SITE CHARACTERIZATION REPORT

INMAN OIL COMPANY
1300 West 12th Street
Vancouver, Washington

Prepared for:

Emerald Petroleum Services
54 south Dawson Street
Seattle, Washington 98134

Prepared by:

Parametrix, Inc.
700 NE Multnomah
Suite 1160
Portland, Oregon 97232

275-3454-003
January 2000

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Emerald Petroleum Services, Inc. (Emerald) recently purchased the Inman Oil Company (Inman) from Tosco Distribution Company (Tosco). The Inman facility, located at 1300 West 12th Street in Vancouver, Washington (Figure 1), conducts used oil collection, treatment, and resale. The facility currently includes two underground storage tanks (USTs), eight aboveground storage tanks (ASTs), a wet oil processing tank, a loading rack and associated piping, and an industrial and storm water handling facility, including two oil/water separators (Figure 2).

Three USTs were originally thought to be present at the site (Figure 2). However, additional information provided by Tosco during the course of the investigation indicated that UST-3 had recently been abandoned (see Section 3.2.1 for a discussion of the abandonment and regulatory status of UST-3). UST-3, located to the north of the office/loading dock, was previously used to store fuel oil to fire a hot oil heater. UST-2 is located near the northwest property corner. It is reportedly a 1,000-gallon concrete basin and was used to collect and temporarily store oily water prior to treatment by the wastewater treatment system. It has been referred to as a "light ends" tank, suggesting that it had been used in the past to store the lighter volatile hydrocarbon fraction recovered during the oil recycling process. UST-2 is not currently in use. UST-1 is a 385-gallon tank currently used to store heating oil for the office furnace. It is located directly south of the office building.

As a part of Emerald's assessment of the environmental conditions at the Inman facility, a review of existing environmental documentation was performed. The review raised several issues regarding UST status and the adequacy of the existing work to meet Ecology requirements. As a result, Emerald retained Parametrix, Inc. (Parametrix) to complete a Site Characterization Study of the Inman facility.

1.2 SUMMARY OF APPLICABLE STANDARDS

To assess whether previously conducted work indicates the presence of chemicals in the environment at the Inman site in concentrations greater than regulatory cleanup standards, existing data were compared to the Washington Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A soil and groundwater cleanup standards. These numerical standards were established for sites such as the Inman Oil facility that are undergoing routine cleanup where relatively few hazardous substances are present. Since used oils were processed at the site and USTs are also present, the Ecology required and recommended analyses for petroleum substances are also applicable (Ecology 1991). The applicable MTCA Method A soil and groundwater cleanup standards for the Inman site are:

Compound	Soil Cleanup Level (mg/kg)	Groundwater Cleanup Level (mg/L)
TPH-g	100	1
TPH-d	200	1
TPH-o	200	1
Total lead	250	5
PCE	500	5
Carcinogenic PAHs	1	Not detected
PCBs	1	Not detected

1.3 SUMMARY OF PREVIOUS INVESTIGATIONS

Two previous investigations have been performed at the site. One soil investigation was performed in September 1997 by Pacific Environmental Group (PEG). The results of that investigation are summarized in a letter report from PEG to Tosco (PEG 1997). Twenty-three soil samples, collected from depths ranging between 2 feet below ground surface (bgs) to 12 feet bgs were analyzed for Total Petroleum Hydrocarbons as gasoline (TPH-g), diesel (TPH-d), and oil (TPH-o), and for the petroleum constituents benzene, toluene, ethylbenzene, and xylenes (BTEX).

The PEG investigation found TPH-d and TPH-o in site soils at concentrations in excess of the Model Toxics Control Act (MTCA) Method A cleanup levels (200 mg/kg for TPH-d and TPH-o). TPH-d and TPH-o were detected at concentrations up to 1,900 mg/kg and 1,650 mg/kg, respectively. With the exception of one location, TPH-d and TPH-o detections above regulatory standards were associated with above ground tanks (B-7 through B-10), USTs (B-4 and B-16), the process area (B-14), and the loading racks (B-12). The exception is located to the east of the loading docks (B1). The PEG investigation did not determine the lateral or vertical extent of TPH in the site soils.

In response to the September 1997 PEG investigation, Tosco entered the site into Ecology's Voluntary Cleanup Program (VCP) in March 1998. The VCP is a fee for service program that offers participants informal advice regarding independent investigations and cleanups. The input from Ecology is in the form of signed opinion letters, including no further action letters, or signed legal agreements. The VCP application is included in Appendix A.

GeoEngineers, Inc. performed a second investigation in June 1998, presumably to follow up on the PEG work. These results are summarized in a report to Tosco (GeoEngineers 1998a). This investigation included an evaluation of both soil and groundwater conditions. Ten soil samples were collected from areas where the previous PEG investigation showed levels of contaminants in excess of Method A cleanup levels (HA-1 through HA-4, MW-1, and MW-2; see Figure 2). These soil samples were collected from greater depths to evaluate the vertical extent of the TPH-d and TPH-o previously detected by PEG. In addition, nine soil samples were collected from the vicinity of a demolished building and storage area (identified through an aerial photograph review), which were formerly located on the southeast side of the property (GEI-1 through GEI-4; see Figure 2). Soil samples were analyzed for TPH-d and TPH-o; two soil samples were also analyzed for TPH-g at the request of Ecology (GeoEngineers 1998a). Three groundwater monitoring wells, each with a twenty-five foot screened interval, were installed and sampled on June 19, 1998. Groundwater samples were analyzed for TPH-g, TPH-d, TPH-o, and for BTEX.

The GeoEngineers investigation found TPH-d and TPH-o at concentrations in excess of the MTCA Method A cleanup level in three soil samples in the vicinity of the loading rack (HA-1, 5'), UST-2 (MW-3, 4'), and the former building (GEI-1, 11'). In the other locations sampled (HA-2 and HA-3), analysis did not detect TPH concentrations greater than MTCA standards. This suggests that the PEG detected contamination associated with the above ground tanks is relatively limited in vertical extent.

Groundwater samples did not contain TPH-g, TPH-d, TPH-o, or BTEX compounds. The groundwater samples were not analyzed for the full list of volatile organic compounds (VOCs) as defined by EPA Method 8240. The GeoEngineers report was forwarded to Ecology on June 3, 1999.

1.4 AREAS OF CONCERN

As a result of the previous investigations at the site, the following areas of concern have been identified: (1) the UST areas; (2) B-1 area and GEI-1/GEI-4 area; and (3) uninvestigated areas.

1.4.1 USTs

USTs were identified as areas of concern because the number, regulatory status, and potential impacts from leaks and/or spills associated with each UST were unknown. Three USTs were identified as being present at the site (Figure 2) during the project scoping process based on available documents (GeoEngineers 1998a). However, one tank (UST 3) was later reported by Tosco as abandoned, although documentation regarding the abandonment was not available for review during the project scoping progress. Data from MW-3 and B-4 also suggest the presence of contaminats in the subsurface from UST-2. Therefore, additional work is required to evaluate the status of the USTs and investigate potential contamination issues associated with the remaining USTs.

1.4.2 Contaminated Soil Area

The B-1 and GEI-1/GEI-4 contaminated soil areas were identified as areas of concern because the lateral and/or vertical extent of previously detected contamination in these areas has not been defined. In the GEI-1 (former building) area, TPH impacts were high enough to warrant additional study because the horizontal and vertical extent of TPH was not determined. Soils from GEI-4 were reported as having an odor which may be due to chemicals not included in the previous investigations. Therefore, additional work is required to identify chemicals and/or define the extent of impacts.

The HA-1 data confirms that TPH is present in the vicinity of the loading racks to a depth of approximately 5 feet bgs. A sample from 7.5 feet bgs detected TPH below cleanup levels. Therefore, additional sampling was not performed in this area at the request of the client.

1.4.3 General Facility Investigation

There are also areas of the site which have not been investigated and based on site use, bear further investigation. Activities designed to evaluate these areas of concern are presented below.

1.5 SCOPE OF WORK

The purpose of the Site Characterization Study at the Inman facility is to enhance our understanding of the potential impacts associated with each area of concern. The study was divided into four tasks to address each area of concern. The tasks are: (1) a review of Ecology UST and administrative files pertaining to the site; (2) a UST investigation; (3) a contaminated soil investigation; and (4) a general facility investigation. The specific objectives and tasks associated with each component are discussed below.

1.5.1 Ecology File Review

The objective of the Ecology file review is to evaluate the status of the USTs at the site and to assess the level of regulatory involvement Ecology has had regarding previous site characterization activities. The file review was conducted at the Ecology Southwest Regional Office in Olympia, Washington. In

addition, the status of the site was discussed with Mr. Craig Rankine of the Vancouver Washington Ecology field office.

1.5.2 UST Investigation

The original objective of the UST investigation was to evaluate the soil and groundwater chemistry in the vicinity of the existing USTs using direct push technology. However, direct push technology (i.e., Geoprobe™ borings) was only able to penetrate to a depth of 16 feet due to the presence of gravels. Thus, the GeoProbe™ was not used for groundwater sample collection. After consultation with the client, only soil chemistry was evaluated using the Geoprobe™. Groundwater quality was evaluated as part of the general facility investigation using hollow stem auger technology. The following tasks were performed as a part of the UST investigation:

- Surveying using a magnetometer to locate the two existing USTs.
- Installing five soil borings to collect soil samples. Two soil borings were installed in the vicinity of UST-1 and three soil borings were installed in the vicinity of UST-2.
- Collecting continuous soil samples at each boring location from the ground surface to the total depth explored.
- Screening soil samples using a photoionization detector (PID) to evaluate the presence of volatile compounds.
- Analyzing six soil samples for TPH, VOCs, and total lead, based on the results of the PID field-screening, visual and olfactory evidence of contamination, and stratigraphic position.

1.5.3 Contaminated Soil Investigation

Previous investigations at the site detected petroleum hydrocarbons in site soils at concentrations above MTCA Method A cleanup levels (see Section 1.3). As a part of this Site Characterization Study, a soil investigation was performed in areas where high levels of contamination had previously been detected. The objective of the contaminated soil investigation was 1) to evaluate the extent of contaminated soil detected at the B-1 and GEI-1/GEI-4 locations (see Figure 2), and 2) to more fully characterize the soil chemistry of areas with documented soil contamination because previous analysis of soil samples was limited to TPH and BTEX. However, Ecology (Ecology 1991) recommends additional parameters for used oil sites. Therefore, analysis of soil samples from previously investigated areas will include an expanded parameters list which includes polynuclear aromatic hydrocarbons (PAHs), polychlorinated byphenols (PCBs), and phenols. The following tasks were included as a part of the contaminated soil investigation:

- Installing ten soil borings at the site to collect soil samples. Three soil borings were installed in the vicinity of B-1 and seven soil borings were installed in the vicinity of GEI-1 and GEI-4.
- Collecting continuous soil samples at each boring location from the ground surface to the total depth explored.
- Screening soil samples using a PID to evaluate the presence of volatile compounds.

- Analyzing ten soil samples for TPH and total lead, based on the results of the PID field-screening, visual and olfactory evidence of contamination, and stratigraphic position.

1.5.4 General Facility Investigation

Previous site investigations did not include several areas where potential petroleum hydrocarbon contamination may be present, based on facility layout and operations. In order to evaluate these areas, a general facility soil and groundwater investigation was performed. The following tasks were included as part of the general facility investigation:

- Installing five soil borings at various locations at the site.
- Collecting continuous soil samples at each soil boring location from the ground surface to the total depth explored.
- Screening soil samples using a PID to evaluate the presence of volatile compounds.
- Analyzing five soil samples for TPH and total lead, based on the results of the PID field-screening, visual and olfactory evidence of contamination, and stratigraphic position.
- Installing three groundwater monitoring wells to evaluate groundwater flow direction and chemistry.
- Collecting groundwater samples from each of the three newly installed groundwater monitoring wells and analyzing samples for TPH, VOCs, and total lead.
- Surveying the top of casing elevations of the three new groundwater monitoring wells to a site specific datum.
- Collecting depth to water measurements in the three newly installed groundwater monitoring wells.
- Collecting a sample of water present in the UST-2 (light ends tank) and analyzing the sample for VOCs.

2.0 FIELD INVESTIGATION METHODS

Soil borings were installed by Cascade Drilling, Inc. of Portland, Oregon, using a GeoProbe drilling rig. Soil samples were collected continuously using a 4-foot coring tube lined with single-use acetate sleeves. After collection, the sleeves were opened and soil was immediately placed in clean sample containers provided by the analytical laboratory and stored on ice. A portion of each sample was placed in a self-sealing plastic bag and field-screened for volatile compounds using a PID. Samples were transported under chain-of-custody procedures to North Creek Analytical Laboratory in Beaverton, Oregon, for analysis.

2.1 UST INVESTIGATION

Five soil borings were installed on September 10, 1999, to a maximum depth of sixteen feet bgs, where probe refusal occurred. Soil borings PMX-16, PMX-17, and PMX-18 were located in the vicinity of UST 2 (light ends tank). Soil borings PMX-19 and PMX-20 were installed in the vicinity of UST-1 (heating oil tank). Boring locations are shown on Figure 2. Six soil samples were selected for chemical analysis for TPH-g, TPH-d, TPH-o and total lead. Samples from the UST-2 area were also analyzed for VOCs. One soil sample was also analyzed for PAHs and PCBs.

2.2 CONTAMINATED SOIL INVESTIGATION

Ten soil borings were installed on September 8 and 9, 1999, to a maximum depth of 16 feet bgs, where Geoprobe™ refusal occurred. Soil borings PMX-3, PMX-4, and PMX-5 were located in the vicinity of B-1; soil borings PMX-1, PMX-2, PMX-6, and PMX-7 were located in the vicinity of GEI-4; soil borings PMX-8, PMX-9, and PMX-10 were located in the vicinity of GEI-1. Boring locations are shown on Figure 2. Fourteen soil samples were selected for chemical analysis for TPH-g, TPH-d, TPH-o and total lead. Three soil samples were also analyzed for PAHs, PCBs, and phenols.

2.3 GENERAL FACILITY INVESTIGATION

Five soil borings were installed on September 10, 1999, to a maximum depth of 16 feet bgs, where Geoprobe™ refusal occurred. Two soil borings were installed to 3 feet bgs using a hand auger. Soil borings PMX-11 through PMX-15 were installed at various locations across the site. Boring locations are shown on Figure 2. Five soil samples were selected for chemical analysis for TPH-g, TPH-d, TPH-o, and total lead. One sample was also analyzed for PAHs, PCBs, and phenols.

Groundwater monitoring wells MW-4, MW-5, and MW-6 were installed by Cascade Drilling, Inc. of Portland, Oregon, on September 20 and 21, 1999, in accordance with WAC 173-160 *Minimum Standards for Construction and Maintenance of Wells*. Monitoring wells were installed to a maximum depth of sixty-five feet bgs using a hollow stem auger drilling rig. New groundwater monitoring wells were developed after installation by surging and pumping until clear water was obtained. Groundwater monitoring well locations are shown on Figure 2; monitoring well logs with well construction details are included in Appendix B.

Soil samples were collected at ten-foot intervals from groundwater monitoring well boreholes. Soil samples were collected using a split-spoon sampler and logged in accordance with the Unified Soil Classification System. After collection, soil samples were immediately placed in clean sample containers provided by the analytical laboratory and stored on ice. A portion of each sample was placed in a self-

sealing plastic bag and field-screened for volatile compounds using a PID. Samples were transported under chain-of-custody procedures to North Creek Analytical Laboratory in Beaverton, Oregon, for analysis. Three soil samples were selected for chemical analysis for TPH-g, TPH-d, and TPH-o.

Groundwater samples were collected from the three new groundwater monitoring wells on September 22, 1999. Depth to groundwater measurements were collected from each new groundwater monitoring well using an electronic water level indicator. Monitoring wells were then purged with a disposable Teflon bailer to remove three well volumes prior to sample collection. Groundwater samples were placed in clean sample containers provided by the analytical laboratory, stored on ice, and transported under chain-of-custody documentation to North Creek Analytical Laboratory in Beaverton, Oregon, for analysis of TPH, total lead and VOCs.

One water sample was collected from inside UST-2 using a disposable Teflon bailer. The water sample was placed in clean sample containers provided by the analytical laboratory, stored on ice, and transported under chain-of-custody documentation to North Creek Analytical Laboratory in Beaverton, Oregon, for analysis of VOCs.

2.4 ANALYTICAL METHODOLOGY

Laboratory analysis was performed on environmental samples using the following methods:

- TPH-g, TPH-d, and TPH-o using Method NWTPH
- Total lead using EPA 6000/7000 series methods
- VOCs using EPA Method 8260B
- Polynuclear Aromatic Hydrocarbons (PAHs) using EPA Method 8270.
- Polychlorinated biphenyls (PCBs) using EPA Method 8082.
- Phenols using EPA Method 8041.

3.0 INVESTIGATION RESULTS

3.1 SITE SETTING

3.1.1 Regional Geologic and Hydrogeologic Conditions

The site is located within a north-south trending structural basin lying between the Coast Range to the west and the Cascade Range to the east. The Columbia River, located approximately 1,500 feet southwest of the site, cuts across both mountain ranges to discharge into the Pacific Ocean. The site lies within the Columbia River floodplain.

The subsurface materials in the site area consist of unconsolidated Pleistocene deposits overlying the Troutdale Formation. These unconsolidated sediments were deposited by catastrophic flooding of the Columbia River (Trimble 1963). Madin (1990) subdivided the flood deposits into three facies: (1) a channel facies; (2) a fine-grained facies; and (3) a coarse-grained facies. The fine- and coarse-grained facies are present along the channel of the Columbia River in southern Clark County (Madin 1990; Swanson et al 1993). Quaternary alluvial deposits consisting predominantly of very poorly consolidated silt and sand overlie the catastrophic flood deposits in the modern Columbia River floodplain.

The coarse-grained flood deposits constitute the most permeable aquifer in the region (Swanson et. al. 1993). These catastrophic flood deposits along with water-bearing alluvial deposits have the hydrogeologic unit designation of unconsolidated sedimentary aquifer (USA). Regional groundwater elevation maps for Clark County (Mundorff 1964, Morgan 1994, Swanson 1995, McFarland 1996) suggest that regional groundwater flow is from the northeast to the southwest (i.e., toward the Columbia River).

3.1.2 Site Geology

The subsurface conditions at the site were evaluated on the basis of the twenty soil borings and three monitoring well boreholes installed at the site, supplemented by information contained in previous investigations (PEG 1997, GeoEngineers 1998a). From the ground surface downward, the following geologic units were encountered:

- Well graded sand – This unit was encountered at all GeoProbe borings and monitoring well locations and has a thickness ranging from 20 feet to 39 feet. This unit consists of fine- to coarse-grained sand and contains a variable amount of silt and gravel. It is dense and dry to moist.

- Poorly graded sand – This unit was encountered at all new and existing groundwater monitoring well locations and soil borings GEI2, GEI-3, and GEI-4 and has a thickness ranging from 9 to 38 feet. This unit consists of fine-grained sand that contains some silt. It is dense and dry to saturated.

- Well graded sand – This unit was encountered at MW-4 only and has a thickness of at least 7 feet. It consists of medium- to coarse-grained, angular, basaltic sand, and contains trace amounts of silt. It is dense and saturated.

These deposits are interpreted to be the fine-grained facies of the catastrophic flood deposits (Madin 1990).

3.1.3 Site Hydrogeology

The site hydrogeology was evaluated on the basis of the monitoring well logs and groundwater level data collected on September 22, 1999, as well as information contained in four quarterly groundwater monitoring reports (GeoEngineers 1998b, 1999a, 1999b, and 1999c).

The uppermost aquifer at the site occurs in well- to poorly-graded sand. These deposits constitute the USA beneath the site. Depth to groundwater is seasonally variable and ranges from 38 and 44 feet bgs. High water table conditions were observed in January 1999, when depth to water was approximately 38 feet bgs. Low water table conditions were observed in September 1998 and September 1999, when depth to water was approximately 44 feet bgs.

Water level measurements were collected from the three new groundwater monitoring wells on September 22, 1999, and are summarized on Table 1. Water level measurements were converted to relative groundwater elevations referenced to a site-specific data. (MW-4 top of casing was assigned an arbitrary elevation of 100.00 feet and the top of casing elevations for MW-5 and MW-6 were referenced to this elevation).

The groundwater elevations beneath the site on September 22, 1999, ranged from 56.44 ft to 56.45 ft (relative to a site specific datum). These elevations suggest a very low gradient across the site. Exact groundwater flow directions cannot be determined under such a low gradient. However, groundwater flow beneath the site will be very slow under such conditions.

Quarterly water level data collected at the site (GeoEngineers 1998b, 1999a, 1999b, and 1999c) confirm the presence of a flat water table. While these data are also insufficient to determine exact groundwater flow direction beneath the site, they do show groundwater generally flowing to the west/northwest. While this groundwater flow direction appears to be inconsistent with a regional groundwater flow to the southwest, toward the Columbia River, the groundwater flow direction beneath the site may be influenced by groundwater pumping at Great Western Malting to the west of the site.

3.2 ECOLOGY FILE REVIEW

3.2.1 UST Status

Two USTs (UST-1 and UST-2) are present on the site. These USTs are exempt from the requirements of Washington Administrative Code (WAC) 173-360, *Underground Storage Tank Regulations*. The UST-1 heating oil tank is exempt under WAC 173-360-110(2)(h): UST systems less than 1,000 gallons used for storing heating oil for consumptive use on premises where stored. UST-2 may be exempt as a stormwater or wastewater collection system, per WAC 173-360-110(2)(l). However, because UST-2 was formerly regulated as a used oil/waste oil tank, it must be abandoned as a regulated UST. It was listed as a used oil/waste oil UST on a 1986 notification form.

UST-3 was located south of the hot oil heater and was used to store diesel fuel that fired the hot oil heater. UST-3 was removed from the site on November 11, 1999. During tank removal, low levels (less than 110 mg/kg) of TPH-o were detected. Additional sampling was conducted at the time of tank removal that confirmed the presence of TPH as oil concentrations below the MTCA Method A cleanup standard.

While some soil sampling was conducted at the time of tank removal, it does not appear that a complete site assessment, as required by Ecology, was performed. However, discussion with Mr. Craig Rankine, Ecology, indicated that UST-3 was not included on the Leaking UST (LUST) database because the detected levels of TPH were below the cleanup standard (personal communication 1999). It is, therefore, unlikely that there are any regulatory concerns regarding UST-3.

3.2.2 Ecology Administrative Actions

The only correspondence from Ecology found in the Ecology files regarding the Inman Oil site was in May 1998 and consisted of Ecology comments regarding GeoEngineers proposal for site characterization activities. According to Mr. Craig Rankine, Ecology, Tosco had not performed any soil cleanup activities at the site (personal communication 1999). In addition, Mr. Rankine indicated that Tosco had not evaluated site soils for a source of the VOCs found in groundwater.

3.3 UST INVESTIGATION

Soil analytical results are summarized on Tables 2 and 3, along with the MTCA Method A soil cleanup standards. Laboratory reports and chain-of-custody documentation are included in Appendix C.

3.3.1 UST-1

Two soil samples collected in the vicinity of UST-1 (PMX-19, 2' and PMX-20, 6') were analyzed for TPH-g, TPH-d, TPH-o, and for total lead. None of the analytes were detected at concentrations exceeding Method A cleanup standards. TPH-g and TPH-o were not detected in either soil sample. TPH-d was detected at 26.0 mg/kg in PMX-19, 2'. This concentration is below the Method A cleanup level of 200 mg/kg for TPH-d. Total lead in PMX-19, 2' was detected at 53.5 mg/kg. This lead level is similar to naturally occurring lead levels in Clark County, Washington, soil (Ecology 1994) and below the cleanup standard for lead in soil (250 mg/kg).

3.3.2 UST-2

Four soil samples collected in the vicinity of UST-2 (PMX-16, 6', PMX-16, 10', PMX-17, 6', and PMX-18, 6') were analyzed for TPH as gasoline, diesel, and oil, total lead, and VOCs. Soil sample PMX-18, 6' was also analyzed for PAHs and PCBs.

In PMX-17, 6' concentrations of TPH-d (2,720 mg/kg), TPH-o (7,630 mg/kg), total lead (378 mg/kg), and one VOC, tetrachloroethene (PCE, 2,430 ug/kg), exceeded MTCA Method A cleanup standards. Concentrations of TPH-d (1,170 mg/kg) and TPH-o (2,300 mg/kg) from soil sample PMX-16, 6' also exceeded the cleanup standards.

Low levels of TPH-g (6.49 to 12.8 mg/kg) and lead (14.3 to 17.7 mg/kg) were also detected in soil samples below the MTCA cleanup levels. One non-carcinogenic PAH, naphthalene, was detected at 41.5 ug/kg in soil sample PMX-18, 6'. This compound was also found in the quality control samples. The laboratory estimated that the amount of naphthalene in sample PMX-18, 6' is 21 ug/kg. There is no Method A cleanup level for non-carcinogenic PAHs. No other PAHs or PCBs were detected in the soil sample PMX-18, 6'.

3.4 CONTAMINATED SOIL INVESTIGATION

Four soil samples collected in the vicinity of B-1 (PMX-3, 2', PMX-3, 10', PMX-4, 12', and PMX-5, 10') were analyzed for TPH-g, TPH-d, TPH-o, and for total lead. Soil sample PMX-3, 2' was also analyzed for PAHs, PCBs, and phenols.

Of the four soil samples analyzed from the vicinity of B-1, TPH-o was detected at a concentration exceeding the MTCA Method A cleanup standard in PMX-3, 2' at 1,560 mg/kg. Low levels of TPH-g (3.97 to 6.28 mg/kg) were also detected in these soil samples. Total lead was detected in PMX-3, 2' at a concentration of 174 mg/kg. This lead concentration is below the cleanup standard of 250 mg/kg, but above naturally occurring lead levels in Clark County, Washington (Ecology 1994). No PAHs, PCBs, or phenols were detected in soil sample PMX-3, 2'.

Ten soil samples collected in the vicinity of GEI-1 and GEI-4 (PMX-1, 4', PMX-2, 7', PMX-6, 14', PMX-7, 10', PMX-8, 5', PMX-8, 12', PMX-9, 2', PMX-9, 12', PMX-10, 9', and PMX-10, 12') were analyzed for TPH-g, TPH-d, TPH-o, and for total lead. Soil samples PMX-1, 4' and PMX-9, 2' were also analyzed for PAHs, PCBs, and phenols.

Of the ten soil samples analyzed from the vicinity of GEI-1 and GEI-4, TPH-o and total lead were detected at concentrations exceeding the MTCA Method A cleanup standard in two samples. TPH-o concentrations of 295 mg/kg and 2,230 mg/kg were detected in soil samples PMX-1, 4' and PMX-9, 2', respectively. Total lead concentrations in these samples were 503 mg/kg and 273 mg/kg, respectively.

Low levels (3.42 to 9.01 mg/kg) of TPH-g were detected in all soil samples analyzed from the vicinity of GEI-1 and GEI-4. TPH-d (89.7 mg/kg) was detected at a concentration below the MTCA Method A cleanup level in one soil sample (PMX-1, 4'). TPH-o was detected in soil sample PMX-10, 12' at a concentration of 66.2 mg/kg. Two carcinogenic PAHs (benzo(b)flouranthene, 70.5 ug/kg, and chrysene, 108 ug/kg); two non-carcinogenic PAHs (flouranthene, 75.3 ug/kg, and pyrene, 102 ug/kg); and one PCB (arochlor 1260, 401 ug/kg) were detected in soil sample PMX-1, 4'. One carcinogenic PAH (chrysene, 71.8 ug/kg); three non-carcinogenic PAHs (naphthalene, 82.8 ug/kg, phenanthrene, 54.2 ug/kg, and pyrene, 59.8 ug/kg); and one PCB (arochlor 1260, 74.0 ug/kg) were detected in soil sample PMX-9, 2'. These concentrations are all below the cleanup standards of 1,000 ug/kg for total carcinogenic PAHs and 1,000 ug/kg for total PCBs; no cleanup standard exists for non-carcinogenic PAHs (see Table 3).

3.5 GENERAL FACILITY INVESTIGATION

3.5.1 Soil Quality

Five soil samples collected across the site in previously uninvestigated areas (PMX-11, 12', PMX-12, 2', PMX-13, 10', PMX-14, 3' and PMX-15, 3') were analyzed for TPH-g, TPH-d, TPH-o, and for total lead. Soil sample PMX-14, 3' was also analyzed for PAHs, PCBs, and phenols.

Of the five soil samples analyzed as a part of the general facility investigation, TPH-d was detected at a concentration exceeding the MTCA Method A cleanup standard in one sample and TPH-o was detected in two soil samples at concentrations exceeding the MTCA Method A cleanup standard. 358 mg/kg TPH-d was detected in soil sample PMX-12, 2'; 806 mg/kg TPH-o was detected in soil sample PMX-12, 2' and 405 mg/kg TPH-o was detected in soil sample PMX-13, 10'. The cleanup standard for TPH-d and TPH-o are each 200 mg/kg.

Low levels (<10 mg/kg) of TPH-g were detected in three of the five soil samples analyzed. Total lead was detected in four of the five soil samples. Total lead levels in soil samples PMX-12, 2' and PMX-13, 10' were similar to naturally occurring levels (<20 mg/kg); lead levels in PMX-14, 3' and PMX-15, 3' (both 154 mg/kg) were elevated with respect to naturally occurring lead levels in Clark County, Washington (Ecology 1994).

Two non-carcinogenic PAHs, naphthalene (43.2 ug/kg) and pyrene (18.7 ug/kg) were detected in soil sample PMX-14, 3'. Naphthalene was also found in the quality control samples. The laboratory estimated that the amount of naphthalene in soil sample PMX-14, 3' is 21 ug/kg. There is no Method A cleanup level for non-carcinogenic PAHs. No carcinogenic PAHs, PCBs, or phenols were detected in the soil sample collected in the vicinity of UST-2.

3.5.2 Groundwater Quality

Groundwater analytical results are summarized on Table 4, along with Method A cleanup standards for groundwater. Laboratory reports and chain-of-custody documentation are included in Appendix C.

3.5.2.1 Quarterly Monitoring Results.

Groundwater quality has been monitored in three site monitoring wells (MW-1, MW-2, and MW-3) on a quarterly basis since September 1998. However, the construction of these groundwater monitoring wells with 25-foot screened intervals make obtaining a representative groundwater quality sample difficult and may cause erroneous results (particularly when trying to detect low levels of dissolved compounds). The results of the quarterly monitoring are discussed in four quarterly reports (GeoEngineers 1998b, 1999a, 1999b, 1999c) and summarized below.

The quarterly monitoring at the site has consisted of groundwater sample collection from monitoring wells MW-1, MW-2, and MW-3 and analysis of the samples for TPH-g, TPH-d, TPH-o, and VOCs. In addition, the first round of sampling included analysis for PCBs, PAHs, semi-volatile organic compounds (SVOCs), and dissolved metals (arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury).

No PCBs, PAHs, or SVOCs were detected in groundwater samples collected in September 1998. Low levels of several dissolved metals were detected, however, none of the detections exceeded the MTCA Method A cleanup standard. Analyses for these compounds were not continued in subsequent sampling rounds.

Three VOCs, tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), and trichloroethene (TCE) were detected in groundwater samples in September 1998. Two of these compounds, PCE and 1,1,1-TCA were detected during each subsequent sampling rounds. The detected levels of these compounds vary and appear to be influenced by the seasonal groundwater elevation fluctuations. High groundwater elevations correspond to the lowest detected contaminant concentrations and low groundwater elevations correspond to the highest detected contaminant concentrations.

The highest levels of PCE and 1,1,1-TCA are consistently detected in MW-3, located in the vicinity of UST-2 ("light ends" tank). PCE concentrations at this location exceeded the MTCA Method A cleanup standard during each sampling round and range from 10.6 ug/l to 49.8 ug/l. 1,1,1-TCA concentrations were below the MTCA Method A cleanup standard and ranged from 1.39 ug/l to 9.30 ug/l. Lower levels of PCE were detected in the MW-1 and MW-2 groundwater samples with the lowest levels consistently detected in MW-1, located approximately 125 feet southeast of UST-2.

3.5.2.2 Groundwater Quality – New Monitoring Wells.

Groundwater samples were collected from the three newly installed monitoring wells (MW-4, MW-5, and MW-6) on September 22, 1999. Groundwater samples were analyzed for TPH-g, TPH-d, TPH-o, VOCs, and total lead.

No TPH or VOCs were detected in the background well, MW-6. TPH-d and TPH-o were detected in MW-4 and MW-5; the MTCA Method A cleanup level for TPH-o was exceeded in MW-4 only. PCE was detected at concentrations exceeding the MTCA Method A cleanup level of 5 ug/L in MW-4 (15.1 ug/L) and MW-5 (23.6 ug/L). 1,1,1-Trichloroethane was detected at levels below the MTCA Method A cleanup level of 200 ug/L in MW-4 and MW-5; trichloroethene was detected at a level below the MTCA Method A cleanup level in MW-5.

Total lead was detected in all groundwater samples at concentrations ranging from 11.7 ug/L in MW-6 to 27.0 ug/L in MW-5. While these levels exceed the MTCA Method A groundwater cleanup standard for lead of 5 ug/L, the concentrations are similar at all well locations, including the background well, suggesting that these are naturally occurring lead levels.

3.5.3 UST-2 Water Quality.

A sample of water contained in UST-2 was collected on September 22, 1999. Due to the limited quantity of water remaining in the tank (~2 inches in the bottom), the water sample was analyzed for VOCs only.

Several VOCs, including BTEX, PCE, and TCE, were detected in the water sample from UST-2 at concentrations up to several thousand ug/L. Because this is a sample of water contained in UST-2, comparison to the cleanup standards is not appropriate.

4.0 EXTENT OF IMPACTS

The site was entered into the VCP by the previous owner (Tosco), however, no soil or groundwater cleanup activities have been performed. While TPH-d and TPH-o are present in site soils at concentrations exceeding the MTCA Method A cleanup levels, it appears that these compounds are, for the most part, limited to the shallow soil. Where this is not the case (B-1, 12', GEI-1, 11'), detected levels of these compounds were found at concentrations as high as 698 mg/kg (B-1, 12') and 2,350 mg/kg (GEI-1, 11'). Alternate soil cleanup levels may be calculated using Ecology's Interim TPH Policy (Ecology 1997). These alternate cleanup levels developed by this method may provide justification for leaving soils in place. If this is the case, Ecology may provide a no further action (NFA) letter for site soils.

4.1 UST INVESTIGATION

UST-1 is an unregulated tank used to store heating oil for consumptive use. Two borings in the vicinity of UST-1 did not reveal significant (i.e. in excess of cleanup levels) soil contamination in this area. There are no outstanding regulatory issues associated with this UST at the time of this investigation. UST-2 is an unregulated tank. It is not currently in use and was most recently used to store process water. It has been used in the past to store used/waste oil. A small quantity of water remains in the bottom of the tank. This water contains VOCs and the release of this water could result in soil and/or groundwater contamination.

Detected concentrations of TPH and PCE in the vicinity of UST-2 suggest that it is a source of these compounds in site soil and groundwater. Concentrations of TPH-d, TPH-o, and PCE were highest in soil samples collected at 6 feet bgs (PMX-16, 6' and PMX-17, 6'), with lower concentrations detected at 10 feet bgs in one sample (PMX-16, 10'). This suggests that the depth of TPH impacts is limited to approximately 10 feet bgs. However, data is not available to evaluate the depth of TPH impacts in the vicinity of PMX-17.

The presence of PCE in the UST-2 tank (UST-2) and in the soil (PMX-17, 6') and groundwater (MW-5) around UST-2 indicate that UST-2 may be the source of the PCE detected in groundwater beneath the site. This conclusion is also supported by the distribution of PCE detected in the groundwater: the highest levels have been detected in the northwest corner of the property, in the vicinity of UST-2, with no PCE detected upgradient (MW-6). PCE has also been detected at the MW-1 location, upgradient of UST-2. It is possible that the flat gradient observed at the site reverses at times due to tidal influences and river stage fluctuations in the nearby Columbia River, causing an irregular pattern of PCE distribution in groundwater.

UST-3 has been removed from the site and does not warrant additional investigation. MW-4 located adjacent to UST-3 detected TPH-o and PCE in concentrations greater than the MTCA standards. The source of the PCE appears to be UST-2. TPH was also detected in MW-5 near UST-2. However, the TPH detected in both MW-4 and MW-5 was flagged by the laboratory as possibly due to biogenic inferences. Therefore, neither UST-2 or UST-3 may be responsible for these TPH detections.

4.2 SOIL CONTAMINATION

Three soil samples analyzed during the contaminated soil investigation contained TPH-o at concentrations exceeding MTCA Method A cleanup level. The detected concentrations ranged from 295 mg/kg (PMX-

1, 4') to 2,230 mg/kg (PMX-9, 2') and were all found in soil samples collected from 2 to 4 feet bgs. The extent of TPH-o found by PEG at B-1, 12 feet bgs, and by GeoEngineers at GEI-1, 11 feet bgs, appears to be limited in extent. It was not detected in PMX-4, 12', PMX-8, 12' or PMX-9, 12'. TPH-o was detected at a concentration of 66.2 mg/kg at PMX-10, 12'.

Two soil samples analyzed during the general facility investigation (PMX-12, 2' and PMX-13, 10') contained TPH-o at concentrations exceeding the MTCA Method A cleanup levels. One of these samples also contained TPH-d at a concentration exceeding the cleanup level. TPH-o concentrations ranged from 405 to 806 mg/kg; the TPH as diesel concentration was 358 mg/kg. The soil sample containing both TPH-d and TPH-o in excess of the cleanup standards was collected from 2 feet bgs (PMX-12, 2') while the soil sample containing 405 mg/kg TPH-d was collected from 10 feet bgs adjacent to an oil-water separator.

While Ecology recommends use of Method A cleanup levels for sites contaminated with TPH, alternate risk-based cleanup levels may be calculated on a site-specific basis in accordance with the Ecology Interim TPH Policy. Generally, these calculated alternate cleanup levels are higher than the levels of TPH detected in site soils (personal communication with Craig Rankine 1999). Calculation of alternate cleanup levels may result in Ecology issuing an NFA letter for site soils (personal communication with Craig Rankine 1999).

4.3 GROUNDWATER CONTAMINATION

The groundwater beneath the site at locations downgradient from UST-2 and various site operations contains TPH-o and PCE at concentrations exceeding MTCA Method A cleanup levels. The highest PCE concentrations are found in the vicinity of UST-2, which contains a small amount of water contaminated with VOCs, including PCE. It appears that UST-2 is a likely source for the PCE in groundwater.

The highest TPH-o concentration is found in the vicinity of UST-3. This UST was previously abandoned and is not on the Ecology Leaking UST (LUST) list (Craig Rankine 1999). It appears likely, however, that this UST is at least one source of the low levels of TPH found in the groundwater.

5.0 CONCLUSIONS

The following conclusions are based on the previously published data and information collected during the course of this investigation:

- Subsurface materials at the site consist of sandy flood deposits.

- Groundwater is present beneath the site under unconfined conditions. The depth to groundwater is approximately 44 feet bgs and is subject to seasonal variability. Groundwater flow is generally to the northwest under a low gradient. Changes in flow direction are possible with seasonal changes in Columbia River stage elevations.

- Two USTs are currently present at the site (UST-1 and UST-2). UST-1 is currently used to store heating oil for the office furnace. UST-2 is not currently in use. It was used most recently to store process waters and has been referred to as the "light-ends" tank. UST-1 and UST-2 may be exempt from the Washington Administrative Code (WAC) UST Regulations. However, because UST-2 was previously used to store used/waste oil, it must be abandoned in accordance with WAC 173-360.

- Investigation of soils in the vicinity of UST-1 (heating oil tank) did not detect TPH concentrations in excess of MTCA Method A cleanup levels.

- Investigation of soils in the vicinity of UST-2 (light ends tank) detected TPH-d, TPH-o, total lead, and PCE concentrations in excess of MTCA Method A cleanup levels. PAHs, PCBs, and phenols were not detected in soils in the vicinity of UST-2. The depth of TPH impacts appears to be limited to approximately 10 feet bgs, as evidenced by soil sample PMX-16, 10'. The depth of PCE impacts in the soil at the PMX-17 location is not known.

- The highest PCE concentrations is groundwater were detected in MW-5 indicating that UST-2 may be the source for PCE and related chlorinated solvents.

- UST-3 was abandoned in 1999. Soil testing did not detect TPH concentrations in excess of MTCA Method A cleanup levels. However, MW-4 detected TPH-o and PCE in concentrations greater than the MTCA standards. The source of the PCE appears to be UST-2. TPH was also detected in MW-5 near UST-2. However, the TPH detected in both MW-4 and MW-5 was flagged by the laboratory as possibly due to biogenic inferences. Therefore, neither UST-2 or UST-3 may be responsible for these TPH detections.

- Investigation of soils in the vicinity of B-1 and GEI-1/GEI-4 detected TPH-o and total lead concentrations in excess of MTCA Method A cleanup levels. With two exceptions, the impacts appear to be limited to 2 to 4 feet bgs, based on soil samples PMX-3, 2', PMX-3, 10', PMX-9, 2, and PMX-9, 12'. The exceptions are based on previous investigations in the B-1 and GEI-1 areas, which detected TPH concentrations as deep as 12 feet bgs. However, analysis of soil samples PMX-4, 12', PMX-9, 12', and PMX-12, 12' did not detect TPH suggesting that the soil contamination at these depths is laterally limited in extent.

- Investigation of soils in previously uninvestigated areas detected TPH-d and TPH-o concentrations in excess of MTCA Method A cleanup levels. TPH-d and TPH-o

concentrations exceeded MTCA Method A cleanup levels in shallow soils at the PMX-12 location. TPH-o concentrations exceeded MTCA Method A cleanup levels in one deeper soil sample, PMX-13, 10', collected near an oil-water separator. Data are not available to evaluate the lateral and vertical extent of TPH at these locations.

- The data from PMX-13 ,10' suggests that the oil-water separator may be a source of subsurface contamination.

- Investigation of groundwater at the site detected concentrations of TPH-o, total lead, and PCE in excess of MTCA Method A cleanup levels. The extent of the groundwater impacts is unknown. It appears that the source of the TPH and PCE may be located on site because the up-gradient monitoring well, MW-6, did not detect these compounds. However, they were detected in down-gradient groundwater monitoring wells MW-4 and MW-5

- Total lead detections appear to represent naturally occurring lead levels in groundwater, based on the similarity between concentrations detected down-gradient (15.5 ug/L in MW-4 and 27.0 ug/L in MW-5) and up-gradient (11.7 ug/L in MW-6).

- Soil impacts in the process area (B-14 and HA-4) and above ground tanks (B-7 through B-10 and HA-2 and HA-3) appear to be limited in vertical extent. Laterally, the impacts appear to be limited to the vicinity of the tank farm.

6.0 RECOMMENDATIONS

Based on the results of this investigation, the following actions are recommended:

- UST-2 appears to be a source of chlorinated solvents in the subsurface environment. Therefore, we recommend abandoning UST-2 in accordance with Ecology guidelines, including site assessment sampling and reporting.

- Some of the detected TPH soil concentrations that exceeded MTCA Method A cleanup levels are associated with specific areas of the site (i.e., the tank farm, UST-2, the process area, and the loading ranks). Other areas of TPH impacts do not appear to be associated with any current activity (B-1, B-16, GEI-1 PMX-1, PMX-3 and PMX-9). TPH concentrations exceeding cleanup standards ranged from 295 mg/kg to 7,630 mg/kg. These TPH concentrations may not exceed an alternate cleanup level calculated using Ecology's Interim TPH Policy. Therefore, we recommend that alternate cleanup levels for TPH in site soils be calculated prior to making any decision regarding remediation of the site.

- The oil-water separator near UST-2 appears to be a source of subsurface contamination. If continued use of the separator is required, the integrity of the separator should be investigated and repaired, if possible. Otherwise, we recommend replacement of the separator.

- Petition Ecology for an NFA letter for site soils, if compliance with alternate cleanup levels is demonstrated.

7.0 REFERENCES

Ecology 1991. Guidance for Site Checks and Site Assessments for Underground Storage Tanks. Department of Ecology Underground Storage Tank Program. February, 1991.

Ecology 1994. Natural Background Soil Metals Concentrations in Washington State. Washington Department of Ecology Publication 94-115. October 1994.

Ecology 1997. Interim Interpretive and Policy Statement, Cleanup of Total Petroleum Hydrocarbons (TPH). Ecology Publication No. ECY97-600. January 1997.

GeoEngineers, Inc. 1998a. Site Characterization Activities, Inman Oil Company Facility, Vancouver, Washington, File No. 4823-022-00 prepared by GeoEngineers, Inc. August 17, 1998.

GeoEngineers, Inc. 1998b. Results of Groundwater Sampling, September 1998, Inman Oil Company Facility, Vancouver, Washington prepared by GeoEngineers, Inc. November 13, 1998.

GeoEngineers, Inc. 1999a. Results of Groundwater Sampling, January 1999, Inman Oil Company Facility, Vancouver, Washington prepared by GeoEngineers, Inc. March 18, 1999.

GeoEngineers, Inc. 1998b. Results of Groundwater Sampling, April 1999, Inman Oil Company Facility, Vancouver, Washington prepared by GeoEngineers, Inc. May 25, 1999.

GeoEngineers, Inc. 1998b. Results of Groundwater Sampling, July 1999, Inman Oil Company Facility, Vancouver, Washington prepared by GeoEngineers, Inc. August 6, 1999.

Madin, I. P. 1990. Earthquake hazard geology maps of the Portland Metropolitan area, Oregon: Text and map explanation, Oregon Department of Geology and Mineral Industries. Open File Report 0-90-2.

McFarland W. D, and David S. Morgan. 1996. Description of the Groundwater Flow System in the Portland Basin, Oregon and Washington US Geological Survey Water Supply Paper 2470A. 1996.

Morgan 1994. Simulation analysis of the groundwater flow system in the Portland Basin, Oregon and Washington: US Geological Survey Open File Report 94-505.

Mundorff, M. J. 1963. Geology and Groundwater Resources of Clark County, Washington, with a description of a Major Alluvial Aquifer along the Columbia River. US Geological Survey Paper 1600, Washington, D.C. 1963.

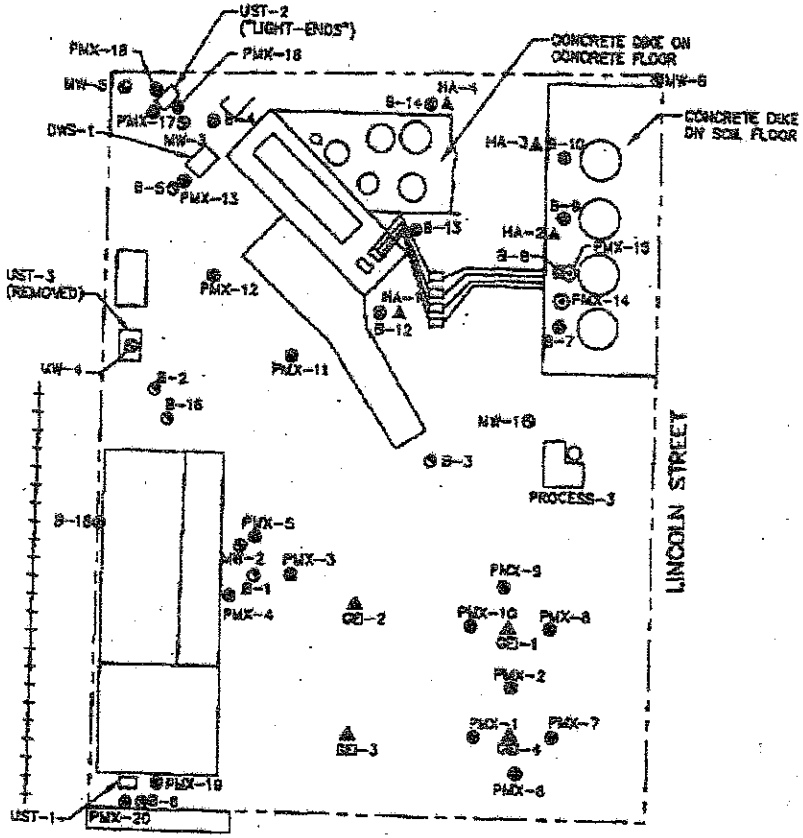
Pacific Environmental Group. 1997. Soil Investigation, Inman Oil Company Facility, 1300 West 12th Street, Vancouver, Washington prepared by Pacific Environmental Group, November 7, 1997.

Rankine, Craig. 1999. Personal communication of October 1999. Hydrogeologist, Washington State Department of Ecology, Vancouver, Washington.

Swanson, R.D. 1993. A description of hydrogeologic units in the Portland Basin, Oregon and Washington. US Geological Survey Water Resources Investigation Report 90-4196. Portland, Oregon.

Swanson, R. D. 1995. Southwest Clark County Generalized Water Table Altitude and Depth to Groundwater Mapping, Clark County Water Quality Division, September 1995.

Trimble, 1963. Geology of Portland, Oregon and adjacent areas: US Geological Survey Bulletin 1119.



EXPLANATION:

MW-1	⊕	MONITORING WELL LOCATION
PMX-12	◉	GEOPROBE LOCATION (BY PARAMETRIX)
PMX-14	⊙	HAND AUGER BORING LOCATION (BY PARAMETRIX)
HA-1	▲	HAND AUGER BORINGS (BY OTHERS)
GEI-1	▲	HOLLOW-STEM AUGER BORINGS (BY OTHERS)
B-4	⊕	EXISTING HAND AUGER LOCATION (BY OTHERS)
B-1	◔	EXISTING GEOPROBE LOCATION (BY OTHERS)
———		PROPERTY LINE

NOTE:
The locations of all features shown are approximate.

REFERENCE:
Drawing entitled "Tosco Corporation, Inmon Oil Company Facility, 1300 West 12th Street, Vancouver, Washington, provided by Pacific environmental Group, Inc.

0 15' 30'
SCALE IN FEET

Figure 2
Site Plan With Geoprobe and Groundwater Monitoring Well Locations

Table 1. Water Level Data
Inman Oil Company Site Characterization Report
Emerald Petroleum Services

Well ID	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW-4	100.00	43.55	56.45
MW-5	100.67	44.23	56.44
MW-6	114.39	57.95	56.44

All elevations are referenced to a site specific datum: top of MW-4 casing = 100.00 ft

Table 2. Soil Analytical Data - Required Analyses
Inman Oil Company Site Characterization Report
Emerald Petroleum Services

Sample ID	Sample Depth (ft bgs)	PID Reading (instrument units)	Total Petroleum Hydrocarbons			Total Lead (mg/kg)	Volatile Organics Compounds (VOCs)
			Gasoline (mg/kg)	Diesel (mg/kg)	Oil (mg/kg)		Tetrachloroethene (ug/kg)
Contaminated Soil Investigation							
PMX-1 4'	4	13.9	**7.15**	**89.7***	**295**	**503**	NA
PMX-2 7'	7	0	**5.27**	<25	<50	<10	NA
PMX-3 2'	2	621	**6.28**	<250	**1560**	**174**	NA
PMX-3 10'	10	42.3	**4.06**	<25	<50	<10	NA
PMX-4 12'	12	0	**4.57**	<25	<50	<10	NA
PMX-5 10'	10	0	**3.97**	<25	<50	<10	NA
PMX-6 14'	14	0	**3.42**	<25	<50	<10	NA
PMX-7 10'	10	2.7	**3.81**	<25	<50	<10	NA
PMX-8 5'	5	5.2	**3.99**	<25	<50	<10	NA
PMX-8 12'	12	3.6	**4.24**	<25	<50	<10	NA
PMX-9 2'	2	3.1	**9.01**	<250	**2230**	**273**	NA
PMX-9 12'	12	3.9	**3.90**	<25	<50	<10	NA
PMX-10 9'	9	2.6	**3.54**	<25	<50	<10	NA
PMX-10 12'	12	<1	**4.20**	<25	**66.2**	**11.0**	NA
General Facility Investigation							
PMX-11 12'	12	5.9	**4.55**	<25	<50	<10	NA
PMX-12 2'	2	0	**6.86**	**358***	**806**	**17.4**	NA
PMX-13 10'	10	0	**7.23**	**147***	**405**	**19.3**	NA
PMX-14 3'	3	NM	<2.50	**37.8***	<50	**154**	NA
PMX-15 3'	3	NM	<2.50	<25	<50	**154**	NA

Table 2. Soil Analytical Data - Required Analyses
Inman Oil Company Site Characterization Report
Emerald Petroleum Services

Sample ID	Sample Depth (ft bgs)	PID Reading (instrument units)	Total Petroleum Hydrocarbons			Total Lead (mg/kg)	Volatile Organics Compounds (VOCs)
			Gasoline (mg/kg)	Diesel (mg/kg)	Oil (mg/kg)		Tetrachloroethene (ug/kg)
UST Investigation							
PMX-16 6'	6	16	**6.49**	**1170***	**2300**	**17.3**	**107**
PMX-16 10'	10	NM	<2.50	**52.5***	**109**	**14.3**	<100
PMX -17 6'	6	39.4	**12.8**	**2720***	**7630**	**378**	**2430**
PMX -18 6'	6	115	<2.50	**41.1***	**97.3**	**17.7**	<100
PMX-19 2'	2	501	<2.50	**26.0**	<50	**53.5**	NA
PMX-20 6'	6	15.1	<2.50	<25	<50	<10	NA
Groundwater Investigation							
MW-4 15'	15	NM	<2.50	**48.0**	<50	NA	NA
MW-5 15'	15	NM	<2.50	<25	<50	NA	NA
MW-6 15'	15	NM	<2.50	<25	<50	NA	NA
MTCA Method A Cleanup Level			100	200	200	250	500

Notes:
Only detected VOCs included on table
[ ] = exceeds MTCA Method A Cleanup Standard
NA = not analyzed
* = detected hydrocarbons appear to be due to overlap of heavy oil as well as weathered deisel

Table 3. Soil Analytical Data - Recommended Analyses
Inman Oil Company Site Characterization Report
Emerald Petroleum Services

Sample ID	Sample Depth (ft bgs)	PID Reading (instrument units)	Polynuclear Aromatic Hydrocarbons (PAHs)						Polychlorinated Biphenyls (PCBs)	
			Carcinogenic		Non-carcinogenic					
			Benzo(b)-flouranthene (ug/kg)	Chrysene (ug/kg)	Flouranthene (ug/kg)	Naphthalene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)	Arochlor 1260 (ug/kg)	Phenols (mg/kg)
PMX-1 4'	4	13.9	**70.5**	**108**	**75.3**	<67.0	<67.0	**102**	**401**	<10.0
PMX-3 2'	2	621	<67.0	<67.0	<67.0	<67.0	<67.0	<67.0	<67.0	<40.0
PMX-9 2'	2	3.1	<67.0	**71.8**	<26.8	**82.8 (B)***	**54.2**	**59.8**	**74.0**	<25.0
PMX-14 3'	3	NM	<13.4	<13.4	<13.4	**43.2 (B)****	<13.4	**18.7**	<67.0	<1.0
PMX-18 6'	6	115	<13.4	<13.4	<13.4	**41.5 (B)****	<13.4	<13.4	<67.0	NA
MTCA Method A Cleanup Level			1000***	1000***					1000****	–

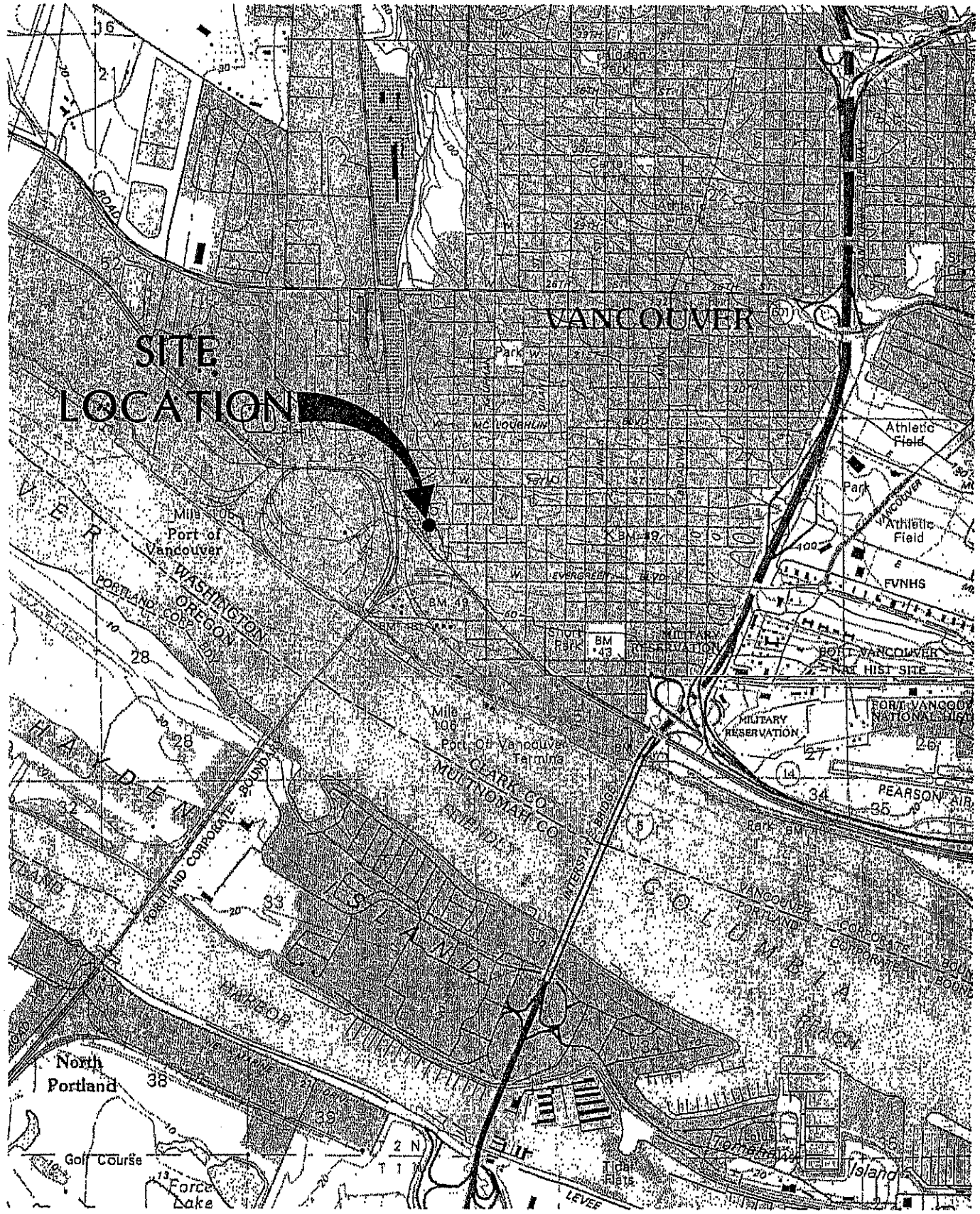
Notes:
Only detected PAHs, PCBs, and phenols included on table
[ ] = exceeds MTCA Method A Cleanup Standard
(B) = compound detected in blank
* = compound detected in blank; lab estimates 43 ug/kg present in sample
** = compound detected in blank; lab estimates 21 ug/kg present in sample
*** = total for all carcinogenic PAHs
**** = for PCB mixtures
NA = not analyzed

Table 4. Groundeater Analytical Data
Inman Oil Company Site Characterization Report
Emerald Petroleum Services

Analyte	MW-4 9/22/99	MW-5 9/22/99	MW-6 9/22/99	UST-2 9/22/99	MTCA Method A Cleanup Standard
Total Petroleum Hydrocarbons (mg/L)					1
Gasoline (ug/L)	<80	<80	<80	NA	
Diesel (mg/L)	**0.995***	**0.432***	<0,250	NA	
Oil (mg/L)	**1.75***	**0.632***	<0.500	NA	
Total Lead (ug/L)	**15.5**	**27.0**	**11.7**	NA	5
Volatile Organic Compounds					
Benzene (ug/L)	<1.0	<1.0	<1.0	**114**	5
n-Butylbenzene (ug/L)	<1.0	<1.0	<1.0	**147**	
sec-Butylbenzene (ug/L)	<1.0	<1.0	<1.0	**92.0**	
tert-Butylbenzene (ug/L)	<1.0	<1.0	<1.0	**70.0**	
1,2-Dichlorobenzene (ug/L	<1.0	<1.0	<1.0	**91.5**	
Ethylbenzene (ug/L)	<1.0	<1.0	<1.0	**778**	30
Isopropylbenzene (ug/L)	<1.0	<1.0	<1.0	**134**	
Naphthalene (ug/L)	<1.0	<1.0	<1.0	**1050**	
n-Propylbenzene (ug/L)	<1.0	<1.0	<1.0	**316**	
Tetrachloroethene (ug/L)	**15.1**	**23.6**	<1.0	**725**	5
Toluene (ug/L)	<1.0	<1.0	<1.0	**3940**	40
1,1,1-Trichloroethane (ug/	**2.01**	**3.67**	<1.0	**287**	200
Trichloroethene (ug/L)	<1.0	**2.53**	<1.0	**<50**	5
1,2,4-Trimethylbenzene (u	<1.0	<1.0	<1.0	**4290**	
1,3,5-Trimethylbenzene (u	<1.0	<1.0	<1.0	**1240**	
0-Xylene (ug/L)	<1.0	<1.0	<1.0	**5450**	20
m,p-Xylene (ug/L)	<2.0	<2.0	<2.0	**12100**	20

Notes:
Only detected VOCs included on table
[ ] = exceeds MTCA Method A Cleanup Standard
NA = not analyzed
* Detected compounds may be due to oil, but also include non-petroleum peaks that suggest the presence of biogenic interferences

FIGURES



FILE: 345403F02
DATE: 10/21/99

0 1000' 2000'
SCALE IN FEET

N

SOURCES:
USGS 7 1/2 MINUTE
QUADRANGLE MAP,
VANCOUVER, WASHINGTON
PORTLAND, OREGON

Figure 1
Site Location Map
INMAN OIL COMPANY
SITE CHARACTERIZATION STUDY
VANCOUVER, WASHINGTON

APPENDIX A

VCP APPLICATION

TOSCO

Tosco Distribution Company
A Division of Tosco Corporation
Portland Terminal
5528 Northwest Doane Avenue
Portland, Oregon 97210
P.O. Box 76
Portland, Oregon 97207

March 6, 1998

Mr. Chuck Kline
Washington Department of Ecology
Southwest Region
PO Box 477775
Olympia, WA 98504-7775

Re: Inman Oil Facility Voluntary Cleanup Program

Dear Mr. Kline:

In response to my recent conversation with Dave Smith of Ecology, Tosco is requesting assistance from Ecology on subsurface spill assessment and, if necessary, remediation activities to be conducted at our used oil recycling and blending facility in Vancouver, Washington (aka Inman Oil). As required by Ecology, I have enclosed a check for $500 and a completed Voluntary Cleanup Program (VCP) form to enter into the VCP and pay for Ecology's initial review costs.

I have also enclosed a proposed work plan from our consultant, Geo Engineers, to conduct additional assessment activities at the Inman Oil site. We would appreciate receiving your input on the work plan at your earliest convenience as we are ready to proceed with the next phase of work.

If you have any questions or require additional information, please feel free to contact me at (503) 248-1517.

Sincerely,

Martin Cramer
Project Manager, Remediation

File: Remediation/Inman/VCPltr

Enclosures