially designed to contain the toxic chemical, is asking for trouble, Defur said.

"With all those factors, the probability of something going wrong is increased dramatically," he said.

"Putting it in a lowland area is really unacceptable for hazardous waste and this is hazardous waste."

The soil from the Time Oil Company site in Oregon has dioxin levels of between 1.2 and 5.6 parts per billion, and an average of 3 parts per billion.

Defur said those levels are enough of a concern in the United States that it would be deemed hazardous waste, which must be entombed in specially-designed double-lined bunkers with leachate collection systems.

"They've done that because it's better safe than sorry. It's a forever sort of waste, particularly in soils," Defur said, noting that the dioxin levels will remain the same for decades and lifetimes to come. "That level of dioxin is not benign."

BZTO104(e)016351

Aldergrove Star
Agassiz Harrison Observer
Burnaby NewsLeader
Chilliwack Progress
Hope Standard
Langley Times
Maple Ridge News
Mission City Record
New West NewsLeader
North Shore Outlook
Peace Arch News
South Delta Leader
Surrey Leader
Tri-City News
WestEnder
other BCNG sites

Stephen Lester, science director for the Centre for Health, Environment and Justice, in Falls Church, Virginia, outside of Washington, D.C. said dioxin levels in the environment are already at levels where adverse health effects have been observed.

"What is clear...(is that) any additional exposures are likely to have significant impacts. This is a serious contaminated material."

The controversy surrounding the shipment has caught Hazco vice-president Gregory Campbell and Ecowaste president Stuart Somerville by surprise.

"It's very hurtful actually," Campbell said, referring to the negative publicity surrounding the soil.

"We think we're doing a good thing," Somerville added.

They took The Richmond Review for a tour of the 400-acre site at 15111 Williams Rd. and explained how the soil will be treated and stored.

The 8,600 tonnes of soil represents a relatively small amount of soil, filling an average Richmond residential lot of 120 feet by 60 feet about 12 feet deep.

The soil will first be placed on a specially-designed asphalt bed with drainage channels that collects any liquid that leaches from the soil.

The mountain of soil will be covered with plastic, and it will sit for anywhere from a few months to a year as the naturally-occurring microbes eat one of the major contaminants, the wood preservative pentachlorophenol, or PCP.

After regular and frequent testing, once the PCP levels have dropped to acceptable standards, the soil will be moved to the regular landfill, which handles mainly non-recyclable construction demolition site waste.

At this point, Somerville said provincial regulations deem the soil to be clean.

The Ecowaste landfill sits atop an impermeable clay layer that has a series of collection pipes tied into it. The runoff is tested monthly in some cases.

"We're a pretty benign sort of operation," Somerville said.

He noted that dioxins are found almost everywhere, including everyday foods like ice cream and is even found in breastmilk.

Laurie Valeriano, policy director for the non-profit environmental health organization Washington Toxics Coalition, agrees that dioxins are fairly ubiquitous, but said that's not a good thing or a reason to brush it off as acceptable.

"It's there because we're putting it into the environment," Valeriano

BZTO104(e)016352

said.

Defur expects that the EPA will bring in even more stringent regulations regarding dioxins later this year, predicting the EPA will drop the site clean-up trigger point an order of magnitude, from one part per billion to 100 parts per trillion. That makes the soil earmarked for Richmond 10 to 50 times higher.

A forthcoming city staff report will include options for dealing with the proposal and whether the city should consider its own soil disposal regulations.

BZTO104(e)016353

Landau Associates
Environmental and Geotechnical Services

REC'D JAN 1 1 2002

January 8, 2002

86-102
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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 2001 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Senior Hydrogeologist

RB/tam
1/8/02 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. ✓

130 2nd AVENUE SOUTH • EDMONDS, WA 98020
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MONTHLY REPORT TO DEQ
TIME OIL - NORTHWEST TERMINAL
December 2001

SUMMARY OF WORK PERFORMED

- Prepared and submitted the November 2001 monthly report to DEQ.
- Continued implementation of the groundwater interim action in the lower zone at RW-2. Approximately a total of 1.32 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.
- Continued review of the system operations performance for the groundwater interim action system and the onsite wastewater treatment system.
- Reinstalled the Grundfos® submersible pump and conductivity sensor in horizontal recovery well, HRW-1 (removed for performance of vacuum-enhanced pumping test). The water level in the well has risen above the sensor; therefore, preparation began for implementation of startup of the groundwater interim action in the upper zone at HRW-1 using the submersible pump.
- Continued client review of the *Soil Stockpile Removal Action Plan.*
- Received approval from EPA regarding the export of hazardous material in the soil stockpile from the United States. Received approval from Environment Canada and the British Columbia Ministry of Environment regarding the import of the material to Canada.
- Continued internal review of the *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report.*
- Began processing fourth quarter 2001 groundwater data.
- 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.*
- Finalized contract with GIS\Solutions, the GIS consultant for conversion of data for the Northwest Terminal projects to a GIS database format, and scheduled software installation and training.
- Continued preparation of the *East Property Remedial Action Plan*, including confirmation of pre-remediation investigation sample locations with a GPS survey.

RESULTS COLLECTED

- Fourth quarter 2001 groundwater results. The analytical results will be provided to DEQ following completion of data process and validation and with the quarterly groundwater report.

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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. Continue full-scale treatment and discharge to POTW.
- Begin startup activities for the groundwater interim action in the upper zone at HRW-1, including collection of baseline groundwater levels, testing of the pumping system, system startup and groundwater level measurements, and effluent sampling and analysis.
- Complete client review of the *Soil Stockpile Remedial Action Plan* and submit to the remediation contractor. Incorporate contractor's comments and submit to DEQ.
- Complete internal review of *Third Quarter 2001 Groundwater Report and Third Quarter 2001 Groundwater Interim Action Status Report* and provide to client for review.
- Install GIS\Key software, begin database conversion to a GIS format, and conduct GIS training.
- Complete preparation of the *East Property Remedial Action Plan* and provide to client for review. Begin preparation of a contractor scope of work for the remedial action activities.
- Validate and begin evaluation of the fourth quarter 2001 groundwater results.
- Continue preparation of the *Phase III Preliminary Evaluation Report*, including development of recommendations for the scope for the Phase III RI.

BZTO104(e)016356

LANDAU ASSOCIATES

RECD OCT 15 2002

October 10, 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 September 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
10/10/02 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
September 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the August 2002 monthly report to DEQ.

- Began soil stockpile removal and transport to the Swan Hills facility. Approximately 3,500 tons of soil was removed from the stockpile in September 2002.

- Submitted a technical memorandum to DEQ providing the results of the pre-removal investigation in the former PCP mixing area and the approach to be used to conduct soil excavation within this area. Received approval of the approach from DEQ in its letter, dated September 30, 2002.

- Conducted 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. Recollected wipe samples from the metal siding and wood and concrete core samples to verify decontamination procedure. The results from the second set of warehouse confirmation samples indicated that PCP concentrations in the wipes of the metal siding or in the concrete cores were nondetect or less than 1 milligram per kilogram (mg/kg). PCP concentrations in the wood cores were less than 4 ppm. Based on the wood cores results, it is likely that the wood timbers were previously treated.

- Provided DEQ with documentation of the warehouse decontamination procedures and laboratory results with a request that DEQ 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.

- Conducted site preparation activities for the removal action in the former PCP mixing area, including warehouse demolition and pipeline, aboveground tank, and concrete wall removal. Following approval from DEQ on disposal of the warehouse debris, disposed of the wood timbers and concrete floor at the Hillsboro solid waste disposal facility in Hillsboro, Oregon. The metal siding and concrete foundation were recycled at local recycling facilities.

- Began *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.

- Continued 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. Approximately 1,400 yd^3 of soil was transported to TPS Technologies in Tacoma, Washington for treatment and disposal.

- Implemented the *in situ* chemical oxidation (ISCO) pilot test study for groundwater remediation.

- Provided a scope of work to DEQ for a stormwater intercept system for recovering PCP-impacted groundwater prior to discharge to the Willamette River. Implemented a temporary stormwater intercept system in conjunction with the ISCO pilot test until a "permanent" stormwater

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bypass/groundwater intercept system can be installed. The permanent system is planned for installation in October, 2002.

- Continued implementation of the groundwater interim action in the lower zone at RW-2 from September 1-16 , at an average flow rate of 5.9 gpm. HRW-1 did not operate during September. RW-2 will be brought back online during October 2002 after the permanent stormwater bypass/intercept system is installed. Approximately a total of 8.06 million gallons of groundwater have been treated and discharged from the interim action, with a total of about 369,500 gallons treated in September 2002. Analytical results from samples collected from the treatment system effluent in September were 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.

- Continued preparation of the 2nd quarter 2002 groundwater report and groundwater interim action status report.

- Conducted additional excavation in one remedial action area at the northeast corner of the east property based on the results of the soil verification samples and collected additional verification samples in this area. The second round of verification samples indicated that soil removal on the east property is complete.

- Excavated and removal approximately 60 to 70 yd^3 of asbestos-containing soil from the east property and transported and disposed of the material at the Hillsboro Landfill. Excavation, removal, transport, and disposal was conducted by Envirocon under the supervision of Keystone Contracting (Ridgefield, WA) under the OSHA protocols for asbestos removal.

- Continued preparation of a report documenting the results from the CPT investigation in the Phase III study area.

RESULTS COLLECTED

- Warehouse decontamination confirmation samples. Sample results were provided to DEQ by Schwabe, Williamson & Wyatt with the request to DEQ for confirmation that the debris were properly decontaminated and no longer contained hazardous waste. A summary of the sample results, laboratory reports, and the data validation results will be provided in the removal action completion report for the soil removal action.

- Soil verification samples for the former Crosby & Overton tank area. Sample results were provided verbally to DEQ by Time Oil. A summary of the sample results, laboratory reports, and the data validation results will be provided in the remedial action completion report for the east property.

- Groundwater treatment system discharge samples collected on September 23, 2002.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- Observations indicate that there is likely biofouling in the discharge line leading from HRW-1. This "plugging" could be limiting the ability of the pump in HRW-1 to discharge water from the horizontal

BZTO104(e)016359

well to the treatment system. The discharge line is being replaced and a well development/biogrowth removal effort is planned.

- During soil removal work on the east property, monitoring well LW-104S was damaged when a contractor's truck backed into the bollards and protective casing. The damaged protective casing and bent upper portion of the PVC well casing was removed and replaced by a licensed well driller (Cascade Drilling).

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 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.
- Submit the 2nd quarter 2002 groundwater interim action status report and groundwater monitoring report to client for review.
- Continue *in situ* soil excavation in the former PCP mixing area and collect soil verification samples.
- Continue soil transport and disposal to the Swan Hills incineration facility in Alberta, Canada.
- Evaluate verification samples from the Crosby & Overton soil scrape area to determine whether additional soil removal is necessary.
- Collect groundwater and saturated zone soil samples to assess the performance of the ISCO pilot test study. Begin preparation of ISCO pilot test study report.
- Implement permanent stormwater bypass/groundwater intercept system and recover PCP-impacted groundwater infiltrating to the storm drain for treatment by the onsite wastewater treatment system. Prepare as-built drawings of the system for submittal to DEQ.
- Begin preparation of the *East Property Remedial Action Completion Report.*
- Prepare well abandonment plan for the east property wells.
- Complete preparation of the Phase III CPT investigation technical memorandum and submit to client.

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TRANSMITTAL

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

RECD OCT 1 1 2002

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

Date: October 8, 2002

Attn: Mr. Tom Roick

Project No.: 231001.139/179

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	Phase II Supplemental Sampling Event, September 2001 (Summary Analytical Data Tables, Soil Boring Logs, Data Validation Memorandum, Laboratory Data Reports)
1	Pre-Removal Investigation, August 2002 (Data Validation Memorandum, Laboratory Data Reports)

Tom,

Enclosed is the supporting documentation for the two sampling events listed above. The data from the Phase II supplemental sampling event were provided in the Landau Associates' removal action plan for the warehouse demolition and soil excavation in the former PCP mixing area (Figure 5), dated July 2, 2002. The results for the pre-removal investigation were provided to you in a Landau Associates' memorandum dated September 26, 2002.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Project Manager

RB/tam
10/8/02 S:\WPROC\231\TRANSMIT FAX\DEQRoickTm.doc

cc: Ms. Patty Dost, Schwabe, Williamson & Wyatt (w/o lab data)
Mr. Kevin Murphy, Time Oil Co. (w/o lab data)
Mr. Mike Tischuk, Beazer East, Inc. (w/o lab data)

PHASE II SUPPLEMENTAL SAMPLING

TABLE 1
SOIL PCP ANALYTICAL RESULTS
PHASE II SUPPLEMENTAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location	Depth (ft, BGS)	Date	Lab ID	Pentachlorophenol (µg/kg) Method 8270SIM
SSS-1	0.5-1	9/4/01	0109005-22	81.0
SSS-1	5-5 5	9/4/01	0109005-23	33 3 ND
SSS-2	0 5-1	9/5/01	0109017-04	33 3 ND
SSS-17 (Dup of SSS-2)	0 5-1	9/5/01	0109017-19	33 3 ND
SSS-2	5-5.5	9/5/01	0109017-05	33 3 ND
SSS-2	10-10.5	9/5/01	0109017-06	16100
SSS-2	15-15 5	9/5/01	0109017-07	33.3 ND
SSS-3	0 5-1	9/4/01	0109005-25	116
SSS-3	5-5 5	9/4/01	0109005-26	33.3 ND
SSS-3	10-10 5	9/4/01	0109005-27	33 3 ND
SSS-4	15-16	9/13/01	0109107-01	4370
SSS-4	18-19	9/13/01	0109107-02	226
SSS-4	20-20.5	9/13/01	0109107-03	89.9
SSS-4	25-25.5	9/13/01	0109107-04	59.1
SSS-4	30-30.5	9/13/01	0109107-05	33 3 ND
SSS-4	35-35.5	9/13/01	0109107-06	33 3 ND
SSS-4	40-40.5	9/13/01	0109107-07	33 3 ND
SSS-5	15.15.5	9/5/01	0109017-01	33.3 ND
SSS-5	17-17.5	9/5/01	0109017-02	33.3 ND
SSS-5	18.5-19	9/5/01	0109017-03	33 3 ND
SSS-5	25-25.5	9/14/01	0109118-07	33.3 ND
SSS-5	30-30 5	9/14/01	0109118-08	33.3 ND
SSS-5	35-35 5	9/14/01	0109118-09	33 3 ND
SSS-5	40-40.5	9/14/01	0109118-10	33.3 ND
SSS-6	10-10.5	9/13/01	0109107-08	1370000
SSS-6	15.15.5	9/13/01	0109107-09	390000
SSS-6	16-16 5	9/13/01	0109107-10	253
SSS-6	20-20 5	9/13/01	0109107-11	39.4
SSS-6	25-25.5	9/13/01	0109107-12	33.3 ND
SSS-6	30-30.5	9/13/01	0109107-13	33.3 ND
SSS-6	35-35 5	9/13/01	0109107-14	33.3 ND
SSS-6	40-40 5	9/13/01	0109107-15	33 3 ND
SSS-7	10-10 5	9/14/01	0109118-01	33 3 ND
SSS-7	15.15 5	9/14/01	0109118-02	33.3 ND
SSS-7	20-20.5	9/14/01	0109118-03	33.3 ND
SSS-18 (Dup of SSS-7)	20-20.5	9/14/01	0109118-06	33.3 ND
SSS-7	25-25.5	9/14/01	0109118-04	33.3 ND
SSS-7	30-30.5	9/14/01	0109118-05	33.3 ND
SSS-8	5-5.5	9/5/01	0109017-08	33.3 ND
SSS-8	10-10.5	9/5/01	0109017-09	12800
SSS-8	15-15.5	9/5/01	0109017-10	41.9
SSS-9	0.5-1	9/5/01	0109017-11	33.3 ND
SSS-9	5-5.5	9/5/01	0109017-12	148
SSS-9	10-10.5	9/5/01	0109017-13	90.4
SSS-9	15-15.5	9/5/01	0109017-14	33.3 ND
SSS-10	0-0.5	9/4/01	0109005-20	3120
SSS-16 (Dup of SSS-10)	0-0 5	9/4/01	0109005-19	2570
SSS-10	5-5 5	9/4/01	0109005-21	682
SSS-11	0 5-1	9/4/01	0109005-15	1940
SSS-11	5-5 5	9/4/01	0109005-16	33.3 ND
SSS-11	10-10.5	9/4/01	0109005-17	33.3 ND
SSS-11	15-15 5	9/4/01	0109005-18	33 3 ND
SSS-12	0 5-1	9/5/01	0109017-15	33 3 ND
SSS-12	5-5 5	9/5/01	0109017-16	33 3 ND
SSS-12	10-10 5	9/5/01	0109017-17	33.3 ND
SSS-12	15 15 5	9/5/01	0109017-18	33.3 ND
SSS-13	0-0.5	9/4/01	0109005-10	641
SSS-13	1-1.5	9/4/01	0109005-11	33 3 ND
SSS-13	5-5 5	9/4/01	0109005-12	33 3 ND
SSS-13	10-10.5	9/4/01	0109005-13	33.3 ND
SSS-13	20-20.5	9/4/01	0109005-14	33.3 ND
SSS-14	0.5-1	9/4/01	0109005-06	33.3 ND
SSS-14	1-1.5	9/4/01	0109005-07	33.3 ND
SSS-14	5-5.5	9/4/01	0109005-08	33.3 ND
SSS-14	15-15.5	9/4/01	0109005-09	33.3 ND
SSS-15	0.5-1	9/4/01	0109005-03	135
SSS-15	1-1.5	9/4/01	0109005-04	33.3 ND
SSS-15	18-18.5	9/4/01	0109005-05	33.3 ND

ND = Not detected at the indicated laboratory reporting limit.

TABLE 2
SOIL PAH ANALYTICAL RESULTS
PHASE II SUPPLEMENTAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

Location	Depth (ft, BGS)	Date	Lab ID	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene
SSS-10	0-0 5	9/4/01	0109005-20	6.67 ND	6.67 ND	6.67 ND	6 67 ND	20.3	32.8	56.6	41 1
SSS-16 (a)	0-0.5	9/4/01	0109005-19	6.67 ND	6.67 ND	6 67 ND	6.67 ND	15 3	27.2	57 4	36 6
SSS-10	5-5.5	9/4/01	0109005-21	6 67 ND	6 67 ND	6.67 ND	6.67 ND	27.7	42.4	49.4	56 3
SSS-11	0.5-1	9/4/01	0109005-15	44.4	65 8	289	2050	660	1170	1300	3770
SSS-11	5-5.5	9/4/01	0109005-16	6 67 ND	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND	6 67 ND	6 67 ND
SSS-11	10-10.5	9/4/01	0109005-17	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND
SSS-11	15-15.5	9/4/01	0109005-18	6.67 ND	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6.67 ND	6 67 ND	6.67 ND
SSS-13	0-0.5	9/4/01	0109005-10	26.0	43.8	277	3210	614	1120	1230	2310
SSS-13	1-1.5	9/4/01	0109005-11	6.67 ND	6 67 ND	6 67 ND	10.5	30.3	48 3	54.7	76.2
SSS-13	5-5 5	9/4/01	0109005-12	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6.67 ND	6.67 ND	7.23	6 67 ND
SSS-13	10-10.5	9/4/01	0109005-13	6.67 ND	6.67 ND	16.7	77 2	212	172	171	71.2
SSS-13	20-20.5	9/4/01	0109005-14	6.67 ND	6 67 ND	6.67 ND	10.1	34 0	29 3	26.7	12 8
SSS-15	0.5-1	9/4/01	0109005-03	6 67 ND	9.46	74.4	119	839	1370	1560	1310
SSS-15	1-1.5	9/4/01	0109005-04	6 67 ND	6.67 ND	6 67 ND	6.67 ND	19 8	34.5	36 8	43.2
SSS-15	18-18 5	9/4/01	0109005-05	6.67 ND	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6.67 ND	6 67 ND	6.67 ND

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TABLE 2
SOIL PAH ANALYTICAL RESULTS
PHASE II SUPPLEMENTAL INVESTIGATION
TIME OIL NORTHWEST TERMINAL

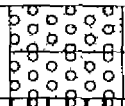
Location	Depth (ft, BGS)	Date	Lab ID	Benzo(k) fluoranthene	Chrysene	Dibenz(a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
SSS-10	0-0.5	9/4/01	0109005-20	20.2	25.0	7.51	38.0	6.67 ND	28 2	6.67 ND	10 7	47.2
SSS-16 (a)	0-0.5	9/4/01	0109005-19	18.9	20 4	6 67 ND	34.7	6.67 ND	24.4	6.67 ND	9.16	43.6
SSS-10	5-5.5	9/4/01	0109005-21	21.9	36.3	6.67 ND	81.6	6 67 ND	35.0	6.67 ND	28.1	105
SSS-11	0 5-1	9/4/01	0109005-15	415	751	371	4500	73 4	963	61.4	785	5830
SSS-11	5-5.5	9/4/01	0109005-16	6.67 ND	6.67 ND	6.67 ND	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND	6.67 ND
SSS-11	10-10.5	9/4/01	0109005-17	6.67 ND	6.67 ND	6 67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND	6.67 ND	6.67 ND
SSS-11	15-15.5	9/4/01	0109005-18	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND	6 67 ND	6.67 ND	6 67 ND	6.67 ND
SSS-13	0-0 5	9/4/01	0109005-10	846	747	486	1560	59.3	1170	47.0	766	2020
SSS-13	1-1.5	9/4/01	0109005-11	23.1	40,0	9 06	95.1	6.67 ND	49 8	6 67 ND	40 9	118
SSS-13	5-5.5	9/4/01	0109005-12	6 67 ND	7.49	6.67 ND	6 86	6.67 ND	6.67 ND	6.67 ND	6 67 ND	9 43
SSS-13	10-10.5	9/4/01	0109005-13	79,3	186	20.8	391	6 67 ND	62.5	6 67 ND	172	402
SSS-13	20-20.5	9/4/01	0109005-14	15.2	30.6	6.67 ND	60 8	6 67 ND	10.3	6 67 ND	20.0	65 5
SSS-15	0.5-1	9/4/01	0109005-03	465	896	120	2340	22.9	958	6.67 ND	948	3460
SSS-15	1-1.5	9/4/01	0109005-04	16.2	28 3	6 67 ND	58.8	6.67 ND	26 8	6.67 ND	17.6	79.4
SSS-15	18-18 5	9/4/01	0109005-05	6.67 ND	6.67 ND	6.67 ND	6 67 ND	6 67 ND	6.67 ND	6 67 ND	6.67 ND	6.67 ND

All units in µg/kg.
ND = Not detected at the indicated laboratory reporting limit.
(a) Duplicate sample of SSS-10 (0-0.5)

BZTO104(e)016365

Soil Boring Logs
Phase II Supplemental Sampling Event

Soil Classification System

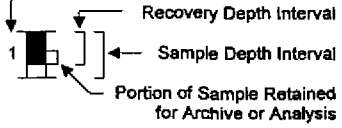
MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel, gravel/sand mixture(s), little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel, gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand, little or no fines
				SP	Poorly graded sand; gravelly sand, little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand, sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay, lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to the symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e g., SP-SM) for a sand or gravel indicate a soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, as outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:
   - Primary Constituent: > 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
   - Secondary Constituents: > 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
     > 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
   - Additional Constituents: > 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
     ≤ 5% - "trace gravel," "trace sand," "trace silt," etc , or not noted.

Drilling and Sampling Key

SAMPLE NUMBER & INTERVAL



SAMPLER TYPE

Code	Description
a	3 25-inch O.D , 2.42-inch I.D. Split Spoon
b	2.00-inch O.D , 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Other - See text if applicable

Groundwater

▽ ATD — Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0 5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\2315\UPPL.GPJ SOIL CLASS SHEET

Soil Classification System and Key | Figure A-1

SSS-1

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND with trace gravel and wood debris (dry to moist, mild odor, no sheen)	Groundwater not encountered.	
						SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5	2	b3		0					
10									
15									
20									
25									
30									
35									

Boring Completed 09/04/01
Total Depth of Boring = 8.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-1

Figure A-2

SSS-2

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5	2	b3		0					
				0					
10	3	b3							
				0		SP	Gray, fine to medium SAND (moist, no odor, no sheen) Becomes wet at 13 ft	▽ ATD	
15	4	b3							
20									
25									
30									
35									

Boring Completed 09/05/01
Total Depth of Boring = 16.0 ft.

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Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols

Log of Boring and SSS-2 | Figure A-3

SSS-3

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		GP	Brown, fine to medium sandy GRAVEL (dry, no odor, no sheen)	Groundwater not encountered.	
						SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5				0					
	2	b3							
				0					
10	3	b3							

Boring Completed 09/04/01
Total Depth of Boring = 12.0 ft.

15
20
25
30
35

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001 132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\2316\SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-3 | Figure A-4

SSS-4

Drilling Method: Hollow-stem Auger
Ground Elevation (ft): NA
Drilled By: Cascade Drilling Co.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level	Detail
0						SP	Brown, fine to medium sandy GRAVEL (dry, no odor, no sheen)		
						SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5		d4		0					
						SP	Gray, fine to medium SAND (moist, strong chemical odor, no sheen)		
10		d4		742					
15	1	a2	31	0			(wet, mild odor, no sheen)	▽ ATD	
	2	a2	19	0		SM	Gray, fine sandy SILT (wet, no odor, no sheen)		
20	3	a2	10	0					
						SM	Gray, fine to medium SAND with trace thin silt lenses (wet, no odor, no sheen)		
25	4	a2	20	0					
30	5	a2	11	0			2-inch fine sandy SILT lens at 30.8 ft.		
						SP	Gray, fine to medium SAND (wet, no odor, no sheen)		
35									

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Log of Boring and SSS-4

Figure A-5
(1 of 2)

SSS-4

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
35	6	a2	16	0		SP	Gray, fine to medium SAND (wet, no odor, no sheen)		
40	7	a2	22	0		SM	Gray, silty, fine SAND (wet, no odor, no sheen)		
45									
50									
55									
60									
65									
70									

Boring Completed 09/13/01
Total Depth of Boring = 41.5 ft.

231001.132 10/7/02 S:\SHARED\DOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Log of Boring and SSS-4

Figure A-5
(2 of 2)

SSS-5

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Geoprobe/Hollow-Stem Auger
Ground Elevation (ft): NA
Drilled By: Cascade Drilling Co.

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description	Water Level
0						SP	Brown, fine to medium SAND (moist, strong odor, no sheen)	
5								
10	1	b3		1630		SP	Gray, fine to medium SAND (moist, strong odor, no sheen)	
				+2000				
15	2	b3					Becomes wet at 13 ft	▽ ATD
				+2000				
	3	b3					(Geoprobe Boring extends to 19 ft. Hollow-stem auger to total depth)	
20	4					SP/ SM	Gray, fine SAND with silt (wet, no odor, no sheen)	
	5	a2	5					
25	6	a2	10	0				
30	7	a2	16	0		SM	Gray, silty, fine SAND with thin lenses of fine sand and trace medium sand (wet, no odor, no sheen)	
35								

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-5

Figure A-6
(1 of 2)

SSS-5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe/Hollow-Stem Auger Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
35	8	a2	20	0		SP/ SM	Gray, fine to medium SAND (wet, no odor, no sheen)		
40	9	a2	40	0					

Boring Completed 09/14/01
Total Depth of Boring = 41.5 ft.

45
50
55
60
65
70

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Log of Boring and SSS-5

Figure A-6
(2 of 2)

SSS-6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0						SP	Brown, fine to medium SAND (dry to moist, no odor, no sheen)		
5									
10	1	a2	35	1737		SP	Gray, fine to medium SAND (moist, strong odor, no sheen)		
15	2	a2	60	497			Becomes wet at 15 ft.	▽ ATD	
	3	a2		5.7		ML	Gray, fine sandy SILT (wet, no odor, no sheen)		
20	4	a2	8	0		SM/ ML	Gray, silty fine SAND to fine sandy SILT (wet, no odor, no sheen)		
25	5	a2	17	0		SP/ SM	Gray, fine SAND with silt (wet, no odor, no sheen)		
30	6	a2	18						
35									

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-6

Figure A-7
(1 of 2)

SSS-6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
35	7	a2	21			SP/ SM	Gray, fine SAND with silt (wet, no odor, no sheen)		
40	8	a2	11	3					

Boring Completed 09/13/01
Total Depth of Boring = 41.5 ft

45
50
55
60
65
70

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Log of Boring and SSS-6

Figure A-7
(2 of 2)

SSS-7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0						SP	Brown, fine to medium SAND (dry to moist, no odor, no sheen)		
5									
10	1	a2	20	0			Becomes moist at 10 ft		
						SP	Gray, fine to medium SAND (moist, no odor, no sheen)		
15	2	a2	28	0		SM/ ML	Gray, fine sandy SILT to silty, fine SAND (wet, no odor, no sheen) 2-inch lens of wood debris at 15 8 ft.	▽ ATD	
20	3	a2	10	0		SM	Gray, fine SAND with silt and trace medium sand (wet, no odor, no sheen)		
25	4	a2	12	0		SM	Gray, silty, fine SAND (wet, no odor, no sheen)		
30	5	a2	23	0		SP	Gray, fine to medium SAND (wet, no odor, no sheen)		
35									

Boring Completed 09/14/01
Total Depth of Boring = 31.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-7 | Figure A-8

SSS-8

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0						SP	Brown, fine to medium SAND (moist, no odor, no sheen)	Groundwater not encountered	
5	1	b3		0					
				0					
10	2	b3							
				0		SP	Gray, fine to medium SAND (moist, no odor, no sheen)		
	3	b3							
15						ML	Gray SILT (moist, no odor, no sheen)		

Boring Completed 09/05/01
Total Depth of Boring = 16.0 ft

20
25
30
35

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Log of Boring and SSS-8 | Figure A-9

SSS-9

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5	2	b3		0 743					
10	3	b3		228		SP	Gray, fine to medium SAND (moist, no odor, moderate sheen) Becomes wet at 13 ft.	▽ ATD	
	4	b3				SP	Brown, fine to medium SAND (wet, no odor, no sheen)		
15									
20									
25									
30									
35									

Boring Completed 09/05/01
Total Depth of Boring = 16.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-9 | Figure A-10

SSS-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND (moist, no odor, no sheen)	Groundwater not encountered.	
5	2	b3		0					

Boring Completed 09/04/01
Total Depth of Boring = 8.0 ft

10
15
20
25
30
35

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-10 | Figure A-11

SSS-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND with gravel (moist, no odor, no sheen)		
						SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5	2	b3		0					
				0					
10	3	b3		0					
	4	b3					Becomes wet at 14ft	▽ ATD	
15									
20									
25									
30									
35									

Boring Completed 09/04/01
Total Depth of Boring = 16.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

231001 132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDSITIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-11 | Figure A-12

SSS-12

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level
0	1	d4		0		GP	Roadbed gravel	
						GP	Brown, fine to medium sandy GRAVEL (dry, no odor, no sheen)	
						SP	Brown, fine to medium SAND (moist, strong odor, no sheen)	
5	2	b3		40 9				
				1183				
10	3	b3				SP	Gray, fine to medium SAND (moist, strong odor, no sheen)	
				1629				
15	4	b3					Becomes wet at 13.5 ft.	▽ ATD
20								
25								
30								
35								

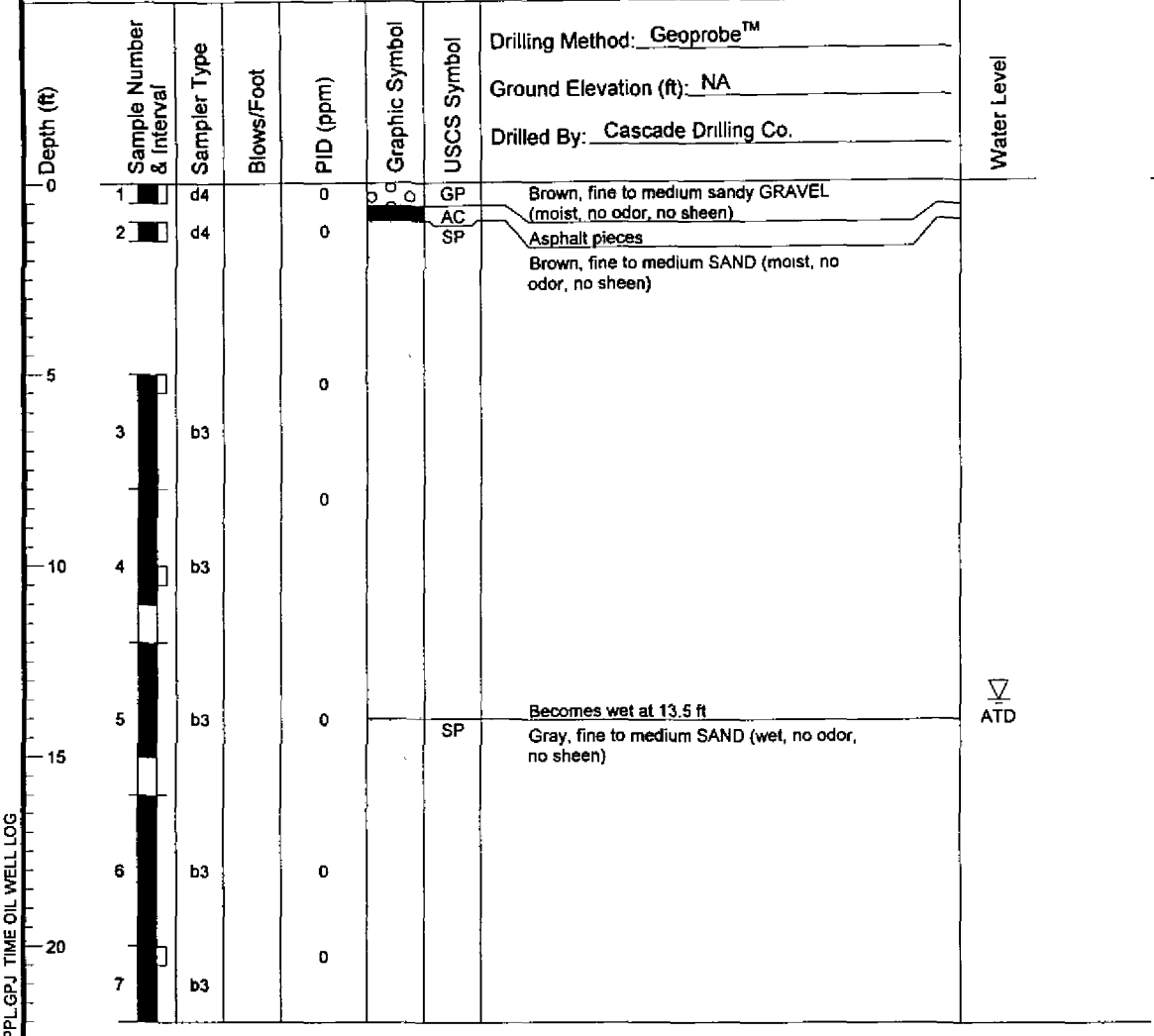
Boring Completed 09/05/01
Total Depth of Boring = 16.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols

231001.132 10/7/02 S:\SHARED\DOC\TRANSFER\2EDMONDS\TIMEOIL\2311SUPPL.GPJ TIME OIL WELL LOG

Log of Boring and SSS-12 | Figure A-13

SSS-13



Boring Completed 09/04/01
Total Depth of Boring = 22.0 ft

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

	Log of Boring and SSS-13	Figure A-14

SSS-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND with gravel (dry, no odor, no sheen)		
	2	d4		0		SP	Brown, fine to medium SAND (moist, no odor, no sheen)		
5	3	b3		0					
10	4	b3		0					
				0					
	5	b3					Becomes wet at 14 5 ft.	ATD	
15						SP	Gray, fine to medium SAND (wet, no odor, no sheen)		

Boring Completed 09/04/01
Total Depth of Boring = 16.0 ft.

20
25
30
35

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Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols

Log of Boring and SSS-14 | Figure A-15

SSS-15

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe™ Ground Elevation (ft): NA Drilled By: Cascade Drilling Co.	Water Level	Detail
0	1	d4		0		SP	Brown, fine to medium SAND (dry to moist, no odor, no sheen)		
	2	d4		0					
5	3	b3		0					
10	4	b3		0					
	5	b3		0			Becomes wet at 14 ft	ATD	
15				0		SP	Gray, fine to medium SAND (wet, no odor, no sheen)		
	6	b3				SM	Gray, silty, fine SAND (wet, no odor, no sheen)		
20									
25									
30									
35									

Boring Completed 09/04/01
Total Depth of Boring = 20.0 ft.

231001.132 10/7/02 S:\SHAREDOC\TRANSFER\2EDMONDS\TIMEOIL\231SUPPL.GPJ TIME OIL WELL LOG

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols

Log of Boring and SSS-15 | Figure A-16

BZTO104(e)016385

Landau Associates
Environmental and Geotechnical Services

TECHNICAL MEMORANDUM

TO: Rebekah Brooks, Project Manager, Landau Associates

FROM: Stacy Pischer, Landau Associates

DATE: November 7, 2001

RE: LABORATORY DATA QUALITY EVALUATION
PHASE II SUPPLEMENTAL SAMPLING EVENT
TIME OIL NORTHWEST TERMINAL

This technical memorandum provides the results of a data quality evaluation for 68 soil samples and 2 stormwater samples collected at the Time Oil Northwest Terminal between September 4 and 14, 2001 for the Phase II supplemental sampling event. A data quality evaluation was performed for analyses of pentachlorophenol [PCP; U.S. Environmental Protection Agency (EPA) Method 8270 with selected ion monitoring (SIM)] and polynuclear aromatic hydrocarbons (PAHs; EPA Method 8270 with SIM); diesel-range petroleum hydrocarbons (Methods NWTPH-D and NWTPH-Dx); motor oil-range petroleum hydrocarbons (Method NWTPH-Dx); and gasoline-range petroleum hydrocarbons (Method NWTPH-G). All of the analyses were performed by Specialty Analytical (Specialty), located in Tualatin, OR. This data quality evaluation covers Specialty data packages 0109005, 0109017, 0109107, and 0109118. The data quality evaluation was performed in accordance with the 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 U.S. Environmental Protection Agency (EPA) *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1994).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Blank results (laboratory, method, and field)
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates (MS/MSD) (including laboratory control samples)
- Duplicate analyses (field and laboratory)
- Quantitation limits
- Completeness.

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

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.

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 with the following exception:

- Extraction of sample SDM-2 for the analysis of PCP occurred 8 days past the method recommended holding time. According to the laboratory, the sample was originally extracted within the holding time and analyzed at the standard reporting limit level of 5 µg/L. To achieve lower reporting limits, the laboratory re-extracted the sample outside the holding time and ran a low-level PCP analysis. Only the low-level result was reported for this sample; therefore, the PCP result for SDM-2 was qualified as an estimate (UJ), as indicated in Table 1.

SURROGATE SPIKE RECOVERIES/INTERNAL STANDARDS

All of the surrogate recoveries were within the current laboratory or project-specified control limits. No qualification of the data was necessary.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Four MS/MSD soil sample pairs were analyzed for PCP, which meets the required frequency of one MS/MSD pair per 20 samples. The MS/MSD pairs were performed using project samples. No MS/MSD groundwater samples were analyzed and no MS/MSD soil samples were analyzed for PAHs. Recoveries and relative percent difference (RPDs) for the MS/MSDs were within the project-specified control limits with the following exception. The recovery values for pentachlorophenol in the MS/MSD samples associated with the project samples reported in data package 0109107 were significantly less than the lower control limits. No qualifiers were assigned to the PCP sample results because the matrix spike concentration was less than 4 times the parent sample PCP concentration making it difficult to accurately evaluate the percent recovered.

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LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample/blank spike was analyzed with each batch of samples for each analysis. Laboratory-specified control limits were met for each laboratory control sample. No qualification of the data was necessary.

METHOD BLANKS

Method blanks were analyzed with each batch of samples for each analysis. Contamination was detected in the method blank associated with the PCP analysis of sample SDM-2. PCP was not detected in the sample; therefore, no qualification of the data was necessary.

FIELD BLANKS

One field equipment rinsate blank was collected and analyzed for PCP and PAHs. No contamination was detected in the equipment rinsate blank indicating that cross contamination from sampling equipment did not likely occur.

FIELD DUPLICATE RESULTS

Three blind field duplicate soil samples were collected during this sampling event. The project-specified criterion of at least one blind field duplicate sample per 20 samples was met. RPDs between the sample pair results were less than the specified control limit of 35 percent (or plus or minus two times the detection limit when the results were within five times the detection limit). No qualification of the data was necessary.

REPORTING LIMITS

The reporting limits for the diesel- and oil-range hydrocarbons for the NWTPH-HCID analysis of samples SDM-1 and SDM-2 were slightly above project-specified quantitation limits (e.g., 0.630 mg/L vs. 0.50 mg/L). Also, the reporting limit for PCP in the equipment rinsate blank sample (ERB-1) was an order of magnitude above project-specified quantitation limit of 0.5 µg/L. All other reporting limits met the reporting limits specified in the QAPP for this project.

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OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through field, matrix spike, and laboratory 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. 1996. *Phases I and II Remedial Investigation/Feasibility Study Work Plan.*

BZTO104(e)016389

TABLE 1
SUMMARY OF DATA QUALIFIERS
PHASE II SUPPLEMENT SOIL AND STORM DRAIN WATER SAMPLE RESULTS
SPECIALTY DATA PACKAGES 0109005, 0109017, 0109107, AND 0109118

Analyte	Qualifier	Sample Number	Reason
Pentachlorophenol	UJ	SDM-2	Holding time exceeded by 8 days

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

PRE-REMOVAL INVESTIGATION

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager, Landau Associates

CC: Mr. Thomas Roick, Oregon Department of Environmental Quality (DEQ)
Mr. Kevin Murphy, Time Oil Co.
Ms. Patty Dost, Schwabe, Williamson & Wyatt
Mr. Mike Tischuk, Beazer East, Inc.

FROM: Stacy Pischer

DATE: October 7, 2002

RE: TIME OIL NORTHWEST TERMINAL
PRE-REMOVAL INVESTIGATION SOIL AND LEACHATE SAMPLING
LABORATORY DATA QUALITY EVALUATION

This technical memorandum provides the results of a data quality evaluation for 45 soil samples collected in August 2002 and 11 leachate water samples, analyzed as part of the pre-removal investigation (PRI) within the former pentachlorophenol (PCP) mixing area of Time Oil Northwest Terminal. A data quality evaluation was performed for analyses of total PCP using EPA method 8270, PCP using the synthetic precipitation leaching procedure (SPLP), total dioxin/furans using EPA method 8290, dioxin/furans using the SPLP, total petroleum hydrocarbons (TPH) using method NWTPH-HCID, and polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270 with selected ion monitoring. The PCP, NWTPH-HCID, and PAH analyses were performed by Specialty Analytical (Specialty) laboratory located in Tualatin, Oregon. The dioxin/furan analyses were performed by Pace Analytical (Pace) laboratory located in Minneapolis, Minnesota and by Columbia Analytical Services (CAS) laboratory located in Houston, Texas. This data quality evaluation covers Specialty data packages 0207058, 0207060, 0207076, 0207077, 0207153, 0207171, and 0208014; Pace data package 02-1059914; and CAS data package K2205211. 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 1994a).

The evaluation considered the following elements:

- Chain-of-custody records
- Holding times
- Method blank results

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- Surrogate and internal standard recoveries
- Laboratory matrix spikes and matrix spike duplicates (MS/MSD) (including laboratory control samples)
- Duplicate analyses (field and laboratory)
- Quantitation limits
- Conclusions 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.

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/INTERNAL STANDARD RECOVERIES

For each sample analyzed for dioxin/furans, recovery of internal standards were within the laboratory target range with the following exceptions:

- Recovery of internal standard OCDD-13C during total dioxin/furan analysis of soil sample PRI-16 (1-2) exceeded the upper laboratory target range, indicating a potential high bias sample result for isomer OCDD. The OCDD result for sample PRI-16 (1-2) was, therefore, qualified as an estimate (J).
- Recovery of several internal standards for the method blank associated with the dioxin/furan SPLP analysis of sample PRI-16 (1-2) were below the laboratory target range, indicating a potential low bias. However, because the recovery values for the internal standards for sample PRI-16 (1-2) were within the laboratory target range, no qualifiers were added to the data.
- Recovery values for internal standard OCDD-13C during the initial total dioxin/furan analysis of soil samples PRI-14 (11-12), PRI-19 (11-12), and PRI-24 (11-12) were below the laboratory target range, indicating a potential low bias. These samples were re-analyzed and results for the reanalysis should be reported.

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For each sample analyzed for PCP, PAHs, and TPH, recovery of surrogate spikes were within the laboratory control limits with the following exceptions:

- Recovery of surrogate spike 2,4,6-tribromophenol was below the laboratory control limit for soil samples PRI-09 (7-8) and PRI-09 (11-12). PCP was detected in both samples. Because low surrogate recoveries indicate a potential low bias, the PCP concentrations for these samples were qualified as estimates (J).

- Recovery of surrogate spike 2,4,6-tribromophenol slightly exceeded the laboratory control limit for soil samples PRI-11 (3-4), indicating a potential high bias. PCP, however, was not detected in the sample; therefore, qualification of the datum was not necessary.

- Recovery of surrogate spike 2,4,6-tribromophenol was diluted out during a dilution analysis of soil sample PRI-23 (11-12). No qualifiers were added to data due to the diluting out of surrogates.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Matrix spike (MS) and matrix spike duplicates (MSD) were performed with most PCP, TPH, and PAH analysis for soil and with dioxin/furan analysis for soil performed by CAS. Recovery values and relative percent difference (RPD) values were within laboratory control limits with the following exceptions:

- Recovery values for PCP in the matrix spike and matrix spike duplicates associated with Specialty data packages 0207153 and 0208014 and for dioxin/furans associated with CAS data package K2205211 were less than the laboratory control limits. However, because the sample concentrations were more than 4 times the spike concentrations, no qualifiers were added to the data.

LABORATORY DUPLICATE

At least one laboratory duplicate sample was performed with the NWTPH-HCID analyses. All RPDs were within the laboratory and project-specified control limits. No qualification of the data was necessary.

LABORATORY CONTROL SAMPLE RESULTS

At least one laboratory control sample/blank spike was analyzed with each batch of samples analyzed except for those samples analyzed for NWTPH-HCID. Laboratory control sample duplicates were performed with soil samples analyzed for dioxin/furans and each sample analyzed by SPLP dioxin/furans and SPLP PCP. Laboratory-specified control limits were met for each laboratory control sample. No qualification of the data was necessary.

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METHOD BLANKS

Method blanks were analyzed with each batch of samples. No contamination was detected in any of the method blanks, with the following exceptions:

- PCP was detected in the method blank associated with SPLP PCP analyses reported in Specialty's data package 0207153. PCP was not detected in the associated project samples at a concentration less than 10 times the method blank concentration; therefore, no qualification of the data was necessary.

- OCDD was detected in the method blanks associates with CAS data package K2205211 and Pace data package 02-1059914. OCDD was not detected in the associated project samples at a concentration less than 10 times the method blank concentration; therefore, no qualification of the data was necessary.

FIELD BLANKS

One rinsate blank was collected and analyzed for PCP by method 8270, NWTPH-HCID, and PAHs. No contamination was detected in the rinsate blank; therefore, no qualification of the data was necessary.

FIELD DUPLICATE RESULTS

No blind field duplicate samples were submitted for analysis.

REPORTING LIMITS

Method and/or project-specified quantitation limits were met for all samples.

OTHER

For several soil and SPLP water samples, furan concentrations were qualified by the laboratory as an estimated maximum possible concentration (EMPC) due to interference with co-eluting compounds. Based on this data quality evaluation, these concentrations were qualified as non-detects (U) at the reported concentration, as shown in Table 1.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory, field, and matrix spike 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.

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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.

Landau Associates. 2001. *Work Plan, Phase III Remedial Investigation, Time Oil Northwest Terminal, Portland, Oregon.* June 18.

BZTO104(e)016396

TABLE 1
SUMMARY OF DATA QUALIFIERS
PRE-REMOVAL INVESTIGATION SOIL AND SPLP SAMPLE RESULTS
SPECIALTY DATA PACKAGES 0207058, 0207060, 0207076, 0207077, 0207153, 0207171, and 0208014; PACE DATA PACKAGE 02-1059914; AND CAS DATA PACKAGE K2205211

Analyte	Concentration	Qualifier	Sample Number	Reason
2,3,4,7,8-PeCDF	9.287	U	PRI-13-(11-12) – soil (composite)	Estimated maximum possible concentration
1,2,3,7,8-PeCDF	3.8	U	PRI-03-(9-10) - soil	Estimated maximum possible concentration
2,3,4,6,7,8-HxCDF	960.979	U	PRI-19-(11-12) - soil	Estimated maximum possible concentration
1,2,3,7,8-PeCDF	28.719	U	PRI-13-(11-12) – water	Estimated maximum possible concentration
1,2,3,7,8-PeCDD	7.414	U	PRI-13-(11-12) - water	Estimated maximum possible concentration
	9.657		PRI-14-(11-12) - water	
	14.039		PRI-24-(11-24) – water	
1,2,3,6,7,8-HxCDF	280	U	PRI-03-(9-10) – soil	Estimated maximum possible concentration
	200		PRI-05-(7-8) – soil	
	24		PRI-08-(4-5) – soil	
	2500		PRI-12-(0-0.5) – soil	
	1200		PRI-16 (1-2) - soil	
OCDD	170,000	J	PRI-16 (1-2) - soil	Potential high bias demonstrated by high internal standard recovery
Pentachlorophenol	17.3	J	PRI-09-(7-8) – soil	Potential low bias demonstrated by low surrogate recoveries
	990		PRI-09-(11-12) – soil	

J = The analyte is present in the sample; the reported concentration is an estimate.
U = Indicates compound was analyzed for, but could not be positively quantified at or above the reported value.

TRANSMITTAL

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

REC'D NOV 1 2 2002

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

Date: November 7, 2002

Attn: Mr. Tom Roick

Project No.: 231001.131

RE: TIME OIL NORTHWEST TERMINAL

Copies	Description
1	*Second Quarter 2002 Groundwater Monitoring Report, Time Oil Northwest Terminal, Portland, Oregon* (11/7/02)
1	Disk - Water Quality Data Summary (beginning March 1997)

Enclosed is a copy of the above-referenced report (with laboratory data). Please let me know if you have questions or need additional information.

LANDAU ASSOCIATES, INC.

Rebekah Brooks
Senior Hydrogeologist

RB/tam

cc: Ms. Patty Dost, Schwabe, Williamson & Wyatt (w/o lab data)
Mr. Kevin Murphy, Time Oil Co. (w/o lab data)
Mr. Mike Tischuk, Beazer East, Inc. (w/o lab data)

Second Quarter 2002 Groundwater Monitoring Report Time Oil Northwest Terminal Portland, Oregon

November 7, 2002

Prepared for

Time Oil Co.

LANDAU ASSOCIATES
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Edmonds, WA 98020
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BZTO104(e)016399

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BZTO104(e)016400

1.0 INTRODUCTION

This report provides the results of the second quarter 2002 groundwater sampling event, conducted June 24-27, 2002 as part of the Phase II remedial investigation (RI) at the Time Oil Northwest Terminal. This report summarizes groundwater elevation and groundwater quality data, and transmits analytical laboratory data packages and the associated data validation report. The second quarter 2002 event was conducted during implementation of a groundwater interim action in the upper water-bearing zone at horizontal well HRW-1 and in the lower water-bearing zone at recovery well RW-2. The status and performance summary of the interim action during this period are summarized in the *Groundwater Interim Action Status Report, Second Quarter 2002* (Landau Associates 2002a).

The Time Oil Northwest Terminal is an inactive bulk petroleum storage and transfer facility owned by Time Oil Co. (Time Oil). Time Oil ceased operations at the facility in September 2001. The facility is located in the industrialized Rivergate area of North Portland, Oregon (Figure 1). Quarterly groundwater monitoring has been conducted at the facility since April 1997, in accordance with the *Phase I/II Remedial Investigation/Feasibility Study (RI/FS)* work plan (Landau Associates 1996). The general configuration and location of 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 conducted at the terminal for the second 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 second quarter 2002 event are provided in Tables B-3 and B-4 for the shallow and deep wells, respectively. The data validation report for these data are provided in Appendix C. Laboratory data packages are provided in Appendix D.

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 either electronically or on computer diskette.

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2.0 SECOND QUARTER 2002 GROUNDWATER SAMPLING EVENT

The second quarter 2002 groundwater sampling event was conducted from June 24 through June 27, 2002. 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, as well as the east property wells (LW-101S through -104S), and wells monitored as part of the groundwater interim action (LW-13S, LW-14D, LW-17D and LW-18D). East property monitoring wells are typically sampled on an annual basis occurring in the first quarter of the calendar year; however, these wells were sampled again this quarter due to detections of pentachlorophenol observed during the first quarter 2002 groundwater monitoring event. In addition to the above listed monitoring locations, four new monitoring wells (OX-1S, -2S, -3S, and -4S) installed in June 2002 and three previously installed wells (RW-1, LW-11S, and PZ-1) were also sampled during this quarterly event as part of the *In Situ* Chemical Oxidation (ISCO) pilot study (Landau Associates 2002c). A summary of the wells sampled for the second 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.

2.1 GROUNDWATER LEVEL AND PRODUCT MEASUREMENTS

Groundwater levels were measured for the second quarter 2002 event on June 27, 2002. The presence of product was also checked in each well. 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 manually in conjunction with the evaluations conducted to evaluate the capture zone of the interim action for the upper and lower water-bearing zones. Groundwater

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elevation contour maps for the upper and lower water-bearing zones are shown on Figures 3 and 4, respectively.

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 second quarter 2002 event were obtained beginning at about 2.5 hours after 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 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 1998b), aquifer test report (Landau Associates 1999c), and previous quarterly measurements.

2.1.2 Product Measurements and Product Recovery

During the second quarter 2002 event, measurable product was observed at well Q. Since only a trace amount of product was noted, product recovery from this well was not performed. Continued monitoring of this well and all other 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 water-bearing zone (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, with a localized shift to the south in an area south of the former PCP mixing area. This localized shift 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 water-bearing zone is

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characteristic of the patterns seen over the previous years of monitoring. Continuous pumping at upper zone recovery well HRW-1 began on February 28, 2002. The groundwater elevation data for the upper zone indicate that the groundwater elevations have decreased throughout the site since the first quarter of 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 and is attributed to seasonal fluctuation of the groundwater table.

2.1.4 LOWER WATER-BEARING ZONE

Groundwater elevations measured in the deep wells were used to estimate groundwater flow conditions in the lower water-bearing zone. Groundwater elevation contours for the lower zone are presented on Figure 4. 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 approximately between LW-17D and 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 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 second quarter 2002 event on June 24 through June 27, 2002. The wells sampled consisted of 22 upper zone wells, 17 lower zone wells, and 1 deep sand unit well. Monitoring well LW-9S was 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); major ions (EPA Methods 6010, SM2320, 160.1, 325.2, 354.1, and 375.2); and field parameters (pH, conductivity, dissolved oxygen, turbidity, and temperature). Additionally, groundwater from 16 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 gasoline and motor oil ranges (NWTPH-G and NWTPH-Dx). Samples for total iron (EPA Method SM3500-Fe); alkalinity (EPA Methods 6010, SM2320, and 160.1); chemical oxygen demand (COD; EPA Method 410.4); total organic carbon (TOC; EPA Method 415.1); and chlorinated phenols (EPA Method 8040)

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were collected at OX-1S, -2S, -3S, -4S, LW-11S, RW-1 and PZ-1 as part of the ISCO pilot study. Laboratory analyses were conducted by Analytical Resources, Inc. (ARI, Seattle, Washington).

Analytical results for the second quarter 2002 event are provided in Table B-3 for the upper zone wells and Table B-4 for the deep zone wells and deep sand unit well. 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. Data qualifier definitions are included in Table B-5.

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 with disposable bailers, except for RW-2 and the deep sand unit well (LW-12D2). Well LW-12D2 was purged and sampled with a Grundfos® pump. The sample from RW-2 was collected 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 three 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 water-bearing zone indicate the following:

- East property wells LW-101S, -102S, -103S, and -104S and interim action well LW-13S were sampled only for PCP this sampling event. PCP was not detected at a concentration greater than the reporting limit in any of the samples from these wells.

- PCP was detected in samples from four wells (LW-2S, LW-4S, LW-11S and RW-1) using EPA Method 8270 with concentrations ranging from 950 µg/L (LW-2S) to 4,000 µg/L (LW-11S), respectively. Using EPA Method 8270 SIM (for those samples reported as nondetect using Method 8270 only), PCP was also detected at wells D and J1 at concentrations of 0.38 µg/L and 4.4 µg/L, respectively.

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- Only low concentrations of metals and conventionals, if analyzed, were detected in the samples collected from wells LW-1S and LW-10S.

- Naphthalene, a noncarcinogenic polycyclic aromatic hydrocarbon (PAH), was detected in samples from eight wells (B1, J1, LW-2S, LW-4S, LW-7S, LW-8S, LW-11S, RW-1) at concentrations ranging from 1.4 to 57 µg/L, using Method 8270. Naphthalene was detected in seven of those same wells (B1, LW-2S, LW-4S, LW-7S, LW-8S, LW-11S, and RW-1) and well OX-1S at concentrations ranging from 11 to 140 µg/L using Method 8260.

- All other semivolatile results were reported as nondetect with the following exceptions:

  - phenol [detected at wells LW-4S (56 µg/L) and RW-1 (76J µg/L)]
  - 2-methylphenol [detected at well B1 (2.0 µg/L)]
  - 4-methylphenol [detected at wells B1 (46 µg/L), LW-11S (1.0 µg/L), and RW-1 (25 µg/L)]
  - 2,4-dichlorophenol [detected in well RW-1 at 8.5 µg/L]
  - 2-methylnaphthalene [detected in six wells (B1, LW-4S, -7S, -8S, -11S, and RW-1) at concentrations ranging from 2.6 µg/L to 51 µg/L]
  - 2,4,6-trichlorophenol [detected in well LW-4S (17 µg/L)]
  - 2,4,5-trichlorophenol [detected in wells RW-1 (5.8 M µg/L; see table A-5 for definition of qualifiers) and LW-4S (8.9 µg/L)], and
  - acenaphthylene [detected in well LW-11S at 1.6 M µg/L].

- Several volatile compounds were detected in the upper zone wells including:

  - Chloromethane (detected at well LW-4S with a concentration of 8.3 µg/L)
  - Acetone (detected at seven wells at concentrations from 8.2 µg/L to 120 µg/L)
  - 2-Butanone (detected at four wells with concentrations ranging from 13 to 58 µg/L)
  - Benzene (detected at six wells at concentrations from 4.1 to 320 µg/L)
  - Toluene (detected at nine wells with concentrations ranging from 6.7 to 520 µg/L)
  - Ethylbenzene (detected at thirteen wells at concentrations ranging from 1.1 to 470 µg/L)
  - m-, p-, and o-Xylene (detected at twelve wells at total xylene concentrations ranging from 15 to 1,800 µg/L)
  - 1,3,5-Trimethylbenzene and 1,2,4-trimethylbenzene (detected at thirteen wells at individual concentrations ranging from 1.2 to 870 µg/L)
  - Isopropylbenzene and n-propylbenzene (detected at thirteen wells at individual concentrations ranging from 6.8 to 260 µg/L)
  - tert-Butylbenzene (detected at four wells with concentrations from 2.8J to 100 µg/L)

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- sec-Butylbenzene (detected at six wells with concentrations ranging from 1.0 to 40J µg/L)
- 4-Isopropyltoluene (detected at seven wells at concentrations from 1.6 to 29 µg/L)
- n-Butylbenzene (detected at wells LW-4S and LW-8S with concentrations of 7.9 and 20 MJ µg/L, respectively).

- Gasoline-range TPH concentrations were detected at each well where analyzed (B1, LW-8S, LW-11S, RW-1) at concentrations ranging from 7.6 to 14 mg/L.
- Diesel-range TPH concentrations were detected at all upper zone wells where analyzed. Concentrations ranged from 0.31 to 28 mg/L.
- Motor oil-range TPH was not detected in any of the samples analyzed.
- At least one priority pollutant metal was detected in each upper zone well as follows:
  - Arsenic (detected at all monitoring wells analyzed, at concentrations ranging from 0.001 to 0.025 mg/L)
  - Chromium (detected at wells K, LW-10S, and PZ-1 at concentrations ranging from 0.007 to 0.035 mg/L)
  - Copper (detected at seven wells, at concentrations ranging from 0.002 to 0.085 mg/L)
  - Lead (detected at six wells with concentrations ranging from 0.001 to 0.003 mg/L)
  - Nickel (detected at five wells at concentrations of 0.02 and 0.08 mg/L)
  - Zinc (detected at ten wells at concentrations ranging from 0.008 to 0.087 mg/L).

In summary, the analytical results from the upper zone wells indicate that samples from six wells contained detectable concentrations of PCP during the second quarter 2002 event. The highest concentration was observed in the sample from well LW-11S (4,000 µg/L by Method 8270), which is located downgradient of the former PCP mixing area. The PCP concentration in the LW-11S sample was slightly less than the PCP concentration detected in the first quarter 2002 (4,700 µg/L), but greater than in the fourth quarter of 2001 (560 µg/L). However, PCP concentrations in this well since May 2000 are considerably lower than the maximum detection observed to date at this location (24,000 µg/L in May 1999). Both the samples collected from wells B1 and J1 indicated much lower PCP concentrations (nondetect and 4.4 µg/L, respectively) during the second quarter 2002 than during the first quarter 2002 sampling event when each of these locations indicated their highest concentrations to date (1.0 and 280 µg/L, respectively). The sample collected from well LW-2S (950 µg/L) indicated a slightly greater PCP concentration during the second quarter 2002 sampling event than during the previous quarter (320 µg/L), but the detected concentration was still well below the well maximum detected in May 1998 (8,500 µg/L). The concentration detected in the sample collected from well LW-4S (2,200 µg/L) was

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significantly greater than the detected concentration observed during the previous quarter (2.0 µg/L), but well below the well maximum detected in August 2000 (9,400 µg/L).

Additionally, the east property monitoring wells were re-sampled during this quarterly event based on low level (less than 1 µg/L) PCP concentrations detected at each well during the first quarter 2002 sampling event. As noted above, PCP was not detected in samples collected from these wells during this sampling event. Data evaluations for the first quarter 2002 results showed that the low level detections were associated with laboratory method blank contamination for this specific data set.

Other semivolatile compounds were detected at low concentrations, but most detections were less than 10 µg/L and none were greater than 76 µg/L (phenol at well RW-1). The highest concentrations of volatile compounds (acetone; benzene; toluene; ethylbenzene; m-, p-, and o-xylene; and 1,2,4-trimethylbenzene) were detected in samples collected at wells B1, RW-1, OX-1S, -3S, -4S, and PZ-1. No TPH detection was greater than 1 mg/L (TPH-d at well RW-1). The highest concentrations of metals were detected in samples collected at wells K, LW-10S, and PZ-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:

- Only low concentrations of metals and conventionals were detected in the samples collected from wells B2, J2, and LW-10D.
- Pentachlorophenol was detected in the sample collected from lower zone well LW-12D1 at a concentration of 1.6 µg/L using EPA Method 8270 SIM and at a concentration of 76 µg/L in the sample collected from well RW-2 using EPA Method 8270.
- Naphthalene, a noncarcinogenic PAH, was detected in the sample collected from well RW-2 at a concentration of 6.4J µg/L using EPA Method 8270 and at 8.7 µg/L using EPA Method 8260.
- Other semivolatile sample results were reported as nondetect for lower zone wells with the following exceptions:
  - Phenol (detected at well RW-2 at 5.9J µg/L)
  - 4-Methylphenol (detected at well RW-2 at 1.1 µg/L)
  - 2-Methylnaphthalene (detected at well LW-4D at 1.6 µg/L and well RW-2 at 14J µg/L)
- Several volatile compounds were detected at low concentrations, including:
  - Acetone (detected at eight wells with concentrations ranging from 6.4 µg/L to 54 µg/L)
  - Benzene (detected at well RW-2 at a concentration of 2.3 µg/L)

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- Bis(2-ethylhexyl)phthalate (detected at well LW-12D2 at a concentration of 5.4 µg/L)
- Ethylbenzene (detected at wells G1A and RW-2 at concentrations of 1.3 µg/L and 15 µg/L, respectively)
- m-, p-, and o-Xylene (detected at well RW-2 at a total concentration of 33 µg/L)
- 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene (detected at four wells at individual concentrations ranging from 1.1 to 62 µg/L)
- Isopropylbenzene and n-propylbenzene detected at seven wells at individual concentrations ranging from 1.3 to 170 µg/L)
- tert-Butylbenzene (detected at three wells at concentrations ranging from 1.4 to 4.7 µg/L)
- sec-Butylbenzene (detected at seven wells at concentrations ranging from 1.1 to 23 µg/L)
- 4-Isopropyltoluene (detected at well RW-2 at 2.1 µg/L)
- n-Butylbenzene (detected at wells O and G1A at concentrations of 1.8 and 13M µg/L, respectively (see table A-5 for definition of qualifiers).

- Diesel-range TPH concentrations were detected at seven of the eight lower zone wells analyzed at concentrations ranging from 0.26 to 5.0 mg/L.
- Gasoline-range and motor-oil range TPH analyses were conducted on the sample from well RW-2 and only gasoline-range TPH was detected at a concentration of 2.6 mg/L.
- At least one priority pollutant metal was detected in each lower zone well tested, as follows:
  - Arsenic (detected at all lower zone wells analyzed, at concentrations ranging from 0.005 to 0.037 mg/L)
  - Chromium (detected at well LW-12D1 at a concentrations of 0.006 mg/L)
  - Copper (detected at seven lower zone wells with concentrations ranging from 0.002 to 0.007 mg/L)
  - Lead (detected at wells LW-1D and LW-12D1 at concentrations of 0.005 and 0.002 mg/L, respectively)
  - Zinc (detected at nine lower zone wells at concentrations ranging from 0.006 to 0.037 mg/L).

In summary, the second quarter 2002 analytical results for samples from the lower zone wells indicate that PCP was detected at wells LW-12D1 (1.6 µg/L) and RW-2 (76 µg/L). Other wells where PCP was detected during the first quarter of 2002 (LW-1D, LW-3D, and LW-17D) did not contain detectable concentrations of PCP during the second quarter 2002. None of the other semivolatile organic compounds detected were at concentrations greater than 14 ug/L (2-methylnapthalene at RW-2). The highest concentrations of volatile organic compounds detected were in the samples collected from wells O, G1A and RW-2; however, none of the detected concentrations were greater than 170 ug/L

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(isopropylbenzene at G1A). None of the detected concentrations of TPH were greater than 5.0 mg/L (diesel-range TPH at G1A). The highest concentrations of metals were detected in the samples collected from wells G1A and LW-12D1.

2.2.4 DEEP SAND UNIT

Well LW-12D2 is the only well installed in the deep sand unit underlying the lower water-bearing zone. Of the constituents analyzed, only the metal arsenic (0.020 mg/L) and the semivolatile organic compound chrysene (5.4 ug/L) were detected in the sample collected from LW-12D2 during the second quarter of 2002.

2.2.5 WATER LEVEL AND CONTAMINANT TRENDS

Potential trends between water levels and 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 earlier events) versus time for selected upper zone wells (LW-2S, -4S, -11S, -13S, and RW-1), selected lower zone wells (LW-4D, -11D, and RW-2), and nested wells (LW-4S and -4D) are provided on Figures 5 through 7. Plots of groundwater elevations and PCP concentrations for upper zone wells LW-2S, LW-4S, and LW-11S are shown on Figures 8 through 10. Figure 11 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 in well LW-2S, located within the former PCP mixing area, have been relatively stable since May 1999 (ranging between 200 and 2,100 µg/L), except for the November 2001 event when the PCP concentration spiked at 8,000 µg/L. 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 has since increased in the last two quarters to concentrations slightly exceeding 1,000 µg/L. The PCP concentration at LW-13S increased to about 10 µg/L between May 2000 and July 2001, but has been reported as nondetect since the fourth quarter 2001 event. The PCP concentration in LW-11S for this quarter is within the range of concentrations detected in 1999-2000 before product was observed in the well. 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

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concentrations appeared anomalous, but after further review over time, it appears that they may be related to precipitation events during periods of relatively low groundwater levels (Figure 9).

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 have increased to 76 µg/L since that time. PCP concentrations at LW-11D have been less than 2 µg/L since December 1999.

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 -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, but, at adjacent upper zone well LW-4S, intermittent spikes in PCP concentrations have been observed, as discussed earlier. In addition, the lower zone concentrations were typically greater than upper zone concentrations before May 1999. However, since that time, the upper zone concentrations are higher when the concentrations at the wells are different.

Figures 8, 9, and 10 show that 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 historically low groundwater levels, which began in about November 2000 and continued through November 2001, appear to be returning to levels similar to those observed during the first quarter 2000. Therefore, the lack of product at well LW-11S during the first and second quarter 2002 may be related to the return to more typical winter season groundwater elevations. Figures 8 and 10 show that PCP concentrations in the upper zone at wells LW-2S and LW-11S generally follow the water level trends in that zone over time (with the exception of LW-2S during the last three quarterly events). However, as shown on Figure 9 and discussed earlier, the only correlation between the water levels and PCP concentrations in the upper zone at well LW-4S may be related to precipitation events during periods of low groundwater levels. 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 11. However, there appears to be no correlation between PCP concentrations and groundwater elevations at LW-4D.

Contaminant and groundwater level trends will continue to be evaluated and discussed for future quarterly events.

3.0 FUTURE GROUNDWATER TASKS

The third quarter 2002 groundwater sampling event was conducted August 26 through August 28. The groundwater analytical program for the third quarter 2002 event included the following: 1) routine quarterly monitoring well locations; 2) wells LW-13S, LW-14D, LW-17D, and LW-18D for evaluation of the groundwater interim action at RW-2; and 3) well HRW-1 (in addition to other wells routinely sampled) for evaluation of the groundwater interim action at HRW-1. Additionally, stormwater samples will be collected from the east-west trending storm drain (SDM-1 and SDM-2). The results for the third quarter 2002 event will be provided in the *Third Quarter 2002 Groundwater Report.*

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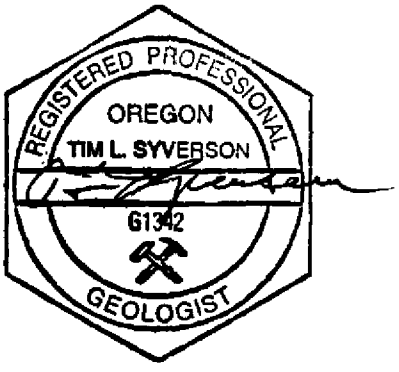
4.0 USE OF THIS REPORT

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.

By:



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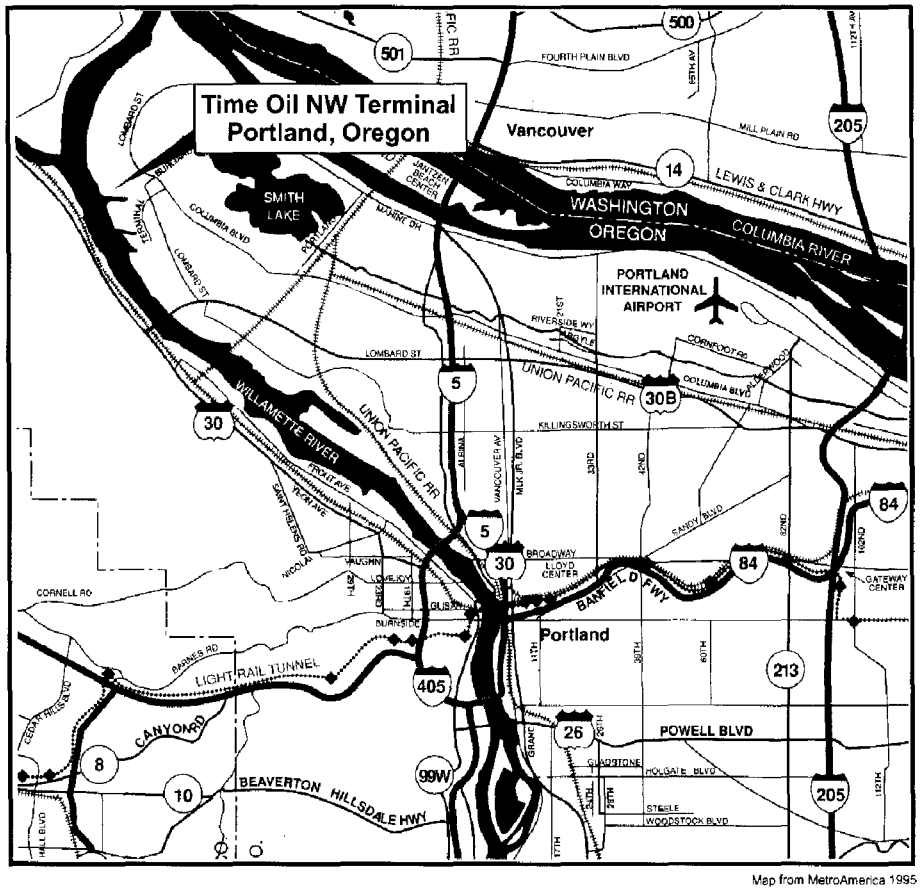
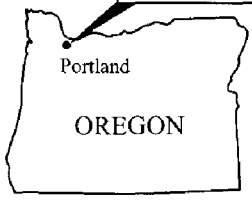


Map from MetroAmerica 1995

SITE LOCATION
(see enlarged map area above)



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Approximate Scale in Miles

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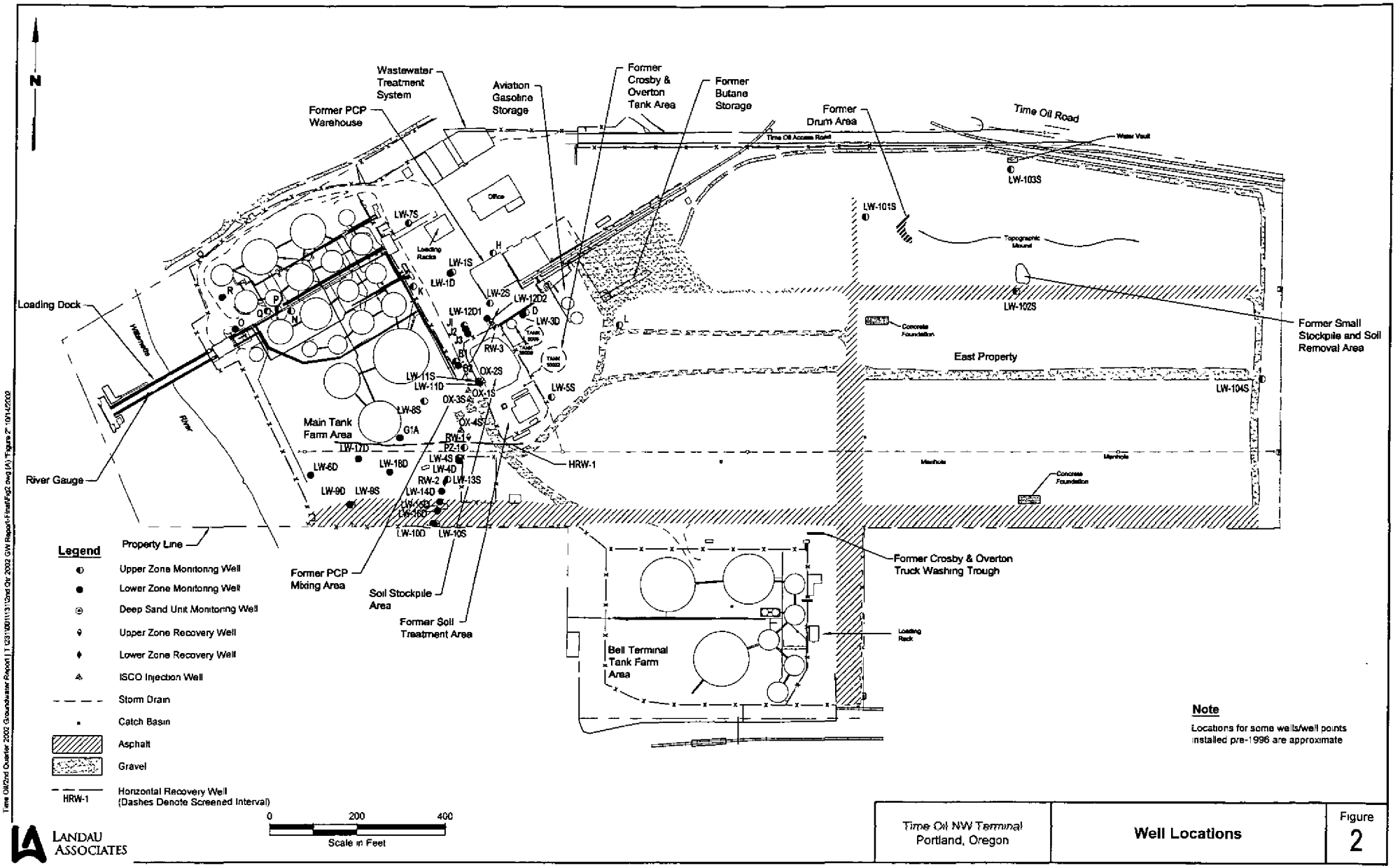
Time Oil NW Terminal Portland, Oregon	**Vicinity Map**	Figure 1



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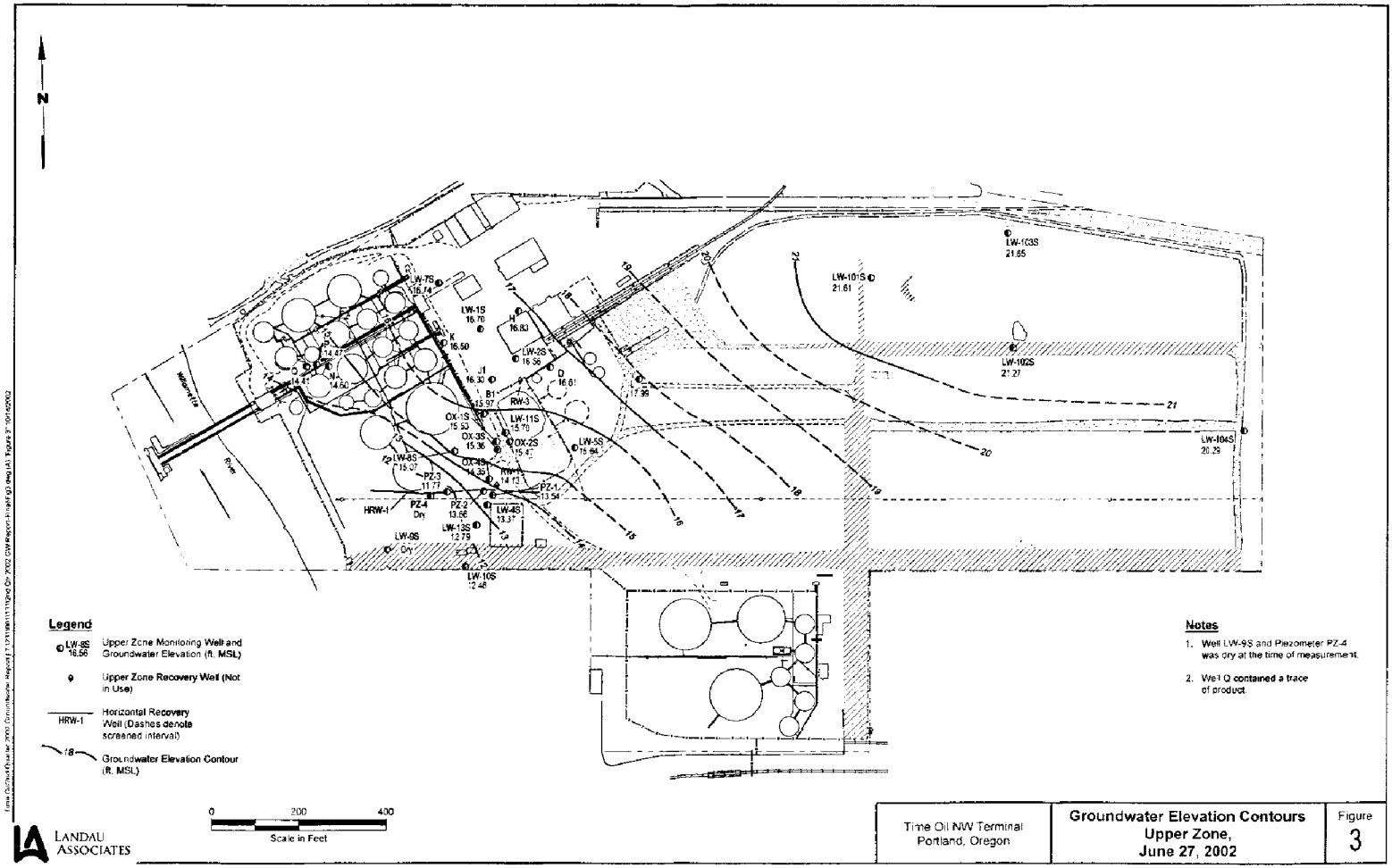

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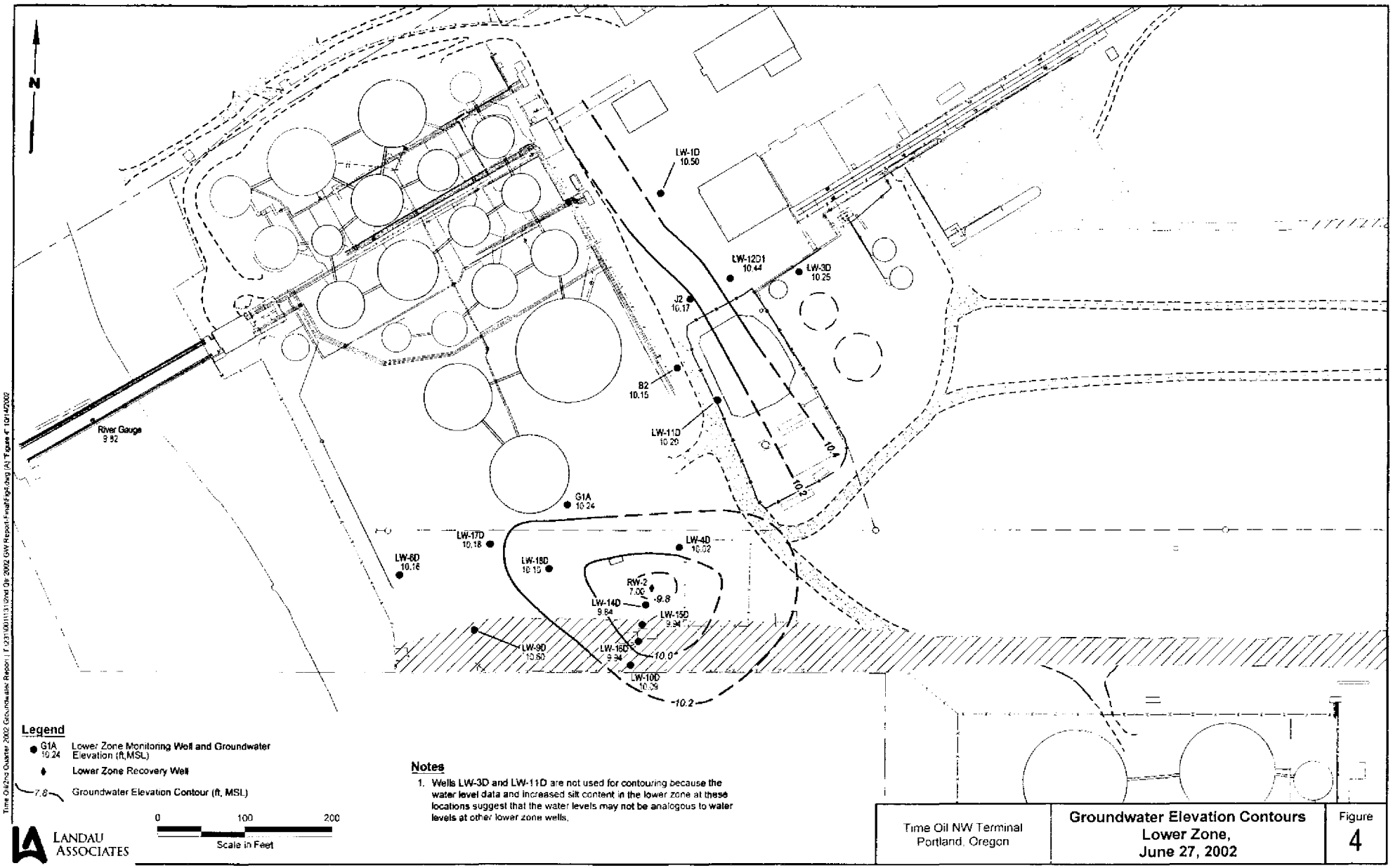

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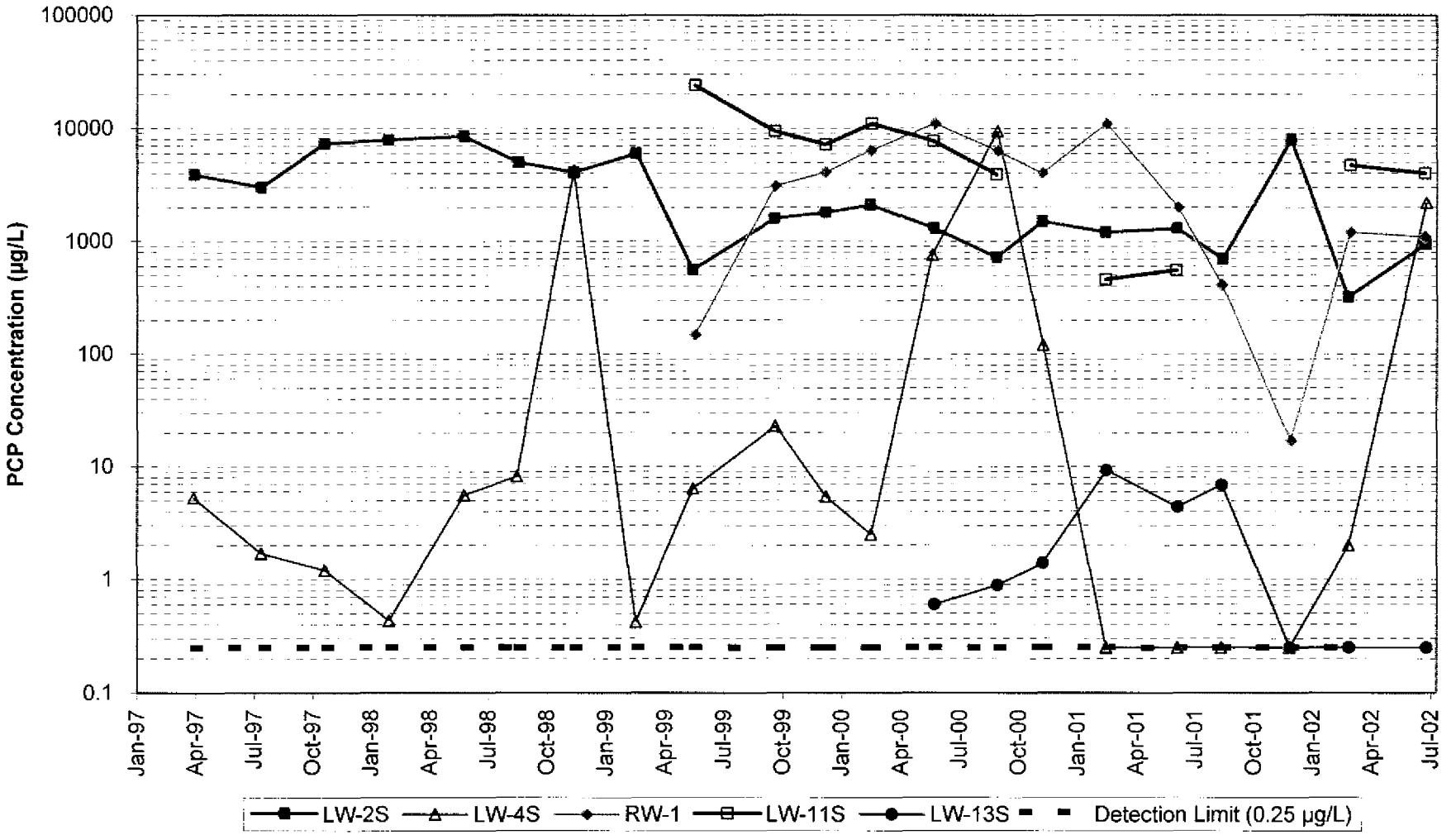
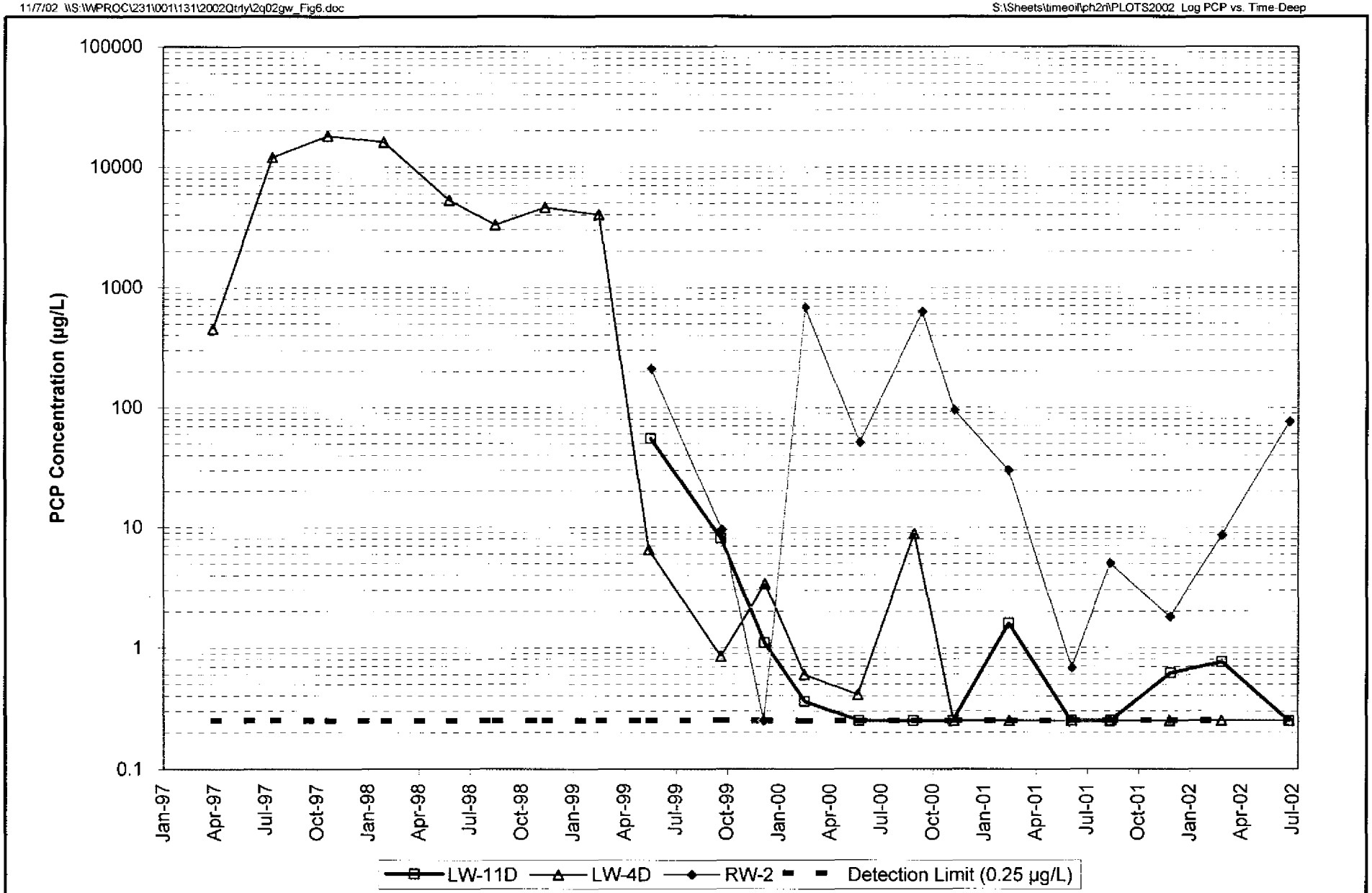


LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Selected Upper Zone Wells April 1997 – June 2002**	Figure 5

BZTO104(e)016420



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Selected Lower Zone Wells April 1997 – June 2002**	Figure 6

BZTO104(e)016421

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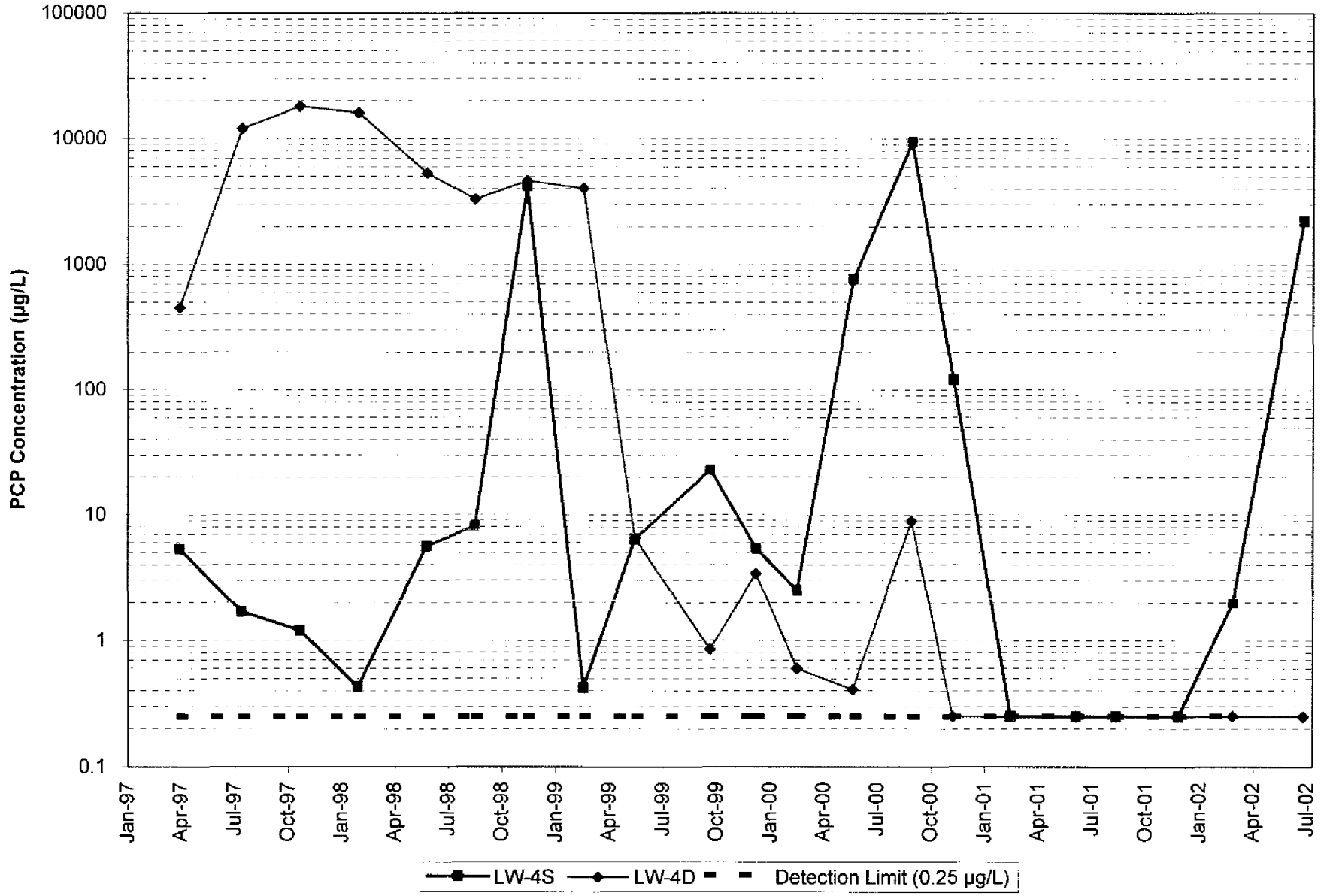

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Wells LW-4S and LW-4D April 1997 – June 2002**	Figure **7**

BZTO104(e)016422

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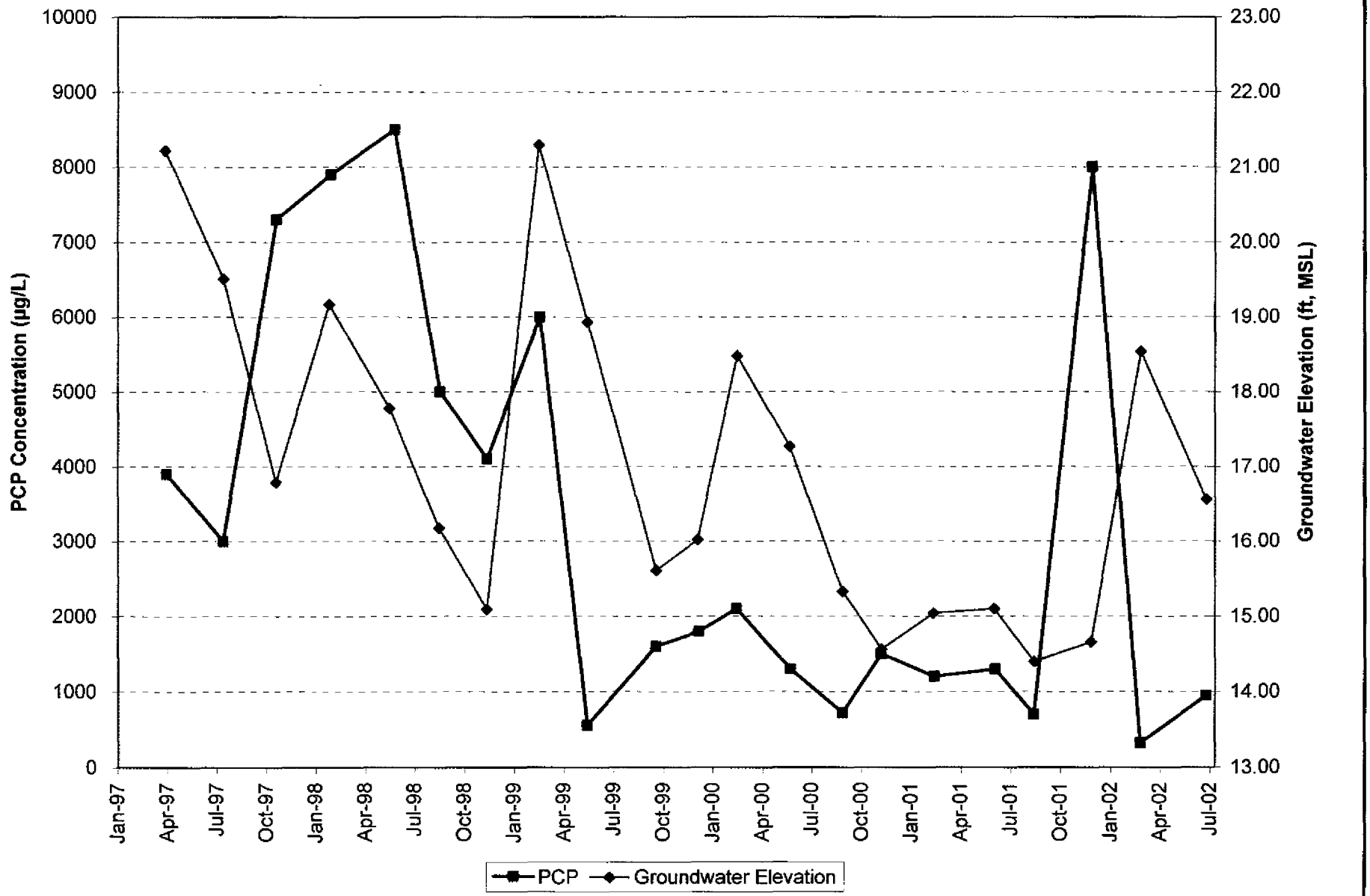
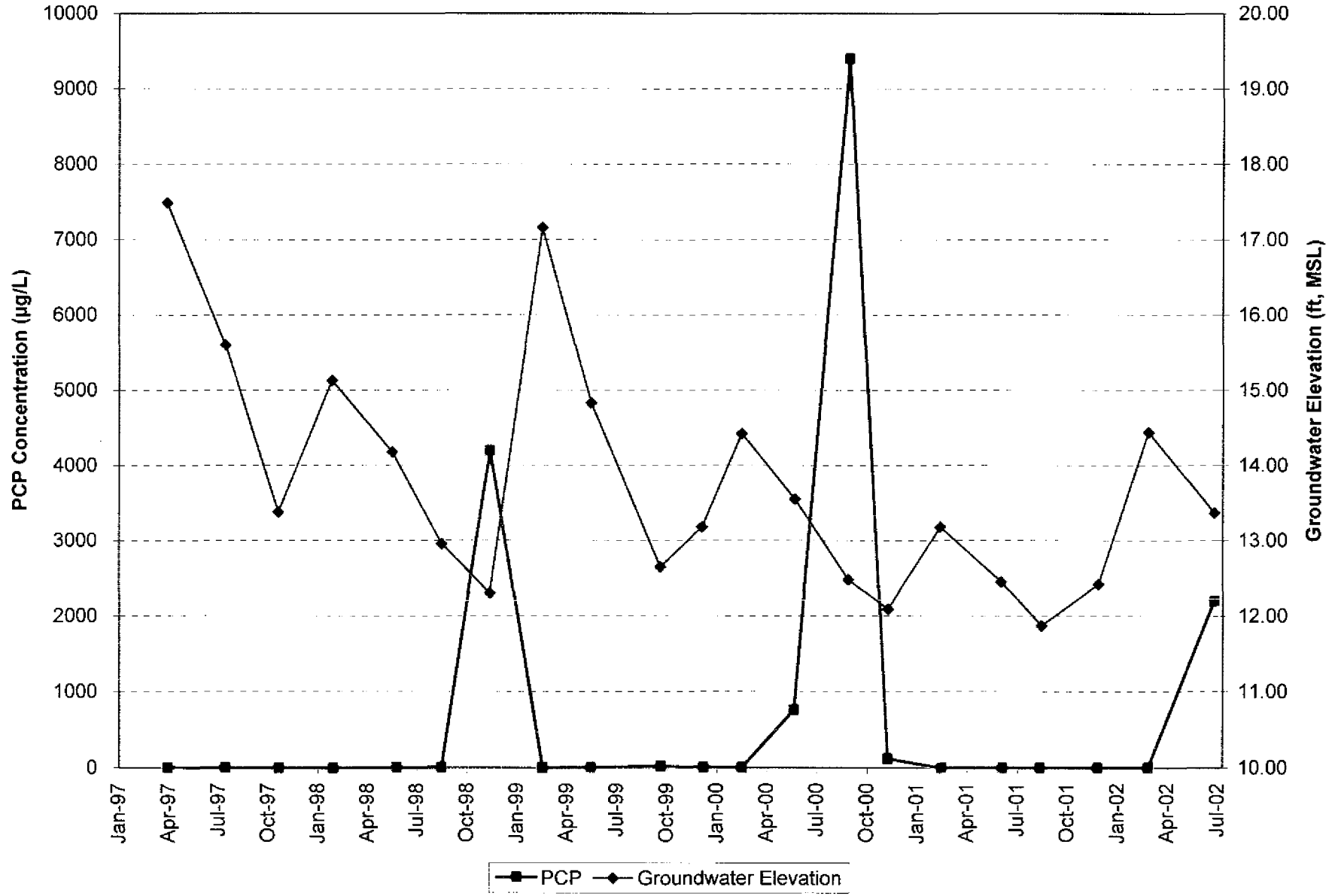


LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations and Groundwater Elevations, LW-2S April 1997 – June 2002**	Figure 8

BZTO104(e)016423



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations and Groundwater Elevations, LW-4S April 1997 – June 2002**	Figure 9

BZT0104(e)016424

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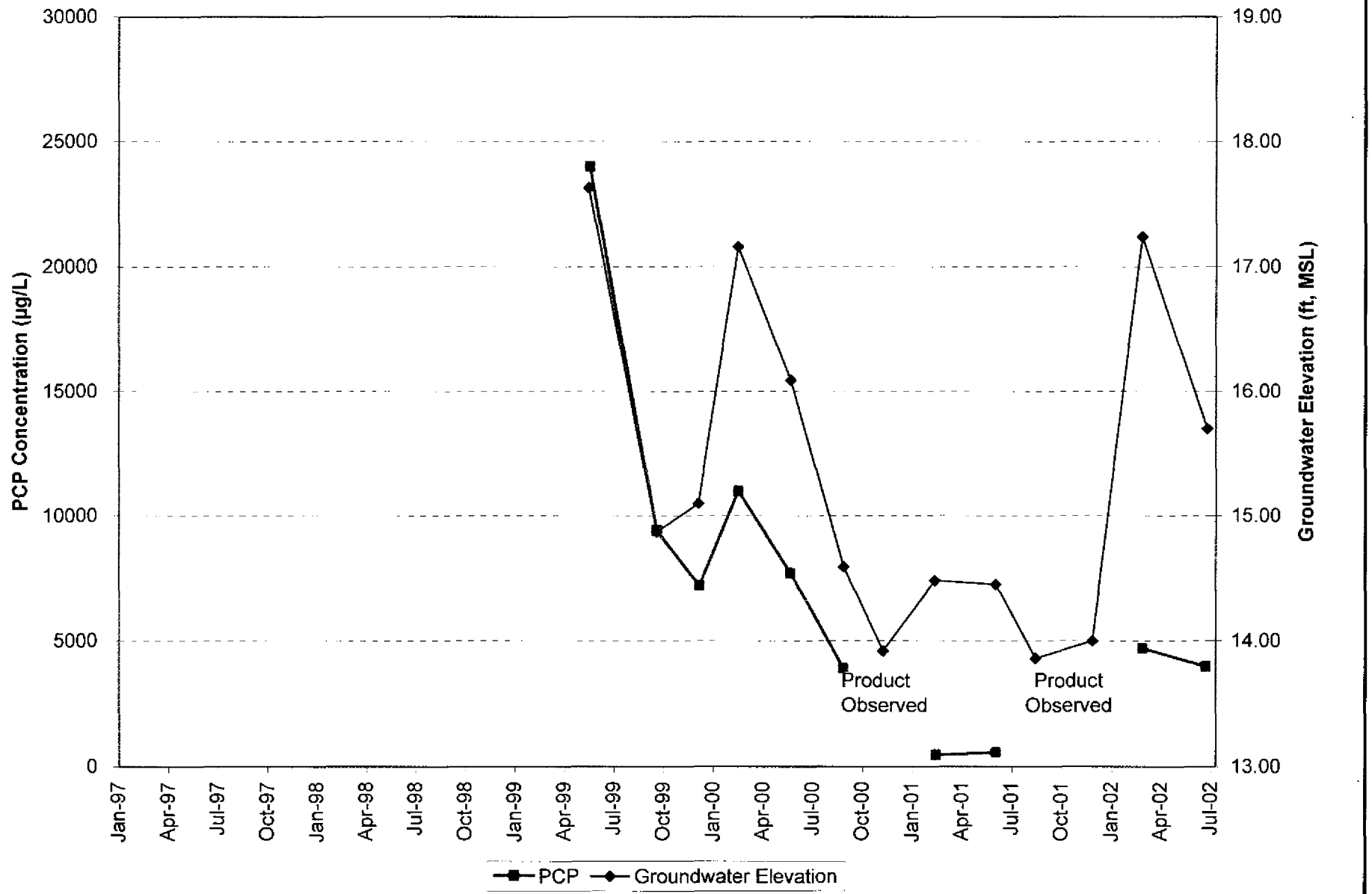
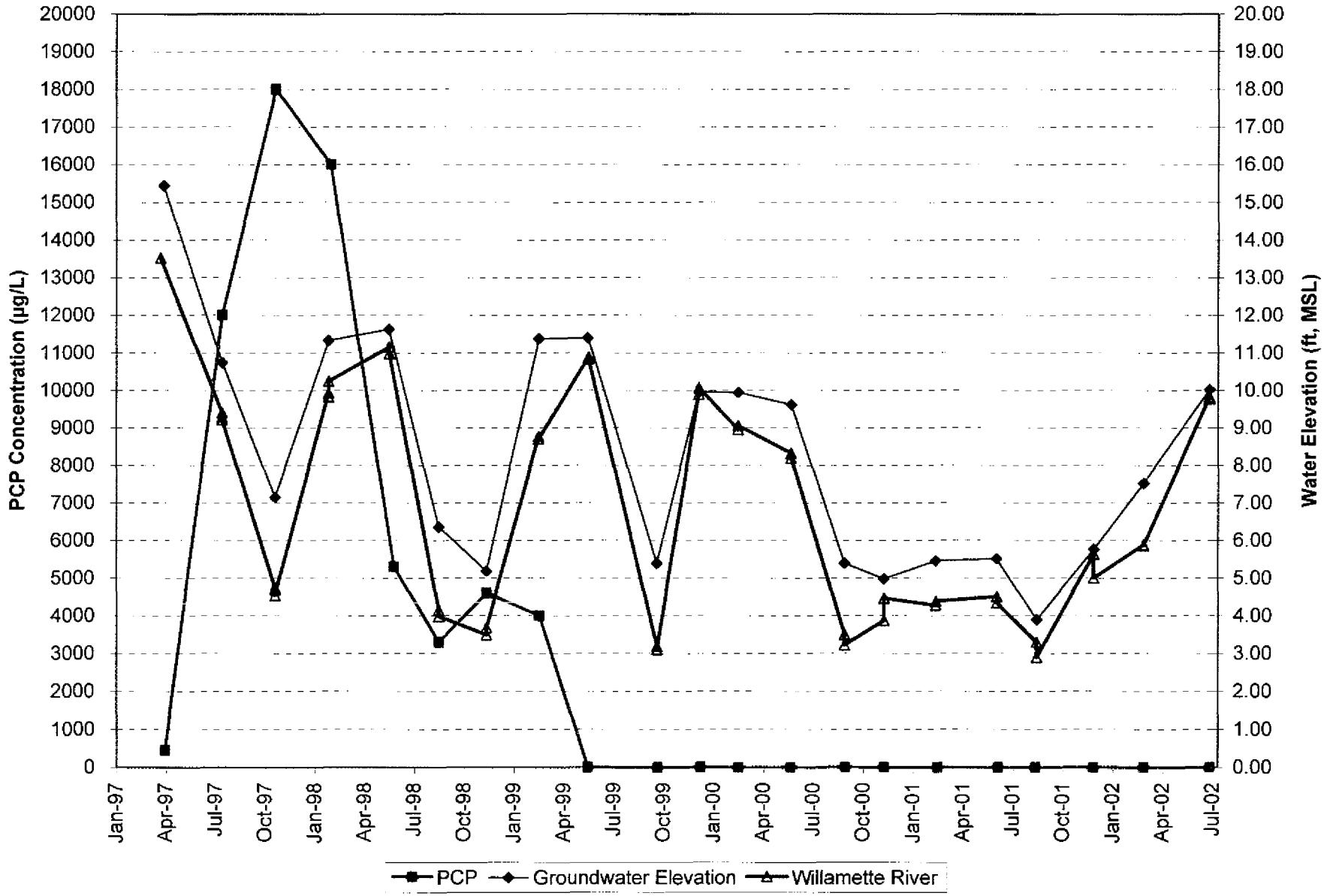


LANDAU ASSOCIATES

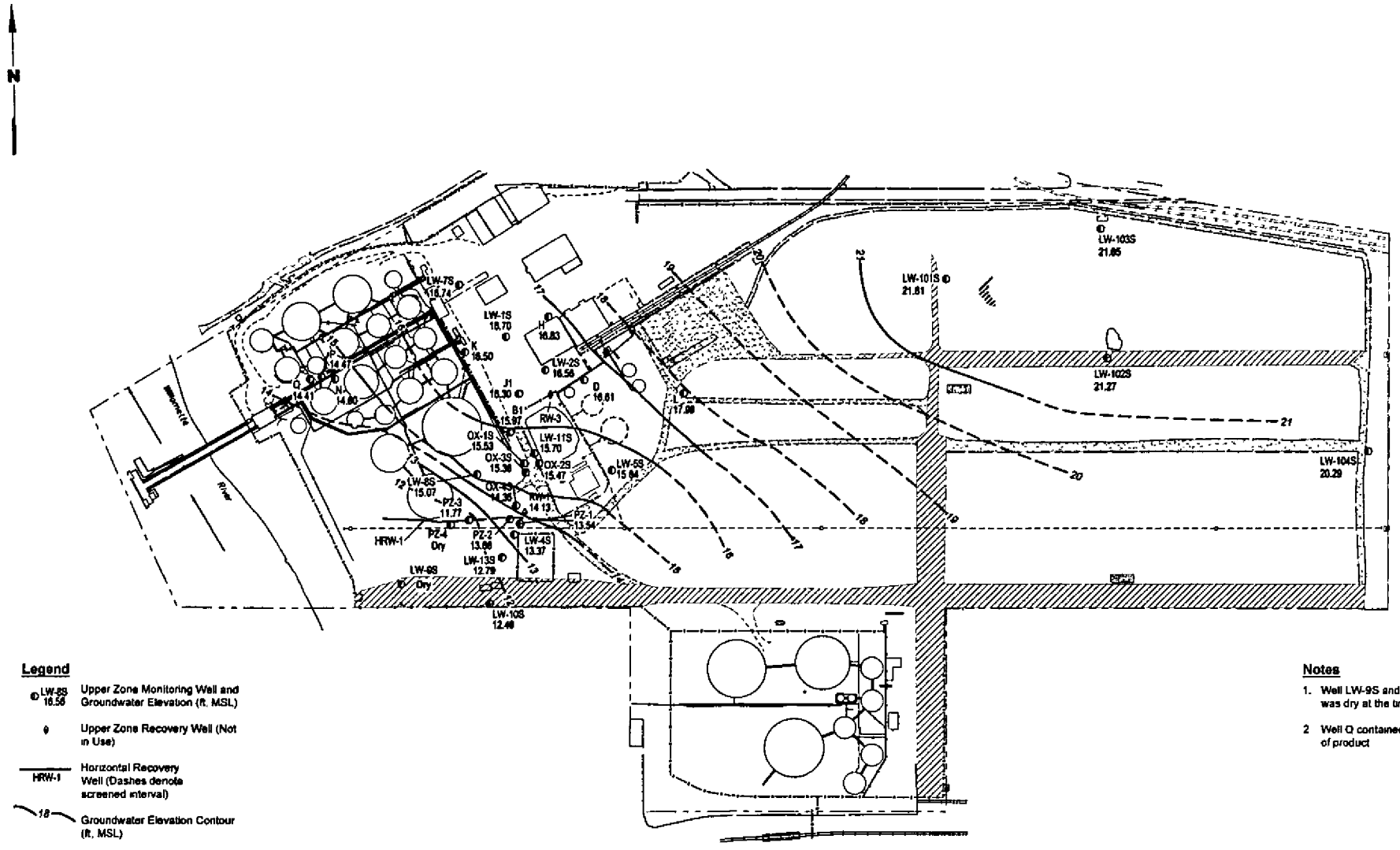
Time Oil NW Terminal Portland, OR	**PCP Concentrations and Groundwater Elevations, LW-11S April 1997 – June 2002**	Figure 10

BZTO104(e)016425



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations, Groundwater Elevations, and River Stage, LW-4D April 1997 – June 2002**	Figure 11



Notes

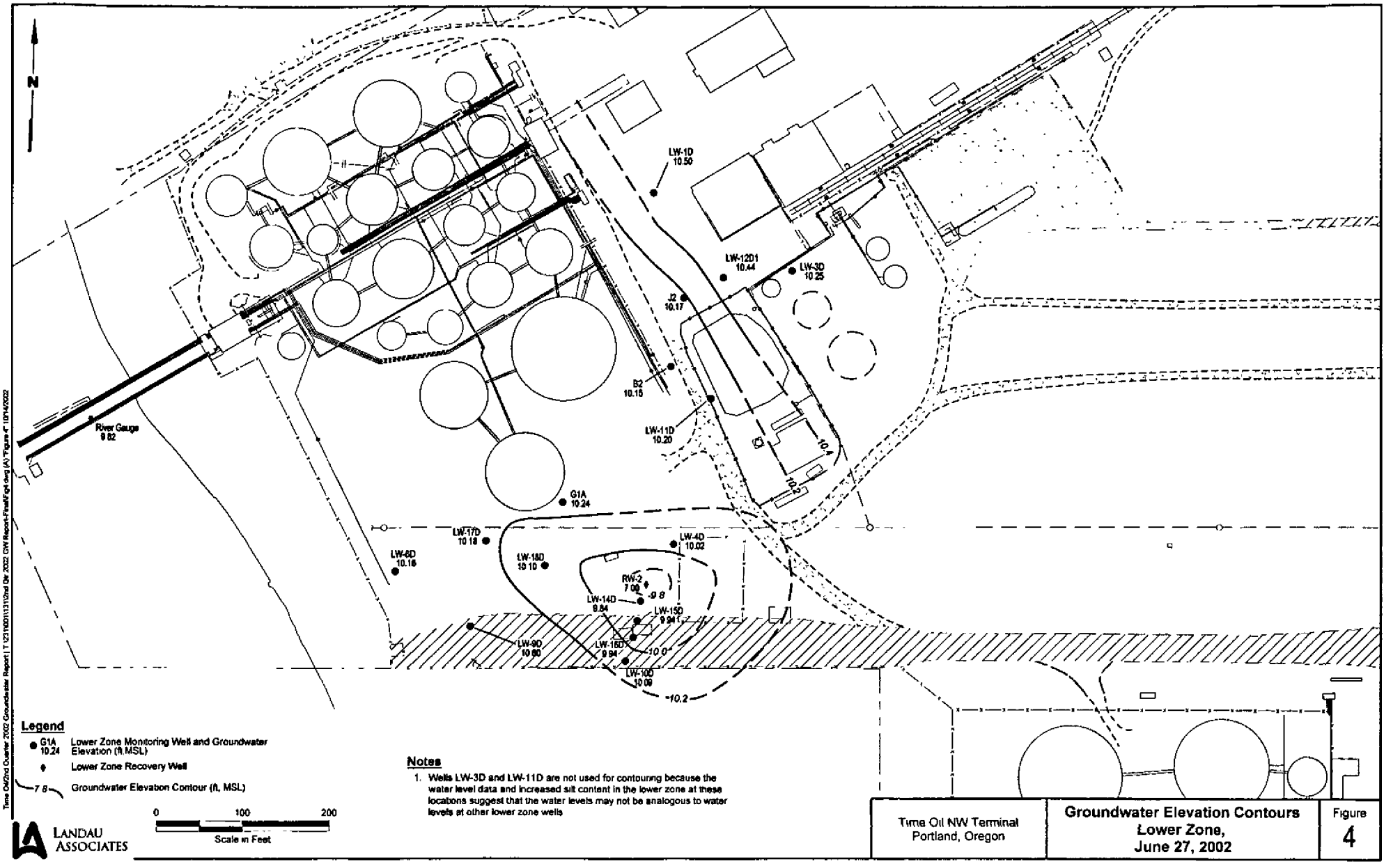
1. Well LW-9S and Piezometer PZ-4 was dry at the time of measurement.
2. Well Q contained a trace of product

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, Oregon	**Groundwater Elevation Contours Upper Zone, June 27, 2002**	Figure 3

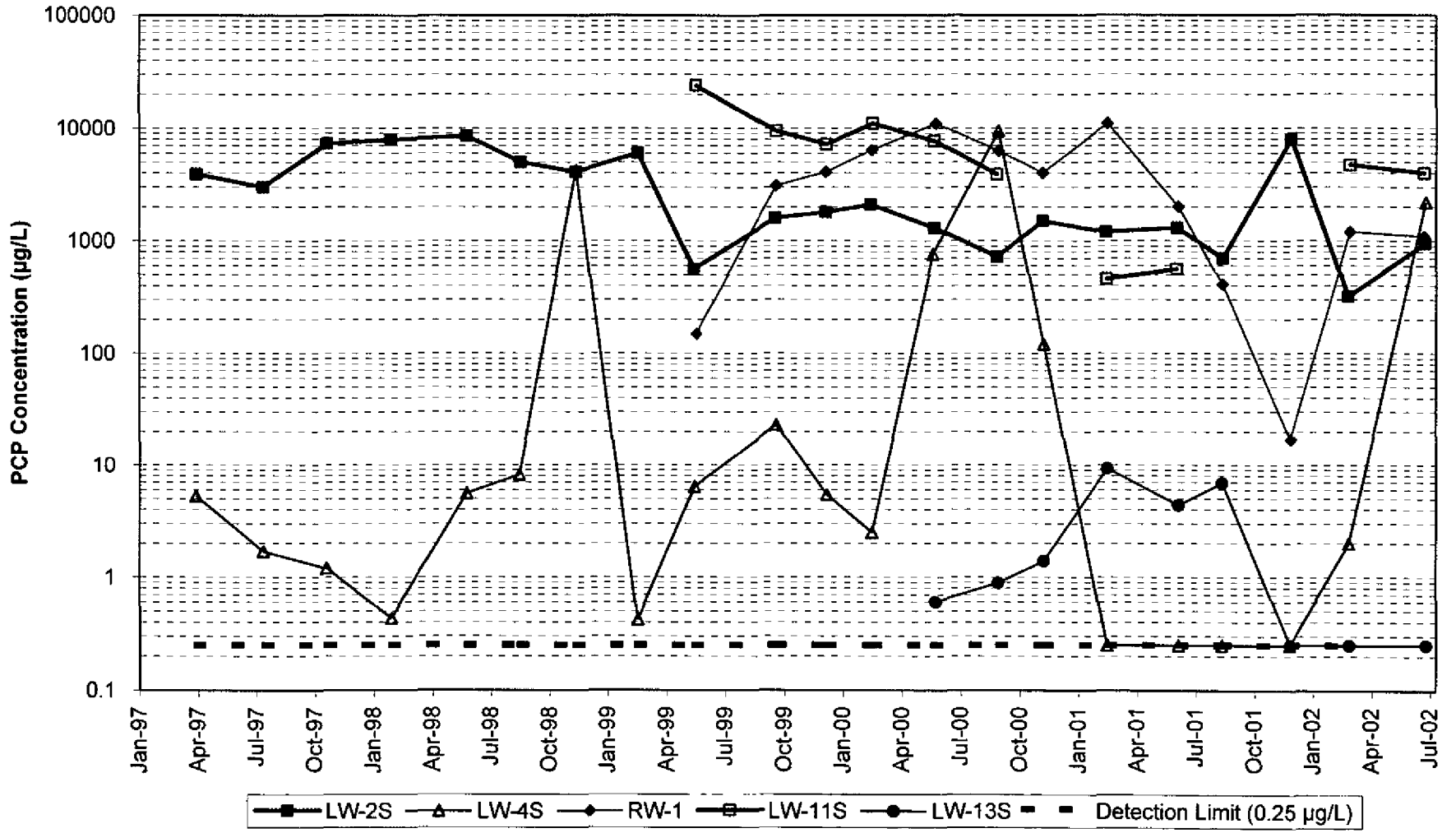
Time Oil/2nd Quarter 2002 Groundwater Report | T:\231\001\131\2nd Qtr 2002 GW Report-Final\Fig3.dwg (A) "Figure 3" 10/14/2002

BZTO104(e)016427



Time Oil/2nd Quarter 2002 Groundwater Report | T:\231\00\111\31\2nd Qtr 2002 GW Report-Final\Fig4.dwg [A] "Figure 4" 10/14/2002

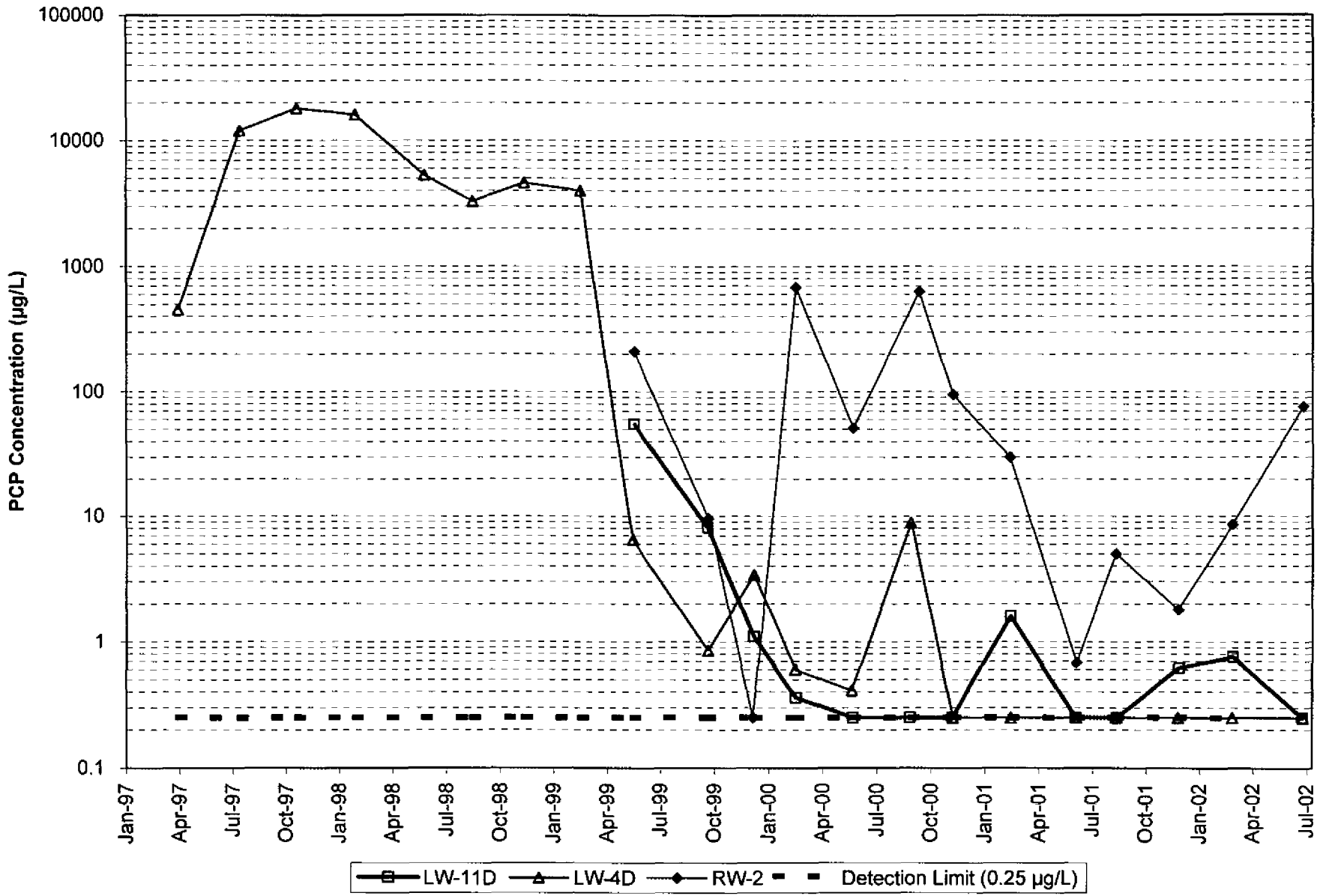
BZTO104(e)016428



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Selected Upper Zone Wells April 1997 – June 2002**	Figure 5

BZTO104(e)016429



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Selected Lower Zone Wells April 1997 – June 2002**	Figure 6

BZTO104(e)016430

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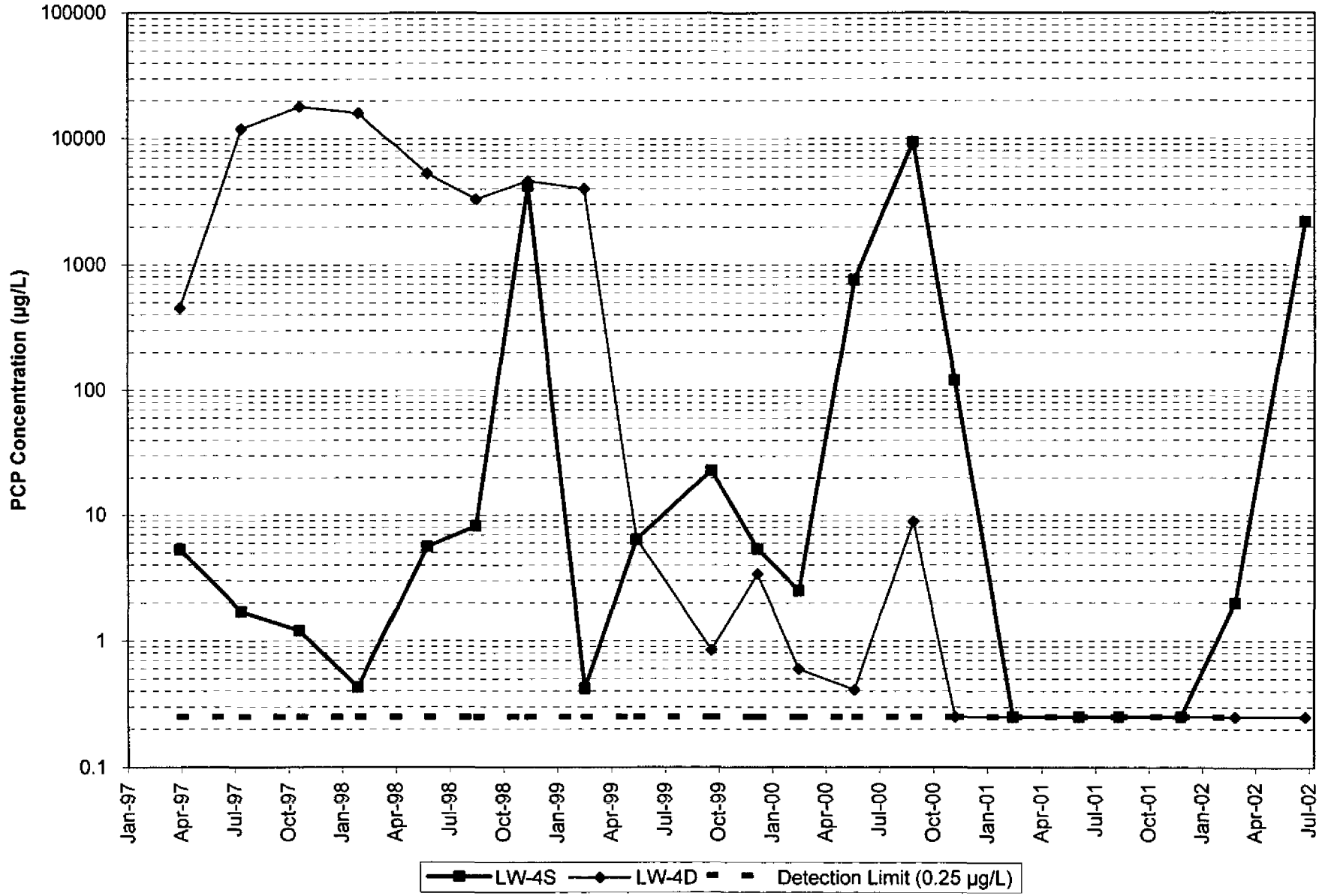
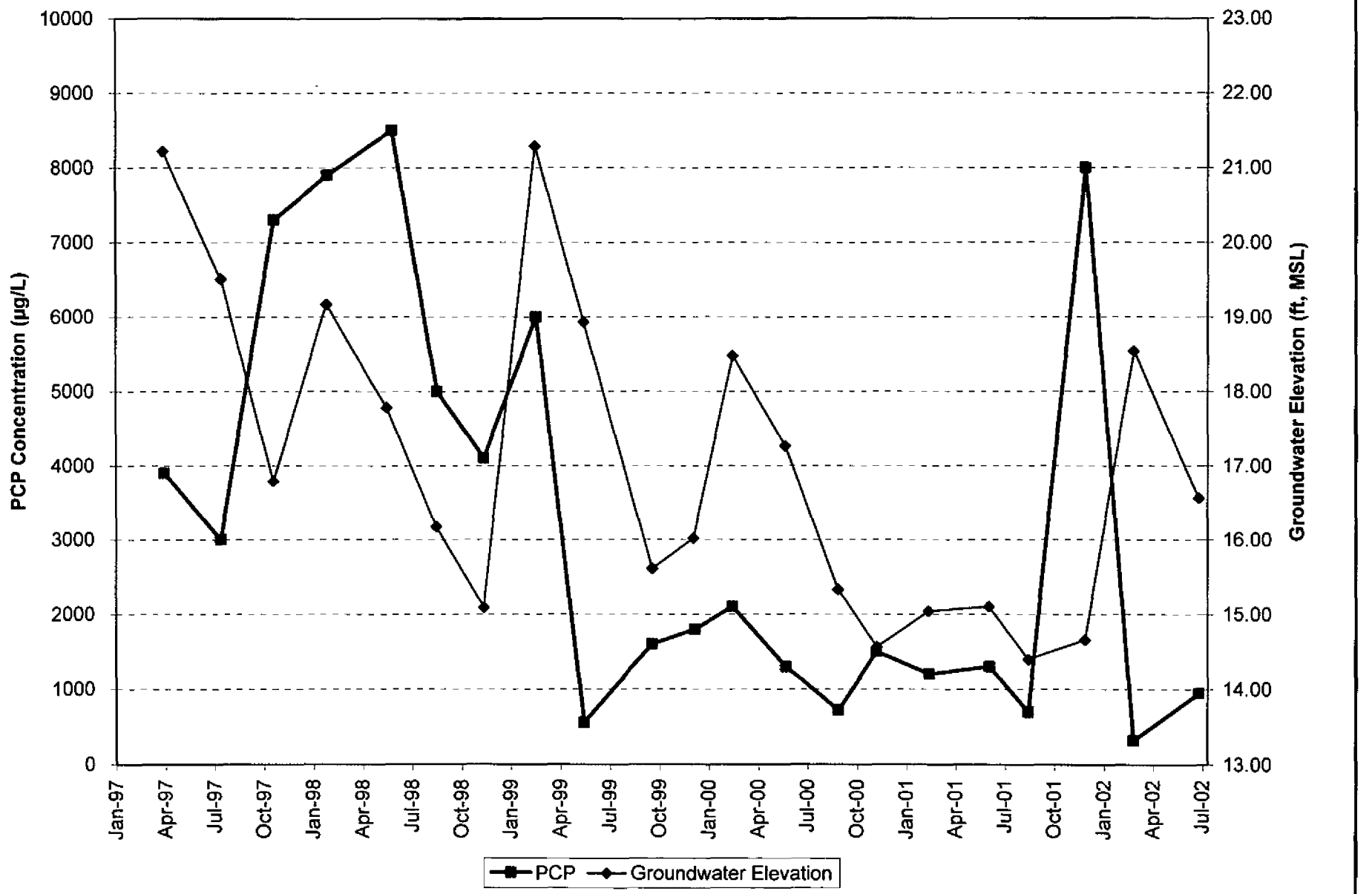


LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations Wells LW-4S and LW-4D April 1997 – June 2002**	Figure **7**

BZTO104(e)016431



LANDAU ASSOCIATES

Time Oil NW Terminal
Portland, OR

PCP Concentrations and Groundwater Elevations, LW-2S April 1997 – June 2002

Figure
8

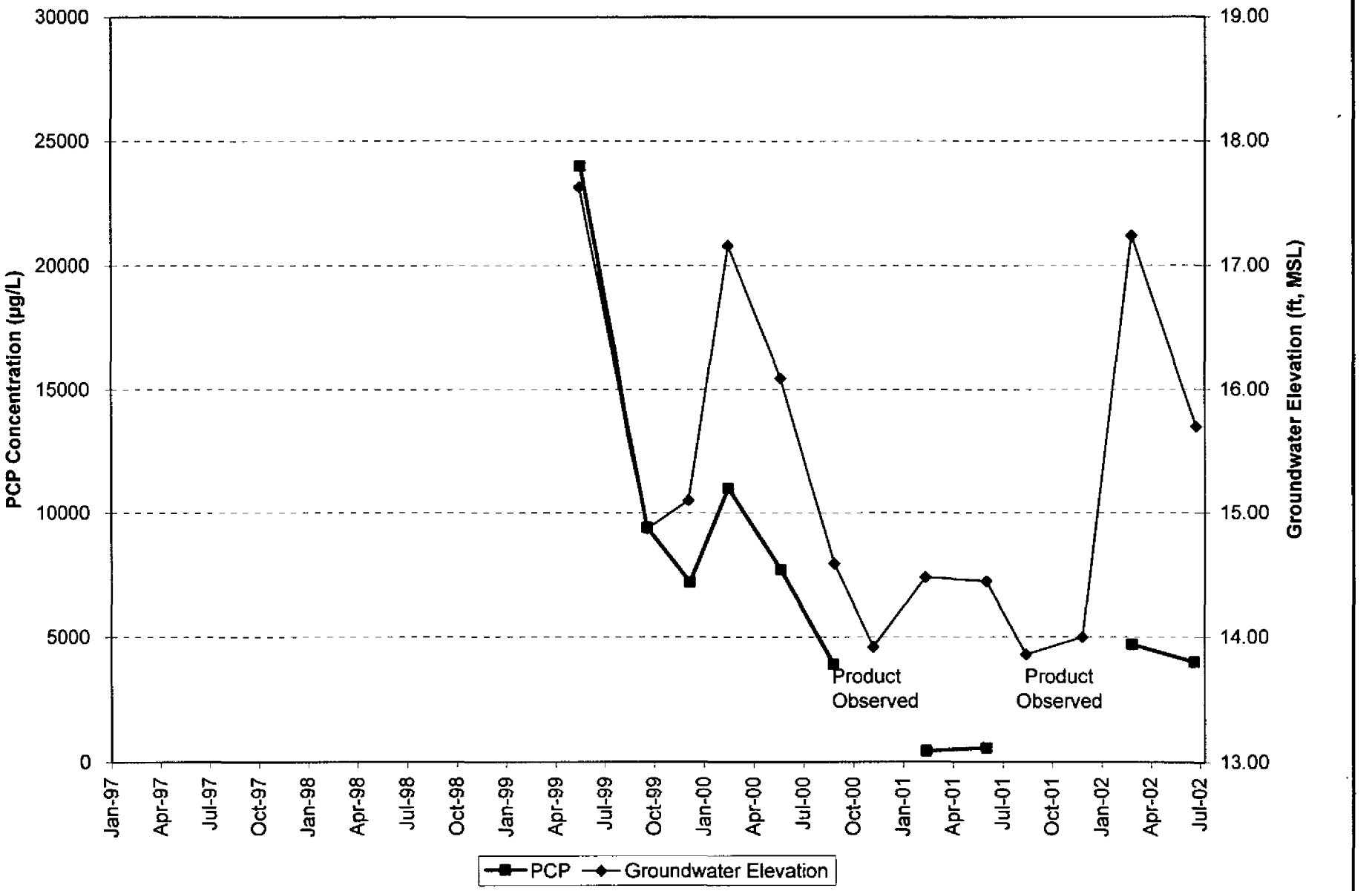
BZTO104(e)016432

11/7/02 S:\WPROC\231\001\131\2002Qtrly\2q02gw_Fig9.doc S:\Sheets\timeoil\ph2rl\PLOTS2002_LW4S PCP-WL

LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations and Groundwater Elevations, LW-4S April 1997 – June 2002**	Figure 9

BZTO104(e)016433



LANDAU ASSOCIATES

Time Oil NW Terminal Portland, OR	**PCP Concentrations and Groundwater Elevations, LW-11S April 1997 – June 2002**	Figure 10

BZTO104(e)016434

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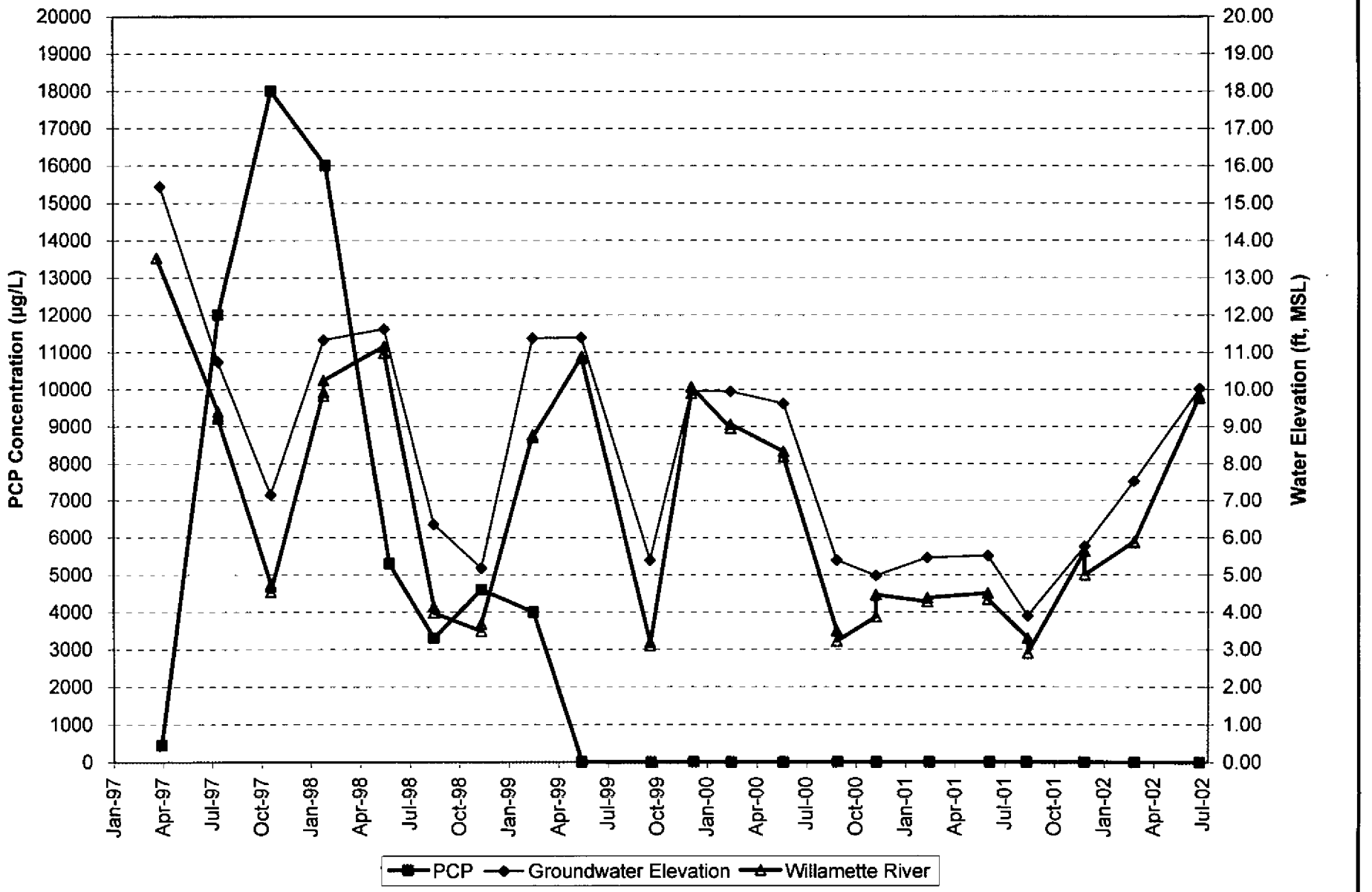

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Time Oil NW Terminal Portland, OR	**PCP Concentrations, Groundwater Elevations, and River Stage, LW-4D April 1997 – June 2002**	Figure 11

BZTO104(e)016435

APPENDIX A

REFERENCES
(Modifications to Quarterly Groundwater Analysis Program)

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DEQ. 2001b. Email to Rebekah Brooks, Landau Associates, Edmonds, Washington, re: *Reduction of Total Petroleum Hydrocarbon Analysis, Time Oil Co. Northwest Terminal.* Thomas E. Roick, Oregon Department of Environmental Quality, Portland, Oregon. May 30.

DEQ. 2000a. Letter to Kevin Murphy, Time Oil Co , Seattle Washington, re: *Dioxin/Furans Groundwater Analysis, Time Oil Northwest Terminal.* Thomas E. Roick, Oregon Department of Environmental Quality, Portland, Oregon. May 18.

DEQ. 2000b. Email to Rebekah Brooks, Landau Associates, Edmonds, Washington, Tom Roick, Oregon Department of Environmental Quality, Portland, Oregon re: *Time Oil Groundwater Monitoring.* August 15.

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Landau Associates. 2000c. *Report Phase II Remedial Investigation, Time Oil Co. Northwest Terminal.* Prepared for Time Oil Co., Seattle, Washington. April 6.

Landau Associates. 1999a. Letter to Karla Urbanowicz, Oregon Department of Environmental Quality, Portland, Oregon re: *Time Oil Northwest Terminal, Portland, Oregon.* January 21.

Landau Associates. 1999b. Personal communication (telephone conversation with Karla Urbanowicz, Oregon Department of Environmental Quality, Portland, Oregon, re: *Approval of additional modification to groundwater sampling and analysis program. Time Oil Northwest Terminal, Portland, OR*). Rebekah Brooks, Landau Associates, Edmonds, Washington. February 12.

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Landau Associates. 1998b. Technical Memorandum re: *Additional Groundwater Investigation, January-February, 1998, Time Oil Northwest Terminal, Portland, Oregon.* Prepared for the Oregon Department of Environmental Quality, Portland, Oregon. July 28.

BZTO104(e)016437

TABLE B-1
GROUNDWATER MONITORING POINTS AND ANALYTICAL METHODS
SECOND QUARTER EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Total Depth	SVOC (8270)	VOC (8260)	PCP (8270 SIM)	TPH-D	TPH-DX	TPH-G	PP Metals (6010/7000)	TDS	Chloride	Total Fe (SM3500-Fe)	Alkalinity	COD (410 4)	TOC (415.1)	Dixion/Furans (8290)	Ch Phenols (8040)
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						
LW2S	20	X	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	21	X	X	X	X			X	X	X						
LW9D	40	X	X	X	X			X	X	X						
LW10S	20	X	X	X	X			X	X	X						
LW10D	39.5	X	X	X	X			X	X	X						
LW11S	21	X	X	X		X	X	X	X	X	X	X	X	X	X	X
LW11D	41	X	X	X	X			X	X	X						
LW12D1	37	X	X	X	X			X	X	X						
LW12D2	88	X	X	X				X	X	X						
LW13S	20 5			X												
LW14D	41 5			X												
LW17D	40			X												
LW18D	40			X												
LW101S	16			X												
LW102S	12			X												
LW103S	21			X												
LW104S	22			X												
RW1	21.5	X	X	X		X	X	X	X	X	X	X	X	X	X	X
RW2	44.5	X	X	X		X	X	X	X	X						
HRW-1	-			X												
X	dup-RW1	X	X	X		X	X	X	X	X						
W	dup-RW2	X	X	X		X	X	X	X	X						
LW-13D	dup-LW103S			X												
OX-1S	21		X					X	X		X	X	X	X		X
OX-2S	18 5		X					X	X		X	X	X	X		X
OX-3S	18		X					X	X		X	X	X	X		X
OX-4S	20.5		X					X	X		X	X	X	X		X
PZ-1	19		X					X	X		X	X	X	X		X

BZTO104(e)016439

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 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	----	
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	----	
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	----	
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	----	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	----	
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	----	
F*	08/18/98	08.10	NA	14 77	NA		
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	----	----	
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	----	----	
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
K	03/05/02	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	----	
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	----	
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	----	
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 06	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

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
LW001S	05/29/02	00 00	27 96	10 49	17.47	----	
LW001S	06/27/02	14.50	27 96	11 26	16.70	----	
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	----	
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	----	
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	
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	----	
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	----	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	----	
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 26	30.75	18 27	12 48	----	
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	----	
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	----	
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
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	----	
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	----	
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	
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	---	
PZ2	06/27/02	15:18	31 97	18 31	13 66	---	Developed 6/26/02
PZ3	06/27/02	15 19	31.12	19 35	11 77	---	Developed 6/26/02
PZ4	06/27/02	15 20	28 47	dry	---	---	
OX001S	06/27/02	15:13	33 38	17 85	15 53	---	
OX002S	06/27/02	15 12	28 69	13 22	15 47	---	
OX003S	06/27/02	15:14	30 01	14 65	15.36	---	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
OX004S	06/27/02	15.15	33 42	19 07	14 35	----	
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	----	
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	----	
G1A	03/25/97	11:55	29.72	14 84	14.88	----	
G1A	03/31/97	09 11	29 72	14.28	15.44	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
J3	06/27/02	15 04	29 58	19 14	10 44	----	
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	----	
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	----	
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	----	
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	
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 - JUNE 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	----	
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	----	
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	----	
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	----	
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	----	
LW012D2	05/18/99	15:14	29.24	18 23	11.01	----	
LW012D2	09/21/99	11 53	29 24	24 69	4 55	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	---	
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	---	
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	---	
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	---	
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	---	
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	---	
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	---	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 2002
TIME OIL NORTHWEST TERMINAL

Well	Date	Time	Reference Elevation (ft) (a)	DTW (ft) (b)	GW Elevation (ft) (c)	LNAPL Thickness (ft)	NOTES
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	----	
							Groundwater interim action pumping began 10/5/00 in the lower zone at this well Pump not running at time of measurement
RW2	11/09/00	12:50	30 68	25 83	4 85	----	
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	----	
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
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	----	

TABLE B-2
GROUNDWATER LEVEL MEASUREMENTS
QUARTERLY SAMPLING EVENTS, MARCH 1997 - JUNE 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	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	---	

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].

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification,	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S
Laboratory Identification	EM75J	EM85B	EM85D	EM75F	EM75G	EM85F	EN00G	EM75E	EM85G
Date Collected:	6/25/02	6/26/02	6/26/02	6/25/02	6/25/02	6/26/02	6/27/02	6/25/02	6/26/02
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	0.25 U	0 38	4 4	NA	0.25 U	NA	NA	0 25 U	0 25 U
SEMIVOLATILES (µg/L)									
EPA Method SW8270									
Phenol	2.0 U	2.0 U	2 0 U	NA	2.0 U	2.0 U	56	2.0 U	2.0 U
Bis-(2-Chloroethyl) Ether	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
2-Chlorophenol	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
1,3-Dichlorobenzene	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
1,4-Dichlorobenzene	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
Benzyl Alcohol	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
1,2-Dichlorobenzene	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
2-Methylphenol	2.0	1 0 U	1 0 U	NA	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	NA	1.0 U	1.0 U	1.0 U	1.0 U	1 0 U
4-Methylphenol	46	1.0 U	1 0 U	NA	1 0 U	1.0 U	22 U	1 0 U	1 0 U
N-Nitroso-Di-N-Propylamine	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
Hexachloroethane	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
Nitrobenzene	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
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
2-Nitrophenol	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
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
Benzoic Acid	50 U	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U
bis(2-Chloroethoxy) Methane	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
2,4-Dichlorophenol	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
1,2,4-Trichlorobenzene	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
Naphthalene	15	1 0 U	1 4	NA	1 0 U	6 2	14	9 0	57
4-Chloroaniline	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
Hexachlorobutadiene	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
4-Chloro-3-methylphenol	2 0 U	2.0 U	2.0 U	NA	2 0 U	2 0 U	6 7 U	2.0 U	2 0 U
2-Methylnaphthalene	5 9	1 0 U	1 0 U	NA	1 0 U	1 0 U	7 5	3 0	51
Hexachlorocyclopentadiene	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
2,4,6-Trichlorophenol	5 0 U	5 0 U	5.0 U	NA	5 0 U	5.0 U	17	5 0 U	5 0 U
2,4,5-Trichlorophenol	5 0 U	5.0 U	5 0 U	NA	5 0 U	5 0 U	8 9	5.0 U	5 0 U
2-Chloronaphthalene	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
2-Nitroaniline	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
Dimethylphthalate	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
Acenaphthylene	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
3-Nitroaniline	6.0 U	6 0 U	6 0 U	NA	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	NA	1 0 U	1 0 U	1.0 U	1 0 U	1 0 U
2,4-Dinitrophenol	25 U	25 U	25 U	NA	25 U	25 U	25 U	25 U	25 U
4-Nitrophenol	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
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
2,6-Dinitrotoluene	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

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TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification	LW10S	LW11S	LW13S	LW101S	LW102S	LW103S	Dup of LW103S LW13D	LW104S
Laboratory Identification:	EN00B	EM66C	EN00F	EM75C	EM75B	EM75D	EM75I	EM75A
Date Collected.	6/27/02	6/24/02	6/27/02	6/25/02	6/25/02	6/25/02	6/25/02	6/25/02
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8270SIM								
Pentachlorophenol	0 25 U	NA	0 25 U	0 25 U	0 25 U	0.25 U	0 25 U	0 25 U
SEMIVOLATILES (µg/L)								
EPA Method SW8270								
Phenol	2 0 U	2 0 U	NA	NA	NA	NA	NA	NA
Bis-(2-Chloroethyl) Ether	2 0 U	2 0 U	NA	NA	NA	NA	NA	NA
2-Chlorophenol	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	1 0 U	1.0 U	NA	NA	NA	NA	NA	NA
2-Methylphenol	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-Chloropropane)	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
4-Methylphenol	1.0 U	1 0	NA	NA	NA	NA	NA	NA
N-Nitroso-Di-N-Propylamine	2.0 U	2 0 U	NA	NA	NA	NA	NA	NA
Hexachloroethane	2 0 U	2 0 U	NA	NA	NA	NA	NA	NA
Nitrobenzene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Isophorone	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2-Nitrophenol	5.0 U	5 0 U	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	3 0 U	3 0 U	NA	NA	NA	NA	NA	NA
Benzoic Acid	50 U	50 U	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	3 0 U	3 0 U	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Naphthalene	1 0 U	6 7	NA	NA	NA	NA	NA	NA
4-Chloroaniline	3 0 U	3.0 U	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	2.0 U	2 0 U	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	2 0 U	2 0 U	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1.0 U	2.6	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	5 0 U	5 0 U	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	5 0 U	5 0 U	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	1.0 U	1 0 U	NA	NA	NA	NA	NA	NA
2-Nitroaniline	5 0 U	5.0 U	NA	NA	NA	NA	NA	NA
Dimethylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	1 0 U	1 6 M	NA	NA	NA	NA	NA	NA
3-Nitroaniline	6 0 U	6 0 U	NA	NA	NA	NA	NA	NA
Acenaphthene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	25 U	25 U	NA	NA	NA	NA	NA	NA
4-Nitrophenol	5.0 U	5 0 U	NA	NA	NA	NA	NA	NA
Dibenzofuran	1 0 U	1.0 U	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	5.0 U	5 0 U	NA	NA	NA	NA	NA	NA

BZTO104(e)016459

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS						
Sample Identification.	RW1	Dup of RW1 X	OX-1S	OX-2S	OX-3S	OX-4S	PZ-1
Laboratory Identification	EM66B	EM66A	EM65A	EM65B	EM65C	EM65D	EM65E
Date Collected	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02
CHLORINATED PHENOLS (µg/L)							
EPA Method SW8270SIM							
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (µg/L)							
EPA Method SW8270							
Phenol	57 J	76 J	NA	NA	NA	NA	NA
Bis-(2-Chloroethyl) Ether	2.0 U	2.0 U	NA	NA	NA	NA	NA
2-Chlorophenol	1.0 U	1.0 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Benzyl Alcohol	5.0 U	5.0 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
2-Methylphenol	1.0 U	1.0 U	NA	NA	NA	NA	NA
2,2'-Oxybis(1-Chloropropane)	1.0 U	1.0 U	NA	NA	NA	NA	NA
4-Methylphenol	21	25	NA	NA	NA	NA	NA
N-Nitroso-Di-N-Propylamine	2.0 U	2.0 U	NA	NA	NA	NA	NA
Hexachloroethane	2.0 U	2.0 U	NA	NA	NA	NA	NA
Nitrobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Isophorone	1.0 U	1.0 U	NA	NA	NA	NA	NA
2-Nitrophenol	5.0 U	5.0 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	3.0 U	3.0 U	NA	NA	NA	NA	NA
Benzoic Acid	50 U	50 U	NA	NA	NA	NA	NA
bis(2-Chloroethoxy) Methane	1.0 U	1.0 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	7.2	8.5	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Naphthalene	11 J	15 J	NA	NA	NA	NA	NA
4-Chloroaniline	3.0 U	3.0 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	2.0 U	2.0 U	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	2.0 U	2.0 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	5.1	6.1	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	5.0 U	5.0 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	5.0 U	5.0 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	5.0 U	5.8 M	NA	NA	NA	NA	NA
2-Chloronaphthalene	1.0 U	1.0 U	NA	NA	NA	NA	NA
2-Nitroaniline	5.0 U	5.0 U	NA	NA	NA	NA	NA
Dimethylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA
Acenaphthylene	1.0 U	1.0 U	NA	NA	NA	NA	NA
3-Nitroaniline	6.0 U	6.0 U	NA	NA	NA	NA	NA
Acenaphthene	1.0 U	1.0 U	NA	NA	NA	NA	NA
2,4-Dinitrophenol	25 U	25 U	NA	NA	NA	NA	NA
4-Nitrophenol	5.0 U	5.0 U	NA	NA	NA	NA	NA
Dibenzofuran	1.0 U	1.0 U	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	5.0 U	5.0 U	NA	NA	NA	NA	NA

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S
Laboratory Identification	EM75J	EM85B	EM85D	EM75F	EM75G	EM85F	EN00G	EM75E	EM85G
Date Collected	6/25/02	6/26/02	6/26/02	6/25/02	6/25/02	6/26/02	6/27/02	6/25/02	6/26/02
2,4-Dinitrotoluene	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
Diethylphthalate	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
4-Chlorophenyl-phenylether	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
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
4-Nitroaniline	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
4,6-Dinitro-2-Methylphenol	15 U	15 U	15 U	NA	15 U	15 U	15 U	15 U	15 U
N-Nitrosodiphenylamine	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
4-Bromophenyl-phenylether	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
Hexachlorobenzene	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
Pentachlorophenol	5.0 U	5.0 U	5.0 U	NA	5.0 U	950	2200	5.0 U	5.0 U
Phenanthrene	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
Carbazole	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
Anthracene	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
Di-n-Butylphthalate	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
Fluoranthene	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
Pyrene	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
Butylbenzylphthalate	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
3,3'-Dichlorobenzidine	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
Benzo(a)anthracene	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
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	4.0 U	NA	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	NA	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	NA	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	NA	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	NA	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	NA	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	NA	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	NA	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	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW10S	LW11S	LW13S	LW101S	LW102S	LW103S	Dup of LW103S LW13D	LW104S
Laboratory Identification:	EN00B	EM66C	EN00F	EM75C	EM75B	EM75D	EM75I	EM75A
Date Collected:	6/27/02	6/24/02	6/27/02	6/25/02	6/25/02	6/25/02	6/25/02	6/25/02
2,4-Dinitrotoluene	5 0 U	5 0 U	NA	NA	NA	NA	NA	NA
Diethylphthalate	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.0 U	1 0 U	NA	NA	NA	NA	NA	NA
Fluorene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
4-Nitroaniline	5.0 U	5 0 U	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	15 U	15 U	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	1 0 U	1.0 U	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Pentachlorophenol	5.0 U	4000	NA	NA	NA	NA	NA	NA
Phenanthrene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Carbazole	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Anthracene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Di-n-Butylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Pyrene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	NA	NA	NA	NA	NA	NA
Chrysene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	2 0 U	2 0 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	1 0 U	1 0 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1 0 U	1.0 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	1.0 U	1 0 U	NA	NA	NA	NA	NA	NA

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS						
Sample Identification,	RW1	Dup of RW1 X	OX-1S	OX-2S	OX-3S	OX-4S	PZ-1
Laboratory Identification	EM66B	EM66A	EM65A	EM65B	EM65C	EM65D	EM65E
Date Collected	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02
2,4-Dinitrotoluene	5.0 U	5.0 U	NA	NA	NA	NA	NA
Diethylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.0 U	1.0 U	NA	NA	NA	NA	NA
Fluorene	1.0 U	1.0 U	NA	NA	NA	NA	NA
4-Nitroaniline	5.0 U	5.0 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	15 U	15 U	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	1.0 U	1.0 U	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	1.0 U	1.0 U	NA	NA	NA	NA	NA
Hexachlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Pentachlorophenol	880 J	1100 J	NA	NA	NA	NA	NA
Phenanthrene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Carbazole	1.0 U	1.0 U	NA	NA	NA	NA	NA
Anthracene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Di-n-Butylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA
Fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Pyrene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Butylbenzylphthalate	1.0 U	1.0 U	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	5.0 U	5.0 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.0 U	1.0 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	4.0 U	4.0 U	NA	NA	NA	NA	NA
Chrysene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	2.0 U	2.0 U	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Benzo(a)pyrene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.0 U	1.0 U	NA	NA	NA	NA	NA
Benzo(g,h,r)perylene	1.0 U	1.0 U	NA	NA	NA	NA	NA

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S
Laboratory Identification:	EM75J	EM85B	EM85D	EM75F	EM75G	EM85F	EN00G	EM75E	EM85G
Date Collected.	6/25/02	6/26/02	6/26/02	6/25/02	6/25/02	6/26/02	6/27/02	6/25/02	6/26/02
VOLATILES (µg/L)									
EPA Method SW8260									
Chloromethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	8.3	1.0 U	1.0 U
Bromomethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	6.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Acetone	18	5.0 U	10 M	NA	5.0 U	8.2	120	5.0 U	14 M
Carbon Disulfide	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	15 U	5.0 U	5.0 U	NA	5.0 U	13	58	13	5.9 U
1,1,1-Trichloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Acetate	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	240	1.0 U	1.0 U	NA	1.0 U	1.0 U	4.1	1.0 U	91 J
trans-1,3-Dichloropropene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone (MIBK)	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	520	1.0 U	1.0 U	NA	1.0 U	1.0 U	7.5	1.0 U	1.0 U
Chlorobenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	97	1.0 U	1.1	NA	1.0 U	4.7	68	31	300 J
Styrene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichlorotrifluoroethane	6.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
m,p-Xylene	270	1.0 U	1.0 U	NA	1.0 U	7.3	95	15	44 J
o-Xylene	150	1.0 U	1.0 U	NA	1.0 U	18	180	1.0 U	1.0 U
1,2-Dichlorobenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

BZTO104(e)016464

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification:	LW10S	LW11S	LW13S	LW101S	LW102S	LW103S	Dup of LW103S LW13D	LW104S
Laboratory Identification:	EN00B	EM66C	EN00F	EM75C	EM75B	EM75D	EM75I	EM75A
Date Collected:	6/27/02	6/24/02	6/27/02	6/25/02	6/25/02	6/25/02	6/25/02	6/25/02
VOLATILES (µg/L)								
EPA Method SW8260								
Chloromethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Bromomethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Vinyl Chloride	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Chloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Methylene Chloride	2.0 U	2.0 U	NA	NA	NA	NA	NA	NA
Acetone	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Carbon Disulfide	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Chloroform	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2-Butanone	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Vinyl Acetate	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Trichloroethene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Dibromochloromethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Benzene	1.0 U	12	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Bromoform	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
4-Methyl-2-Pentanone (MIBK)	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
2-Hexanone	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Tetrachloroethene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Toluene	1.0 U	10	NA	NA	NA	NA	NA	NA
Chlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Ethylbenzene	1.0 U	56	NA	NA	NA	NA	NA	NA
Styrene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1,2-Trichlorotrifluoroethane	2.0 U	2.0 U	NA	NA	NA	NA	NA	NA
m,p-Xylene	1.0 U	100	NA	NA	NA	NA	NA	NA
o-Xylene	1.0 U	94	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS						
Sample Identification	RW1	Dup of RW1 X	OX-1S	OX-2S	OX-3S	OX-4S	PZ-1
Laboratory Identification	EM66B	EM66A	EM65A	EM65B	EM65C	EM65D	EM65E
Date Collected	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02
VOLATILES (µg/L)							
EPA Method SW8260							
Chloromethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Bromomethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Vinyl Chloride	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Chloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Methylene Chloride	6.0 U	2.0 U	2.0 U	6.0 U	50 U	50 U	100 U
Acetone	50 U	48 U	19	16	120 U	120 U	250 U
Carbon Disulfide	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1-Dichloroethene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1-Dichloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
trans-1,2-Dichloroethene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
cis-1,2-Dichloroethene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Chloroform	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,2-Dichloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
2-Butanone	15 U	16 J	6.8 U	15 U	120 U	120 U	250 U
1,1,1-Trichloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Carbon Tetrachloride	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Vinyl Acetate	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
Bromodichloromethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,2-Dichloropropane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
cis-1,3-Dichloropropene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Trichloroethene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Dibromochloromethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1,2-Trichloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Benzene	3.0 U	3.0 U	320	3.0 U	66	25 U	50 U
trans-1,3-Dichloropropene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Bromoform	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
4-Methyl-2-Pentanone (MIBK)	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
2-Hexanone	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
Tetrachloroethene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1,2,2-Tetrachloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Toluene	16	14 J	29	6.7	63	71	80
Chlorobenzene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Ethylbenzene	140	120 J	180	43	280	440	470
Styrene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Trichlorofluoromethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1,2-Trichlorotrifluoroethane	6.0 U	2.0 U	2.0 U	6.0 U	50 U	50 U	100 U
m,p-Xylene	310	250 J	740	72	820	1300	1000
o-Xylene	220	190 J	280	79	370	500	710
1,2-Dichlorobenzene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,3-Dichlorobenzene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S
Laboratory Identification	EM75J	EM85B	EM85D	EM75F	EM75G	EM85F	EN00G	EM75E	EM85G
Date Collected	6/25/02	6/26/02	6/26/02	6/25/02	6/25/02	6/26/02	6/27/02	6/25/02	6/26/02
1,4-Dichlorobenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acrolein	150 U	50 U	50 U	NA	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoethane	6.0 U	2.0 U	2.0 U	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Acrylonitrile	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloropropene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromomethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1,2-Tetrachloroethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	9.0 U	3.0 U	3.0 U	NA	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
trans-1,4-Dichloro-2-butene	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	22	1.0 U	1.0 U	NA	1.0 U	24	58	20	67 J
1,2,4-Trimethylbenzene	73	1.2	1.0 U	NA	1.0 U	110	230	6.9	150 J
Hexachlorobutadiene	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylene Dibromide	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,2-Dichloropropane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichloropropane	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	11	1.0 U	6.4	NA	1.0 U	6.8	38	20	260 J
n-Propylbenzene	16	1.0 U	12	NA	1.0 U	14	43	30	250 J
Bromobenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Chlorotoluene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chlorotoluene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	3.1	1.0 U	12 MJ
sec-Butylbenzene	3.0 U	1.0 U	1.0	NA	1.0 U	7.5	16	2.6	40 J
4-Isopropyltoluene	3.0 U	1.0 U	1.0 U	NA	1.0 U	6.6	8.8	1.6	1.0 U
n-Butylbenzene	3.0 U	1.0 U	1.0 U	NA	1.0 U	5.7 U	7.9	2.6 U	20 MJ
1,2,4-Trichlorobenzene	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	24	5.0 U	5.0 U	NA	5.0 U	11	21	14	140
1,2,3-Trichlorobenzene	15 U	5.0 U	5.0 U	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

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TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification.	LW10S	LW11S	LW13S	LW101S	LW102S	LW103S	Dup of LW103S LW13D	LW104S
Laboratory Identification:	EN00B	EM66C	EN00F	EM75C	EM75B	EM75D	EM75I	EM75A
Date Collected.	6/27/02	6/24/02	6/27/02	6/25/02	6/25/02	6/25/02	6/25/02	6/25/02
1,4-Dichlorobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Acrolein	50 U	50 U	NA	NA	NA	NA	NA	NA
Methyl Iodide	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Bromoethane	2.0 U	2.0 U	NA	NA	NA	NA	NA	NA
Acrylonitrile	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Dibromomethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,1,1,2-Tetrachloroethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	3.0 U	3.0 U	NA	NA	NA	NA	NA	NA
trans-1,4-Dichloro-2-butene	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	1.0 U	35	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	1.0 U	150	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Ethylene Dibromide	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Bromochloromethane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
Isopropylbenzene	1.0 U	16	NA	NA	NA	NA	NA	NA
n-Propylbenzene	1.0 U	24	NA	NA	NA	NA	NA	NA
Bromobenzene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
4-Chlorotoluene	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	1.0 U	2.8 J	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	1.0 U	7.4	NA	NA	NA	NA	NA	NA
4-Isopropyltoluene	1.0 U	6.0	NA	NA	NA	NA	NA	NA
n-Butylbenzene	1.0 U	5.0 U	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA
Naphthalene	5.0 U	17	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	5.0 U	5.0 U	NA	NA	NA	NA	NA	NA

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS						
Sample Identification.	RW1	Dup of RW1 X	OX-1S	OX-2S	OX-3S	OX-4S	PZ-1
Laboratory Identification.	EM66B	EM66A	EM65A	EM65B	EM65C	EM65D	EM65E
Date Collected.	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02
1,4-Dichlorobenzene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Acrolein	150 U	50 U	50 U	150 U	1200 U	1200 U	2500 U
Methyl Iodide	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Bromoethane	6.0 U	2.0 U	2.0 U	6.0 U	50 U	50 U	100 U
Acrylonitrile	3.0 U	1.0 U	4.7 U	3.0 U	25 U	25 U	50 U
1,1-Dichloropropene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Dibromomethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,1,1,2-Tetrachloroethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,2-Dibromo-3-chloropropane	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
1,2,3-Trichloropropane	9.0 U	3.0 U	3.0 U	9.0 U	75 U	75 U	150 U
trans-1,4-Dichloro-2-butene	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
1,3,5-Trimethylbenzene	100	100 J	160	46	160	220	290
1,2,4-Trimethylbenzene	370	310 J	460	190	520	590	870
Hexachlorobutadiene	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
Ethylene Dibromide	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Bromochloromethane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
2,2-Dichloropropane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
1,3-Dichloropropane	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
Isopropylbenzene	42	47 J	140	18	57	86	120
n-Propylbenzene	63	64 J	1.0 U	28	83	110	170
Bromobenzene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
2-Chlorotoluene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
4-Chlorotoluene	3.0 U	1.0 U	1.0 U	3.0 U	25 U	25 U	50 U
tert-Butylbenzene	3.0 U	3.0 U	100	3.0 U	25 U	25 U	50 U
sec-Butylbenzene	3.0 U	3.0 U	1.0 U	3.0 U	25 U	25 U	50 U
4-Isopropyltoluene	9.3	8.8 J	29	5.2	25 U	25 U	50 U
n-Butylbenzene	10 U	8.2 U	28 U	5.8 U	25 U	25 U	50 U
1,2,4-Trichlorobenzene	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U
Naphthalene	19	20 J	83	15 U	120 U	120 U	250 U
1,2,3-Trichlorobenzene	15 U	5.0 U	5.0 U	15 U	120 U	120 U	250 U

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS								
Sample Identification:	B1	D	J1	K	LW1S	LW2S	LW4S	LW7S	LW8S
Laboratory Identification:	EM75J	EM85B	EM85D	EM75F	EM75G	EM85F	EN00G	EM75E	EM85G
Date Collected	6/25/02	6/26/02	6/26/02	6/25/02	6/25/02	6/26/02	6/27/02	6/25/02	6/26/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	1.3	NA	NA	NA	NA	2 8	25	0.31	4 0
TPH-Motor Oil Range	0 50 U	NA	NA	NA	NA	NA	NA	NA	0 50 U
TPH-Gasoline Range	7 6	NA	NA	NA	NA	NA	NA	NA	11
PRIORITY POLLUTANT									
METALS (mg/L)									
Arsenic (7060)	0.006	0.013	0.014	0.002	0 010	0 014	0 002	0 017	0 025
Chromium (6010)	0.005 U	0 005 U	0.005 U	0 009	0.005 U	0 005 U	0 005 U	0.005 U	0 005 U
Copper (6010)	0 016	0 002 U	0.002 U	0 010	0.002 U	0 002 U	0 085	0 002 U	0 002 U
Lead (7421)	0 003	0 001 U	0 001 U	0 003	0.001 U	0 001 U	0 001 U	0 002	0.001 U
Nickel (6010)	0 07	0.01 U	0 01 U	0 08	0 01 U	0.01 U	0 03	0.01 U	0.01 U
Zinc (6010)	0 016	0.006 U	0.006 U	0.040	0 006 U	0.012	0 006 U	0 006 U	0.006 U
CONVENTIONALS (mg/L)									
Calcium (6010)	NA	NA	NA	NA	NA	NA	163	NA	NA
Magnesium (6010)	NA	NA	NA	NA	NA	NA	49 6	NA	NA
Potassium (6010)	NA	NA	NA	NA	NA	NA	7.9	NA	NA
Sodium (6010)	NA	NA	NA	NA	NA	NA	15 0	NA	NA
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (EPA 160 1)	330	260	160	NA	200	110	890	260	240
Chloride (EPA 325.2)	6 2	3.3	3 6	NA	2.7	3.3	9 4	3 5	4 4
FIELD PARAMETERS									
pH (avg)	6 50	6 42	6.52	5 83	6.57	6.39	6 23	6 56	6.23
Temperature (° C) (avg)	16 4	13.8	15 4	15.2	16 1	15.2	14 4	15.1	15.3
Conductivity (mS/cm) (avg)	718	452	224	199	370	150	843	408	405
Dissolved oxygen (mg/L) (avg)	4 21	4.39	4 98	4 91	5 34	3 67	5 19	5 27	3.92
Turbidity (NTU)	52	0	0	42	59	5	27	142	18
Redox	NA	NA	NA	NA	NA	NA	NA	NA	NA

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TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS							
Sample Identification	LW10S	LW11S	LW13S	LW101S	LW102S	LW103S	Dup of LW103S LW13D	LW104S
Laboratory Identification	EN00B	EM66C	EN00F	EM75C	EM75B	EM75D	EM75I	EM75A
Date Collected	6/27/02	6/24/02	6/27/02	6/25/02	6/25/02	6/25/02	6/25/02	6/25/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0 25 U	8.0	NA	NA	NA	NA	NA	NA
TPH-Motor Oil Range	NA	0 50 U	NA	NA	NA	NA	NA	NA
TPH-Gasoline Range	NA	9.7	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT								
METALS (mg/L)								
Arsenic (7060)	0 001	0.006	NA	NA	NA	NA	NA	NA
Chromium (6010)	0.007	0.005 U	NA	NA	NA	NA	NA	NA
Copper (6010)	0 012	0.002 U	NA	NA	NA	NA	NA	NA
Lead (7421)	0 001	0 001 U	NA	NA	NA	NA	NA	NA
Nickel (6010)	0.02	0.01 U	NA	NA	NA	NA	NA	NA
Zinc (6010)	0 043	0.006 U	NA	NA	NA	NA	NA	NA
CONVENTIONALS (mg/L)								
Calcium (6010)	26 2	NA	NA	NA	NA	NA	NA	NA
Magnesium (6010)	9 50	NA	NA	NA	NA	NA	NA	NA
Potassium (6010)	3.9	NA	NA	NA	NA	NA	NA	NA
Sodium (6010)	8 31	NA	NA	NA	NA	NA	NA	NA
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids (EPA 160 1)	120	180	NA	NA	NA	NA	NA	NA
Chloride (EPA 325 2)	2.3	2 7	NA	NA	NA	NA	NA	NA
FIELD PARAMETERS								
pH (avg)	6 44	6.14	6.43	5.43	5.24	6 47	6 47	5 43
Temperature (° C) (avg)	14 3	15 6	12 7	13 6	14 5	13 5	13 5	13 8
Conductivity (mS/cm) (avg)	149	205	180	174	91	187	188	123
Dissolved oxygen (mg/L) (avg)	7 22	4 17	7.00	4 62	4.96	5 70	5.74	4.26
Turbidity (NTU)	20	0	2	64	51	41	44	9
Redox	NA	-1091	NA	NA	NA	NA	NA	NA

BZTO104(e)016471

TABLE B-3
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	SHALLOW WELLS						
Sample Identification:	RW1	Dup of RW1 X	OX-1S	OX-2S	OX-3S	OX-4S	PZ-1
Laboratory Identification:	EM66B	EM66A	EM65A	EM65B	EM65C	EM65D	EM65E
Date Collected:	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02	6/24/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)							
Method OR-DEQ							
TPH-Diesel Range	6 8 J	17 J	NA	NA	NA	NA	NA
TPH-Motor Oil Range	0 50 U	0.50 U	NA	NA	NA	NA	NA
TPH-Gasoline Range	13	14	NA	NA	NA	NA	NA
PRIORITY POLLUTANT							
METALS (mg/L)							
Arsenic (7060)	0 006	0.006	0 02	0.01	0 02	0 021	0 005
Chromium (6010)	0.005 U	0 005 U	0.005 U	0 005 U	0 005 U	0.005 U	0 035
Copper (6010)	0 005	0.006	0 002 U	0 002 U	0 002	0.002 U	0 011
Lead (7421)	0 001	0.001 U	0 001 U	0.001 U	0 001 U	0 001 U	0 001
Nickel (6010)	0.01 U	0 01 U	0.01 U	0 01 U	0 01 U	0.01 U	0.04
Zinc (6010)	0 016	0 020	0.009	0 009	0 012	0 008	0.087
CONVENTIONALS (mg/L)							
Calcium (6010)	NA	NA	32 4	33	40 2	37.9	42.3
Magnesium (6010)	NA	NA	8 55	10 7	11	10.4	13.6
Potassium (6010)	NA	NA	3 4	2.7	3 8	3 6	3 3
Sodium (6010)	NA	NA	7.45	6.06	8 75	8 42	5 25
Alkalinity (mg/L CaCO3) (SM 2320)	NA	NA	160	120	160	160	180
Carbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	1.0 U	1 0 U	1.0 U	1.0 U	1 0 U
Bicarbonate (Alkalinity) (mg/L CaCO3) (SM 2320)	NA	NA	160	120	160	160	180
Total Dissolved Solids (EPA 160.1)	1900	2000	240	220	270	250	250
Chloride (EPA 325 2)	8.8	8 0	NA	NA	NA	NA	NA
FIELD PARAMETERS							
pH (avg)	6.16	6.14	5 99	6 15	5 94	6.74	6 02
Temperature (° C) (avg)	15 6	15.6	14.3	15 5	14 4	14 5	15.3
Conductivity (mS/cm) (avg)	803	805	302	249	342	326	278
Dissolved oxygen (mg/L) (avg)	3 86	3 54	3 97	4 10	4 34	4 42	5.09
Turbidity (NTU)	43	40	0	0	0	9	0
Redox	-1106	-1110	-1460	-843	-1480	-1345	-902

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	EM75K	EM85E	EM75L	EM75M	EM85J	EM75H	EM85A	EN00H	EM85I
Date Collected:	6/25/02	6/26/02	6/25/02	6/25/02	6/26/02	6/25/02	6/26/02	6/27/02	6/26/02
CHLORINATED PHENOLS (µg/L)									
EPA Method SW8270SIM									
Pentachlorophenol	0.25 U	0.25 U	NA	NA	0.25 U	0.25 U	0.25 U	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	1.6	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

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TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification.	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	EM85H	EN00C	EM85C	EN00K	EN00L	EN00E	EN00J	EN00I
Date Collected.	6/26/02	6/27/02	6/26/02	6/27/02	6/27/02	6/27/02	6/27/02	6/27/02
CHLORINATED PHENOLS (µg/L)								
EPA Method SW8270SIM								
Pentachlorophenol	0 25 U	0 25 U	0 25 U	1.6	0 25 U	0 25 U	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	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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 W
Laboratory Identification:	EN00D	EN00A
Date Collected:	6/27/02	6/27/02
CHLORINATED PHENOLS (µg/L)		
EPA Method SW8270SIM		
Pentachlorophenol	NA	NA
SEMIVOLATILES (µg/L)		
EPA Method SW8270		
Phenol	2.0 U	5.9 J
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	1.0 U	1.1
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	5.2 J	6.4 J
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	11 J	14 J
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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	EM75K	EM85E	EM75L	EM75M	EM85J	EM75H	EM85A	EN00H	EM85I
Date Collected	6/25/02	6/26/02	6/25/02	6/25/02	6/26/02	6/25/02	6/26/02	6/27/02	6/26/02
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	5.0 U	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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification:	EM85H	EN00C	EM85C	EN00K	EN00L	EN00E	EN00J	EN00I
Date Collected:	6/26/02	6/27/02	6/26/02	6/27/02	6/27/02	6/27/02	6/27/02	6/27/02
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	5.4	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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification	RW2	Dup of RW2 W
Laboratory Identification:	EN00D	EN00A
Date Collected	6/27/02	6/27/02
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	76	75
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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	EM75K	EM85E	EM75L	EM75M	EM85J	EM75H	EM85A	EN00H	EM85I
Date Collected:	6/25/02	6/26/02	6/25/02	6/25/02	6/26/02	6/25/02	6/26/02	6/27/02	6/26/02
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	11	11	7.8	6.4	50	20 U	6.8
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	5.0 U	5.0 U	5.0 U	5.0 U	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	1.0 U	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	1.3	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

BZTO104(e)016479

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification	EM85H	EN00C	EM85C	EN00K	EN00L	EN00E	EN00J	EN00I
Date Collected	6/26/02	6/27/02	6/26/02	6/27/02	6/27/02	6/27/02	6/27/02	6/27/02
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	14	5.0 U	54	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	5.0 U	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

BZTO104(e)016480

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2 W
Laboratory Identification:	EN00D	EN00A
Date Collected.	6/27/02	6/27/02
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	5.1 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	2.3	2.2
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	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U
Ethylbenzene	15	15
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	32	33
o-Xylene	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U

BZTO104(e)016481

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	EM75K	EM85E	EM75L	EM75M	EM85J	EM75H	EM85A	EN00H	EM85I
Date Collected	6/25/02	6/26/02	6/25/02	6/25/02	6/26/02	6/25/02	6/26/02	6/27/02	6/26/02
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
Acrolein	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl Iodide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	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	2.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	5.0 U	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	3.0 U	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	5.0 U	5.0 U	5.0 U
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	1.1	1.0 U
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	9.5	1.0 U
Hexachlorobutadiene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	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	1.0 U	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	1.0 U	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	1.0 U	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	1.0 U	1.0 U	1.0 U
Isopropylbenzene	1.0 U	1.0 U	30	7.3	170	1.0 U	1.0 U	5.0	2.6
n-Propylbenzene	1.0 U	1.0 U	7.3	1.0 U	150	1.0 U	1.0 U	5.1	1.0 U
Bromobenzene	1.0 U	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-Chlorotoluene	1.0 U	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-Chlorotoluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	4.7	1.0 U	1.0 U	1.0 U	1.8
sec-Butylbenzene	1.0 U	1.0 U	5.5	2.2	23	1.0 U	1.0 U	1.7	1.7
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
n-Butylbenzene	1.0 U	1.0 U	1.8	1.0 U	13 M	1.0 U	1.0 U	1.6 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	5.0 U	5.0 U	5.0 U
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
1,2,3-Trichlorobenzene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification:	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification.	EM85H	EN00C	EM85C	EN00K	EN00L	EN00E	EN00J	EN00I
Date Collected:	6/26/02	6/27/02	6/26/02	6/27/02	6/27/02	6/27/02	6/27/02	6/27/02
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	1.0 U	1.0 U	NA	NA	NA
1,2,4-Trimethylbenzene	1.0 U	1.0 U	1.4	4.7	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	1.3	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	1.1	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

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

Sample Identification	DEEP WELLS RW2	Dup of RW2 W
Laboratory Identification:	EN00D	EN00A
Date Collected.	6/27/02	6/27/02
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	21	23
1,2,4-Trimethylbenzene	62	62
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	46	44
n-Propylbenzene	58	57
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	1.6	1.4
sec-Butylbenzene	8.4	8.2
4-Isopropyltoluene	2.1	2.0
n-Butylbenzene	6.5 U	6.1 U
1,2,4-Trichlorobenzene	5.0 U	5.0 U
Naphthalene	8.7	8.5
1,2,3-Trichlorobenzene	5.0 U	5.0 U

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TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS								
Sample Identification:	B2	J2	O	R	G1A	LW1D	LW3D	LW4D	LW6D
Laboratory Identification:	EM75K	EM85E	EM75L	EM75M	EM85J	EM75H	EM85A	EN00H	EM85I
Date Collected:	6/25/02	6/26/02	6/25/02	6/25/02	6/26/02	6/25/02	6/26/02	6/27/02	6/26/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)									
Method OR-DEQ									
TPH-Diesel Range	NA	NA	NA	NA	5 0	NA	NA	2 8	1 6
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)	0.010	0 005	NA	NA	0 037	0 005	0.019	0 027	0 016
Chromium (6010)	0 005 U	0.005 U	NA	NA	0 005 U	0 005 U	0.005 U	0.005 U	0 005 U
Copper (6010)	0 002 U	0.002 U	NA	NA	0 002	0 002 U	0 002	0 003	0.002 U
Lead (7421)	0 001 U	0 001 U	NA	NA	0 001 U	0 005	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	0 006	0.008	0.009	0 006 U
CONVENTIONALS (mg/L)									
Calcium (6010)	NA	NA	NA	NA	NA	NA	NA	65.9	NA
Magnesium (6010)	NA	NA	NA	NA	NA	NA	NA	29.4	NA
Potassium (6010)	NA	NA	NA	NA	NA	NA	NA	1 3	NA
Sodium (6010)	NA	NA	NA	NA	NA	NA	NA	18 2	NA
Total Dissolved Solids (EPA 160 1)	190	290	NA	NA	320	300	310	360	240
Chloride (EPA 325.2)	5.1	4.8	NA	NA	5 1	1 6	3.4	15	2.5
FIELD PARAMETERS									
pH (avg)	7.01	6 58	6 43	6.64	6 48	6.86	6.30	6 65	6 41
Temperature (° C) (avg)	15 3	15.3	17 3	15.2	17.5	16 0	14.4	14.4	16 6
Conductivity (mS/cm) (avg)	272	467	471	591	592	451	629	624	331
Dissolved oxygen (mg/L) (avg)	4.80	3.17	4.16	4.86	2.72	5.36	4.43	4.00	3.07
Turbidity (NTU)	58	41	57	195	65	23	58	53	48

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TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS							
Sample Identification	LW9D	LW10D	LW11D	LW12D1	LW12D2	LW14D	LW17D	LW18D
Laboratory Identification*	*EM85H	EN00C	EM85C	EN00K	EN00L	EN00E	EN00J	EN00I
Date Collected*	6/26/02	6/27/02	6/26/02	6/27/02	6/27/02	6/27/02	6/27/02	6/27/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)								
Method OR-DEQ								
TPH-Diesel Range	0 26	0 25 U	1 1	1 0	NA	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)	0 033	0 031	0 007	0 028	0 018	NA	NA	NA
Chromium (6010)	0 005 U	0 005 U	0 005 U	0 006	0 005 U	NA	NA	NA
Copper (6010)	0 002	0 004	0 003	0 007	0 002 U	NA	NA	NA
Lead (7421)	0 001 U	0 001 U	0 001 U	0 002	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)	0 011	0 010	0 013	0 022	0 006 U	NA	NA	NA
CONVENTIONALS (mg/L)								
Calcium (6010)	NA	19 1	NA	59 3	52 5	NA	NA	NA
Magnesium (6010)	NA	9 37	NA	28 1	23 0	NA	NA	NA
Potassium (6010)	NA	0 7	NA	1 0	3 1	NA	NA	NA
Sodium (6010)	NA	8 77	NA	12 4	21 7	NA	NA	NA
Total Dissolved Solids (EPA 160.1)	220	140	410	300	330	NA	NA	NA
Chloride (EPA 325 2)	3 0	2 1	12	3 8	4 1	NA	NA	NA
FIELD PARAMETERS								
pH (avg)	6 41	6 56	6 56	7 07	6 66	6 64	6 68	6 45
Temperature (° C) (avg)	16 9	14 1	14 9	14 3	14 2	13 9	14 2	15 5
Conductivity (mS/cm) (avg)	310	189	694	410	528	487	196	393
Dissolved oxygen (mg/L) (avg)	3 30	5 59	3 33	4 73	4 25	5 08	4 92	4 42
Turbidity (NTU)	38	38	3	133	2	160	16	15

TABLE B-4
PHASE II REMEDIAL INVESTIGATION
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTERLY SAMPLING EVENT, JUNE 2002
TIME OIL NORTHWEST TERMINAL

	DEEP WELLS	
Sample Identification:	RW2	Dup of RW2
Laboratory Identification:	EN00D	W EN00A
Date Collected:	6/27/02	6/27/02
TOTAL PETROLEUM HYDROCARBONS (mg/L)		
Method OR-DEQ		
TPH-Diesel Range	1.8	1.9
TPH-Motor Oil Range	0.50 U	0 50 U
TPH-Gasoline Range	2.6	2.6
PRIORITY POLLUTANT		
METALS (mg/L)		
Arsenic (7060)	0 019	0 020
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)	0.015 J	0 037 J
CONVENTIONALS (mg/L)		
Calcium (6010)	42.3	43.3
Magnesium (6010)	17.0	17.5
Potassium (6010)	2 3	2 3
Sodium (6010)	12.0	12 3
Total Dissolved Solids (EPA 160 1)	250	270
Chloride (EPA 325 2)	6.1	5 8
FIELD PARAMETERS		
pH (avg)	6 47	6.47
Temperature (° C) (avg)	14.5	14.5
Conductivity (mS/cm) (avg)	450	448
Dissolved oxygen (mg/L) (avg)	4.87	4.72
Turbidity (NTU)	14	12

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TABLE B-5
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.

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Rebekah Brooks, Project Manager, Landau Associates

cc: Tom Roick, Oregon Department of Environmental Quality (DEQ)
Kevin Murphy, Time Oil Co.
Patty Dost, Schwabe, Williamson & Wyatt
Mike Tiskuk, Beazer East, Inc.

FROM: Stacy Pischer and Denise Nieman

DATE: August 8, 2002

RE: SECOND QUARTER 2002 GROUNDWATER MONITORING LABORATORY DATA QUALITY EVALUATION TIME OIL NORTHWEST TERMINAL

This technical memorandum provides the results of a data quality evaluation for 38 groundwater samples and two storm drain water samples collected at the Time Oil Northwest Terminal between June 24 and 27, 2002 for the Phase II remedial investigation (RI) second 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 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 EM66, EM75, EM85, EN00, and EN01. 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 U.S. Environmental Protection Agency (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

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- 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.

CHAIN-OF-CUSTODY RECORDS

Signed chain-of-custody records accompanied each data package except data package EM75. 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 one exception. The third analysis of sample X for VOCs was performed 1 day past the method holding time. All detected VOCs for this sample were qualified as estimates (J). Reporting limits for non-detected VOCs for sample X will be reported from the initial analysis, which was performed within the recommended holding time. Qualification of the reporting limits for the non-detected VOCs is, therefore, not necessary.

SURROGATE SPIKE RECOVERIES

All of the surrogate spike recoveries were within the project-specified and/or laboratory control limits except as indicated in Table 1, and discussed below:

- **Data Package EM66 – VOC analyses.** VOC analyses were performed twice for samples RW-1 and LW-11S and three times for sample X to address quality performance issues or for dilutions. During the second VOC analyses of samples RW-1 and LW-11S, recovery values for surrogate d4-1,2-dichlorobenzene exceeded the laboratory control limit, indicating a potential high bias. During the first analysis of sample X, recovery of surrogate d4-1,2-dichlorobenzene significantly exceeded the laboratory control limit; therefore, a second analysis was performed. The concentrations reported in the second analysis were not similar to those reported in the initial analysis; therefore, a third analysis was performed. During the third analysis, recovery of this surrogate only slightly exceeded the laboratory control limits. Qualification of the VOC data and which results are recommended for use are discussed below for each sample.

  - **Sample RW-1**. For sample RW-1, the most accurate detected concentrations were determined to be those reported in the initial run, which was performed at a dilution.

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Recovery values for all surrogates were within laboratory control limits for this run. However, due to high reporting limits in this run, isopropyltoluene and naphthalene were not detected. The compounds were, however, detected in the second analysis, which was not performed at a dilution. Concentrations for these compounds should be reported from the second analysis. The lower reporting limits for the second analysis (nondiluted) should also be used for those compounds that were not detected. No qualifiers were assigned to the VOC data for RW-1 for the following reasons: 1) recovery values for surrogates in the initial analyses were within control limits, 2) the accuracy of isopropyltoluene and naphthalene results for the second analysis is qualified using surrogates other than d4-1,2-dichlorobenzene, and 3) high surrogate recoveries do not affect nondetects.

- **Sample X.** For sample X the most accurate detected concentrations were determined to be those reported in the third run (see above). Recovery of surrogate d4-1,2-dichlorobenzene only slightly exceeded the laboratory control limit in this run. Although this analysis was performed 1 day past the recommended holding time, an evaluation of the data provided in the first and second runs for this sample and of the data provided in the two analyses performed on the field duplicate (RW-1) indicate that the data reported in the third analysis of sample X is most representative. Therefore, it is recommended that the detected concentrations reported in the third run for sample X be used and qualified as estimates (J) due to holding time exceedance and high surrogate recovery. The lower reporting limits from the initial analysis, however, should be used because these are not affected by the high surrogate recovery.

- **Sample LW-11S.** For sample LW-11S the most accurate detected concentrations were determined to be those reported in the initial run, which was performed at a dilution. Recovery values for all surrogates were within laboratory control limits for this run. However, due to high reporting limits in this run, tert-butylbenzene, 4-isopropyltoluene, and naphthalene were not detected. The compounds were, however, detected in the second analysis, which was not performed at a dilution. Concentrations for these compounds should be reported from the second analysis. Only the concentration for tert-butylbenzene was qualified as an estimate (J) due to a potential high bias indicated by the high recovery of surrogate d4-1,2-dichlorobenzene, as shown in Table 1. The lower reporting limits for the second analysis should also be used for those compounds that were not detected.

- **Data Package EM66 – SVOCs.** All surrogates were diluted out during the dilution analysis of SVOCs for samples X and LW-11S. Because surrogate recoveries during the initial (nondiluted) analysis of these samples were within the laboratory- and/or project-specified control limits, no qualifiers were assigned.

- **Data Package EM-66 – TPH-Dx.** Surrogate o-terphenyl was diluted out during the diluted TPH-Dx analysis of sample X. Because the surrogate recovery during the initial (nondiluted) analysis of this sample was within the laboratory control limit, no qualifiers were assigned.

- **Data Package EM85 – VOC analyses.** During the initial analysis and the diluted reanalysis of sample LW-8S for VOCs, the recovery values for surrogate d4-1,2-dichlorobenzene exceeded the upper laboratory control limit, indicating a potential high bias. All detected benzene-related VOCs reported from the initial analysis and the reanalysis of sample LW-8S were qualified as estimates (J), as indicated in Table 1.

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- **Data Package EN00 – VOC analyses.** During the initial analysis of sample LW-4S for VOCs, the recovery value for surrogate d4-1,2-dichlorobenzene exceeded the upper laboratory control limit, indicating a potential high bias. The sample was reanalyzed using a dilution. All surrogate recovery values were within the laboratory control limits for this run, but the detected concentrations differed from those obtained during the initial run. A third analysis was performed to confirm the results obtained during the second analysis. The results in the third analysis confirmed the results in the second analysis; however, because the third analysis was performed outside the method holding time, it is recommended that the results for the detected VOCs in the second analysis be used. Also, it is recommended that the reporting limits reported in the initial analysis of LW-4S be used for all non-detected VOCs. High surrogate recoveries do not affect reporting limits for the non-detected VOCs; therefore, no qualification of these data is necessary.

- **Data Package EN00 – SVOC analyses.** All surrogates were diluted out during dilution reanalysis of sample LW-4S for SVOCs. Because surrogate recoveries during the initial (nondiluted) analysis of this sample were within laboratory control limits, no qualifiers were assigned.

- **Data Package EN00 – TPH-Dx.** The surrogate, o-terphenyl, was diluted out during dilution reanalysis of sample LW-4S for diesel- and motor oil- range hydrocarbons. Because the surrogate recovery during the initial (nondiluted) analysis of this sample was within the laboratory 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 difference (RPDs) for the MS/MSDs were within the project-specified control limits except as indicated in Table 1 and discussed below:

- Recovery of spiked compound, 4-nitrophenol, in the MS/MSD pair reported in data package EM85 exceeded the upper laboratory control limit, indicating a potential high bias. Because 4-nitrophenol was not detected in the associated project samples, qualification of the data was not necessary.

- Recovery of spiked compounds, phenol and 2-chlorophenol, in the MSD reported in data package EM85 exceeded the upper laboratory control limits. However, because the recovery values for phenol and 2-chlorophenol in the associated MS sample were within the laboratory control limits, no qualifiers were assigned 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 most analyses performed. Recoveries and relative

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percent differences (RPDs) for the laboratory control samples and associated duplicates were within laboratory-specified control limits. No qualification of the data was necessary.

METHOD BLANK RESULTS

Method blanks were analyzed with each batch of samples for each analysis. Contamination was detected in some of the method blanks, as indicated in Table 1, and as discussed below:

- Acetone was detected in the method blank associated with the VOC analyses performed on July 2, 2002. Acetone was detected in some associated project samples at concentrations less than 10 times the method blank concentration. These acetone results were qualified as nondetect (U), as indicated in Table 1.

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 and TPH-G. No VOCs or gasoline-range hydrocarbons were detected in the trip blanks.

LABORATORY DUPLICATE RESULTS

At least one laboratory duplicate sample was analyzed for TDS, sulfate, 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 (RW-1/X, RW-2/W, and LW-103S/LW-13D) 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 all six 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 phenol, naphthalene, pentachlorophenol, and diesel results for the blind field duplicate pair RW-1/X exceeded the project-specified control limits. Phenol, naphthalene, pentachlorophenol, and diesel results for these two samples were qualified as estimates (J).

- The RPD between phenol, naphthalene, 2-methylnaphthalene, and zinc results for blind field duplicate pair RW-2/W exceeded the project-specified control limits. Phenol, naphthalene,

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2-methylnaphthalene, and zinc results for these two samples were qualified as estimates (J/UJ).

REPORTING LIMITS

Method- and/or project-specified quantitation limits were met for all samples.

OVERALL DATA QUALITY AND COMPLETENESS

Data precision was evaluated through laboratory duplicates, field duplicates, matrix spike duplicates, and laboratory control sample 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.

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TABLE 1
SUMMARY OF DATA QUALIFIERS
SECOND QUARTER 2002 EVENT GROUNDWATER SAMPLE RESULTS
ARI DATA PACKAGES EM66, EM75, EM85, EN00, and EN01

Data Package No.	Analyte	Qualifier	Sample Identification	Reason
EM66	Acetone	U	X, RW-1	Method blank contamination
EM66	2-Butanone Toluene Ethylbenzene M,p-Xylene o-Xylene 1,3,5-Trimethylbenzene 1,2,4 Trimethylbenzene Isopropylbenzene n-Propylbenzene 4-Isopropyltoluene Naphthalene	J	X	Holding time exceeded by one day
EM66	tert-Butylbenzene	J	LW-11S	High surrogate recovery
EM66	Phenol Naphthalene Pentachlorophenol	J	RW-1, X	Low precision in field duplicate
EM66	Diesel	J	RW-1, X	Low precision in field duplicate
EM85	Benzene m,p-Xylene 1,3,5-Trimethylbenzene 1,2,4-Trimethylbenzene tert-Butylbenzene sec-Butylbenzene n-Butylbenzene Ethylbenzene Isopropylbenzene n-Propylbenzene	J	LW-8S	High surrogate recovery
EN00	Acetone	U	W, LW-4D	Method blank contamination
EN00	Phenol Naphthalene 2-Methylnaphthalene	J	W, RW-2	Low precision in field duplicate
EN00	Zinc	J	W, RW-2	Low precision in field duplicate
EN01	Acetone	U	SDM-1	Method blank contamination

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.

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LANDAU ASSOCIATES

November 8, 2002

RECD NOV 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 October 2002 monthly report for Time Oil Northwest Terminal RI/FS.

LANDAU ASSOCIATES, INC.

By:

Rebekah Brooks
Project Manager

RB/tam
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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
October 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the September 2002 monthly report to DEQ.

- Completed *in situ* soil excavation of PCP-impacted soil in the former PCP mixing area and collected soil verification samples at the base and sidewalls for each 5-ft lift. 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 the verification samples indicated PCP concentrations exceeded the soil cleanup action level of 5 ppm. Because the verification soil samples results indicated that PCP concentrations were nondetect or less than 2 ppm for the 5- and 10-ft lifts in the extended excavation areas, the soil excavated at approximately 0 to 7 ft below ground surface (BGS) in these areas were segregated from the impacted soil and used as backfill in the excavation area.

- Continued soil removal and transport to the Swan Hills facility. Approximately 3,800 tons of soil was removed from the site in October 2002, for a total of about 7,300 tons removed and transported through the end of October.

- Began backfill in the former PCP mixing area using clean fill from the excavation and imported fill from Angell Quarry in Portland, Oregon. Completed backfill within the former Crosby & Overton tank area and continued backfill on the east property using imported fill.

- Conducted pilot study follow-up groundwater and soil sampling for evaluation of the effectiveness of the *in situ* chemical oxidation (ISCO) technique for groundwater remediation. Began preparation of the ISCO pilot study report.

- Installed manifold piping in the former PCP mixing area excavation for use as injection points for future soil and groundwater remediation activities using ISCO techniques. Provided UIC permit application to Water Quality Division of DEQ for new injection points and received permit from DEQ.

- Installed a permanent stormwater bypass/groundwater intercept system for recovering PCP-impacted groundwater prior to discharge to the Willamette River for treatment by the onsite wastewater treatment system. Groundwater flow into this portion of the storm drain is estimated at about 3 to 3.5 gpm based on flow into the onsite wastewater treatment system.

- Continued implementation of the groundwater interim action in the lower zone at RW-2 in October, at an average flow rate of 1.7 gpm. HRW-1 did not operate during October. RW-2 was brought back online on October 10, after the permanent stormwater bypass/intercept system was installed. A total of approximately 8.33 million gallons of groundwater have been treated and discharged from the interim action, with a total of about 268,000 gallons treated in October 2002. Analytical results from a sample collected from the treatment system effluent on October 3, 2002 indicated a PCP concentration of 8.84 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.

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- Provided DEQ with the laboratory results, data validation reports, and other supporting documentation for the Phase III preliminary evaluation and the Phase II RI supplemental sampling.

- Completed client review of the 2nd quarter 2002 groundwater report and groundwater interim action status report and submitted the 2nd quarter 2002 groundwater interim action status report to DEQ.

- Received and began validation of the 3rd quarter 2002 groundwater results.

- Began preparation of the *East Property Remedial Action Completion Report*.

- Continued preparation of a report documenting the results from the CPT investigation in the Phase III study area.

RESULTS COLLECTED

- Soil verification results from the *in situ* excavation in the former PCP mixing area. The validated results, laboratory reports, and data validation report will be provided to DEQ with the completion report for the stockpile and *in situ* excavation.

- Soil and groundwater results from the ISCO pilot study. The validated results, laboratory reports, and data validation report will be provided to DEQ with the ISCO pilot study report.

- Groundwater treatment system discharge samples collected on October 3, 2002.

PROBLEMS ENCOUNTERED AND STEPS TO RESOLVE

- Soil verification results from the *in situ* excavation within the former PCP mixing area indicate that PCP concentrations greater than 5 ppm will be left in place at about 12 to 15 ft BGS following the completion of soil excavation. Based on preliminary results from the ISCO pilot study, it is anticipated that the ISCO technique will be effective in treating residual soil PCP concentrations within the zone of groundwater fluctuation. Additional information on the effectiveness of ISCO technique will be provided with the ISCO pilot study report.

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 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.

- Submit the 2nd quarter 2002 groundwater monitoring report to DEQ.

- Prepare the 3rd quarter 2002 groundwater monitoring and interim action status report.

- Submit 4th quarter 2002 Self Monitoring Report (SMR) for the wastewater treatment system to the City of Portland.

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- Complete soil transport and disposal to the Swan Hills incineration facility in Alberta, Canada. Conduct a scrape of surface soil below the stockpile area and collect soil verification samples. Continue backfill of excavation within the former PCP mixing area. Complete backfill of excavation on the east property.

- Continue preparation of the ISCO pilot study report.

- Continue to recover groundwater infiltrating to the storm drain.

- Begin preparation of the removal action completion report for the soil stockpile and warehouse demolition/*in situ* soil excavation.

- Continue preparation of the *East Property Remedial Action Completion Report* and submit to client.

- Prepare well abandonment plan for the east property wells.

- Complete preparation of the Phase III CPT investigation technical memorandum and submit to client.

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LANDAU ASSOCIATES

December 10, 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 November 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
November 2002

SUMMARY OF WORK PERFORMED

- Prepared and submitted the October 2002 monthly report to DEQ.

- Completed soil removal and transport to the Swan Hills facility in mid-November. Approximately 2,353 tons of soil were removed from the site in November 2002, for a total of 9,695 tons removed and transported from the former soil stockpile area and *in situ* excavation area for the soil removal actions.

- Following removal of the soil stockpiled in the former stockpile area and the stockpile liner, conducted a scrape of soil (approximately 6 inches below grade) across the entire area, and collected soil confirmation samples for pentachlorophenol (PCP). Conducted excavation of soil (up to about 1.5 ft) in the southeast corner of the stockpile area where the PCP concentrations for the confirmation samples exceeded the cleanup action level and where field observations noted visual soil contamination. Recollected soil confirmation samples in this area.

- Completed installation of manifold piping in the former PCP mixing area excavation for use as injection points for future soil and groundwater remediation activities using *in situ* chemical oxidation (ISCO), bioventing, or other techniques.

- Completed backfill in the former PCP mixing area and soil stockpile area using clean fill from the excavation and imported fill from Angell Quarry in Portland, Oregon. The area was graded so that surface water runoff was diverted away from the former PCP mixing area. All operations related to the soil excavation, removal, and backfilling have been completed and the City of Portland inspector has signed off on all building permits.

- Collected a concrete wipe sample for PCP analysis from the concrete wall bordering the east side of the former stockpile area and removed the wall. The PCP result for the wipe sample was nondetect and the concrete was disposed at a concrete recycler.

- Conducted data validation of soil confirmation sample results from the excavation within the former PCP mixing area.

- Continued preparation of the ISCO pilot study report.

- Continued implementation of the groundwater interim action in the lower zone at RW-2 at an average flow rate of 7.1 gpm. HRW-1 did not operate during November. Continued implementation of the groundwater intercept system at the east-west trending storm drain line, at an average flow rate of 2.4 gpm. A total of approximately 8.73 million gallons of groundwater have been treated and discharged from the interim action system, with a total of about 400,000 gallons treated in November 2002.

- Collected a treated stormwater effluent sample on November 11, 2002. The effluent sample results for oil and grease, copper, lead, and zinc were nondetect.

- 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.

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- Began preparation of as-built drawings for storm drain modifications and the groundwater intercept system.

- Conducted the 4th quarter 2002 groundwater sampling event on November 11-13, 2002. Began processing and evaluating groundwater level data.

- Began preparation of the 3rd quarter 2002 groundwater monitoring and groundwater interim action status report. Beginning with the 3rd quarter 2002 sampling event, the groundwater monitoring report and groundwater interim action status report will be combined into a single deliverable.

- Completed preparation of the draft *East Property Remedial Action Completion Report* and submitted to client for review, including soil removal on the east property and within the former Crosby & Overton tank area.

- Completed backfill of excavation on the east property.

- Completed preparation of a draft technical memorandum documenting the results from the CPT investigation in the Phase III study area and submitted to client for review.

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. 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.

- Receive and begin data validation of 4th quarter 2002 groundwater data.

- Receive final results for the post-injection groundwater sampling, validate the data, incorporate into the ISCO pilot study report, and conduct internal reviews of the 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.

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- Prepare well abandonment plan for the east property wells.
- 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.
- Receive final laboratory results for the soil confirmation samples within the former stockpile area and conduct data validation.

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